US Army Corps of Engineers®
Honolulu District

Appendix A-1: Engineering

East Hagatna, Guam
CAP Section 14 Emergency Shoreline Protection

Draft Integrated Feasibility Report and Environmental Assessment

July 2023

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1. General

The following describes the technical assessment completed as part of the U.S. Army Corps of Engineers (USACE) Continuing Authorities Program Section 14 East Hagåtña Emergency Shoreline Protection Study in Hagåtña, Guam. The purpose of the study is to conduct a feasibility level evaluation of the existing coastal/hydraulic conditions including extreme water levels, wave climate evaluation, and sea level change that affect the study area, and evaluation of the proposed shoreline stabilization alternatives to determine the recommended plan.

1.1. Previous Reports

Previous Federal reports, listed below, have assessed various conditions within the region and are referenced within this document as needed.

- **Draft East Agana, Territory of Guam, Detailed Project Report and Environmental Assessment**, U.S. Army Corps of Engineers, Honolulu Engineer District, July 1993 (terminated at Sponsor's request). The report identified a federal interest in shore protection measures along two reaches of the East Agana shoreline. The benefit- to-cost ratio for five alternatives evaluated ranged from 1.7 to 1.9.
- **East Agana, Territory Guam, Shore Protection Study, Reconnaissance Report**, U.S. Army Corps of Engineers, Honolulu Engineer District, April 1990. The reconnaissance level report is the predecessor to this feasibility phase investigation. It identified the coastal flooding problem in East Agana and identified a potential solution to the problem.
- **Agana Bayfront Storm Surge Protection Study, Territory of Guam (Draft Feasibility Report and Environmental Impact Statement)**, U.S. Army Corps of Engineers, Honolulu Engineer District, December 1988. This feasibility level report identified the coastal flooding problems and needs of the low-lying areas of Agana Bay. Various measures available to reduce coastal flood damages caused by storm surge and their environmental consequences were investigated.
- **Typhoon Stage-Frequency Analysis for Agana Bay, Guam (Draft Technical Report)**, U.S. Army Corps of Engineers, Coastal Engineering Research Center, Waterways Experiment Station, July 1987. The purpose of the study was to determine the frequency of flood levels along the shoreline of Agana Bay that are caused by the combined effects of astronomical tides and typhoon-induced water levels. The results of this study have been incorporated into the analyses contained in this report.
- **Guam Comprehensive Study - Agana Bay Typhoon and Storm-Surge Protection Study (Technical Documentation),** U.S. Army Corps of Engineers, Pacific Ocean Division, January 1984. This was the first report to attempt identification of the problems and needs for coastal flooding in the Agana Bay area. Due to the lack of data, the documentation did not include typhoon stage-frequency analyses.

Flood Insurance Study, Territory of Guam, U.S. Army Corps of Engineers, Pacific Ocean Division, September 1983. The study was completed by the U.S. Corps of Engineers for the Federal Emergency Management Agency (FEMA) under the authorities of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The flood insurance study investigated the existence and severity of flood hazards on the island of Guam. The study also developed flood risk data for various areas of the community that have been used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound flood plain management. A section of the report covered the problems of coastal flooding and documented several accounts of damages by wind generated waves.

- **Guam Comprehensive Study - Stage 1 Report**, U.S. Army Corps of Engineers, Honolulu Engineer District, August 1979. The reconnaissance level (Stage 1) report identified the water resource problems and needs for the Territory of Guam. The Guam Comprehensive Study was the parent study for the Agana Bayfront feasibility study. The Stage 1 report included problem identification, planning objectives, potential management and nonstructural measures, and potentially significant impact for regional harbors, water supply, flood plain management, and shore protection and beach restoration.
- **Shoreline Investigations, Agana, Guam**, U.S. Army Corps of Engineers, Honolulu Engineer District, September 1981. This report described existing shoreline features, structures, and conditions and showed the boundaries of storm surge and storm wave flooding at Agana Bay.

1.2. Problem Description

- The low-lying coastline of East Hagåtña is subject to infrequent but severe storm wave attack. The much higher than usual wave heights reaching the shoreline during severe storm events in combination with a limited sediment supply, have caused erosion to the beach and resulted in undermining of the existing seawall. This continual damage to the existing shore protection structure has put Marine Corps Drive and public utilities in the immediate vicinity of the project area at imminent risk. Future sea level rise will continue to exacerbate this condition and cause erosion and the resulting damage to accelerate. Due to the observed ongoing shoreline erosion along Marine Corps Drive, replacement shore protection alternatives will be explored within this feasibility study.

2. Existing Site Conditions

The following is a general description of the existing conditions of the project area, as known at the time of this study, which are utilized in developing the proposed alternatives for the site.

2.1. Study Area

The Mariana Islands are a north-south archipelago arc chain consisting of 15 relatively small islands with the total landmass of approximately 400 square miles of which 215 square miles comprise the island of Guam. Guam is the largest and southernmost island of the Mariana Islands. Located 3,950 miles west of Hawaii, Guam is the westernmost point of the United States. The island is approximately 30 miles long, 4 to 12 miles wide, with 110 miles of shoreline. Hagåtña Bay is centrally located on the west coast of the island of Guam. The project area is within Hagåtña Bay between the villages of Asan and Tamuning and spans approximately 2100 ft. long, shown in Figure 1.

Figure 1: Project Area Map

The project area is fronted by an extensive fringing reef. The reef is approximately 0.5 miles wide, with maximum water depths of less than 6 feet. The reef is continuous for most of its length within Hagåtña Bay, and is highly effective at dissipating most wave energy from reaching the beach during periods of typical water levels and wave heights. Due to the curved shape of the bay and rocky headlands on either end, the shoreline within this area is also sheltered from the prevailing wind and wave energy from the northeast to southwest. Just to the west of the project area is Agana Small Boat Harbor, a federally authorized and maintained harbor. Also located near the center of the project area is the US Veterans of Guam Pavilions Park. The park protrudes oceanward from the coastline. The beach within the project area is narrow, ranging from approximately 0 ft to 50 ft wide, with a mean width of 20 ft wide. The beach does not appear stable and shows evidence of past erosion, particularly around the public park. This erosion is thought to be caused by a combination of chronic erosion with storm induced elevated water levels and wave energy.

An existing seawall runs the length of the project area. This wall's foundation was built approximately at or below the shoreline elevation at the time of construction (1990's), and was not placed on hard substrate or constructed footings. Since construction, erosion of the sandy shoreline underneath the wall has resulted in many sections being critically undermined, thus degrading the overall stability and functionality of the wall. Loss of foundation material has caused sinkholes to form in the area landward of the wall, which have often been filled with grout to avoid a continual safety hazard. Due to the continued exposure of the beach to elevated water levels and wave energy, this structure will continue to be susceptible to further undermining and eventual failure.

Figure 2 to Figure 4 present a sample of the general conditions of the existing seawall.

Figure 2. Sinkhole along landward side of wall in backfill

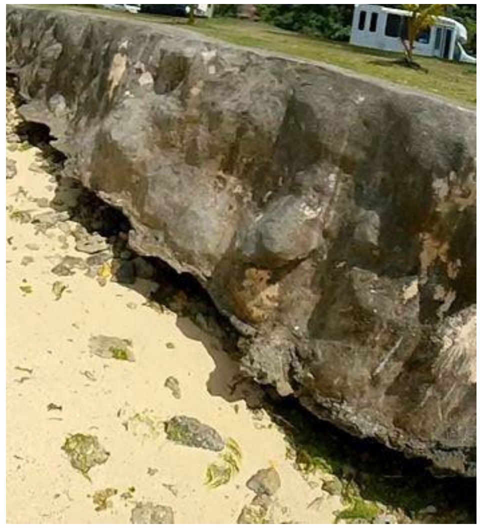

Figure 3. Eastern section of the wall undermined due to erosion

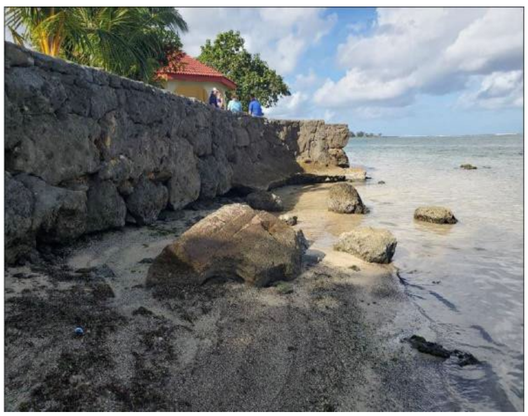

Figure 4. Undermining of the structure around the park pavilion

Figure 5. Voids where wall was constructed around trees that have since been removed or fallen

The shoreline was assumed to be relatively consistent throughout the project limits with subtle changes to the orientation, profile and elevation of the foreshore and beach elements. There is some variation along the backshore area throughout the project limits, with varying widths of backfill between the shoreline and Marine Corps Drive Road. As mentioned, the sandy foreshore varies from 0 to 50 feet wide along the project area.

Sparsely grouped trees lie along the project area, with 2-3 trees being integrated into the existing structure. At the public park there are two sets of access stairs which lead to the water. Due to the critical undermining of the area, there is some sinking of the adjacent backfill near the stairs, as well as cracks in the structure.

There are a total of 3 culverts along the project length, all of which have significant debris clogging their outlets. It is assumed that these culverts are strictly for storm water management; no permanent inland waterway lies within the project limits.

2.2. Climatology

The Guam climate is tropical, with warm and humid conditions throughout the year. The surrounding ocean has a year-round temperature of 81 degrees and is largely responsible for the island's climate. There are two distinct seasons, defined by variations in wind and rainfall. A dry season extends from January through May, and a wet season from July through November. December and June are transitional months. Annual rainfall averages are typically above 80 inches. Easterly trade winds occur throughout the year but are dominant during the dry season. From July to October the winds become variable, and the occurrence of typhoons increases.

2.3. Tropical and Extratropical Storms

In the western Pacific Ocean, west of the International Date Line, hurricanes are referred to as typhoons. This term is analogous to hurricanes in the eastern Pacific Ocean or western Atlantic Ocean. The low latitude location of Guam is favorable for tropical storm and typhoon formation and passage. The island often experiences typhoon impacts which are highly dependent on the storm track. Typical typhoon impacts include wind and rainfall damage to buildings, roads and crops, and coastal inundation and resulting damage during periods of high waves and water levels.

Typhoons are tropical storms with winds of 65 knots or greater with associated intense rainfall. Although severe typhoons occur in the western Pacific throughout the year, the period from July to December is characterized as the primary typhoon season. From 1900 to 1941 Guam was affected by 23 typhoons, and from 1945 to 1990 Guam was affected by 37 typhoons. Gaps in the data exist from 1942-1944 when Guam was occupied by Japanese forces (Weir 1983). In 1962, Typhoon Karen destroyed 90% of the homes on Guam, with estimated peak sustained wind of 135 knots (Rupp and Lander, 1996). Typhoon Pamela in 1976, with sustained winds of 120 knots, stalled off the west coast of Guam for several days, resulting in extensive damage to coastal facilities. Typhoon Yuri in 1991 caused extensive beach erosion and structural damages with gusts up to 100 knots. The storm also produced extreme waves in the area. Typhoon Omar and Gay devastated the island in 1992, with sustained winds of 170 knots and 87 knots, respectively. Then in 1997, Typhoon Paka, with an estimated maximum sustained wind speed of 107 knots at Apra Harbor, destroyed roughly 1,500 buildings, leaving an estimated 5,000 people homeless (EQE International 1998 and NCDC 1997). Typhoon Pongsona in 2002, left more than 60% of the island’s water wells inoperable and destroyed approximately 1,300 homes (FEMA 2003 and Gillespie 2002). The most recent typhoons to affect Guam was Typhoon Wutip in February 2019, with sustained winds of 130 knots and Typhoon Mawar in June 2023, with sustained winds of 122 knots.

Extratropical storms are generated far from the island of Guam. These types of events can be generated by an extratropical storm in the northern or southern Pacific Ocean or a large event in the Southern Ocean. They are characterized by waves generated far away from the project site that propagate across the open ocean, interact with each other, and finally impact the project site with large waves. Distant typhoons are also capable of generating a wave-only event if the storm is large enough and traveling in specified direction in relation to the island. The difference between a typhoon condition and the extratropical swell condition is the longer period of the swell conditions along with a minimal increase to the nearshore water levels.

2.4. Winds

The USACE Wave Information Study (WIS) provides offshore wind statistics at selected stations around Guam. The nearest WIS station to the East Hagåtña project area is station 81416, located at 14° N and 144.5° W, approximately 40 miles from the project site. A wind rose displaying the frequency (%), wind speed (in meters/second), and wind direction (wind coming from) for 1980-2019 is shown in Figure 6. The dominant winds in Guam are the easterly trade winds, which approach from the sector northeast through east-southeast. They occur approximately 70 percent of the time throughout the year, but are particularly pronounced during the dry season, January through April, when they occur more than 90 percent of the time. Typical trade wind speeds fall in the 7 to 16 knot (3.6 to 8.2 m/s) range. Wind speeds greater than 21 knots (10 m/s) only occur about 5 to 10 percent of the time. Wind directions are variable with frequent calms during the main typhoon season from July to December. Trade winds, although they occur less frequently than during the dry season, are still the most common winds during this period. The highest percentage of strong winds come from the northeast.

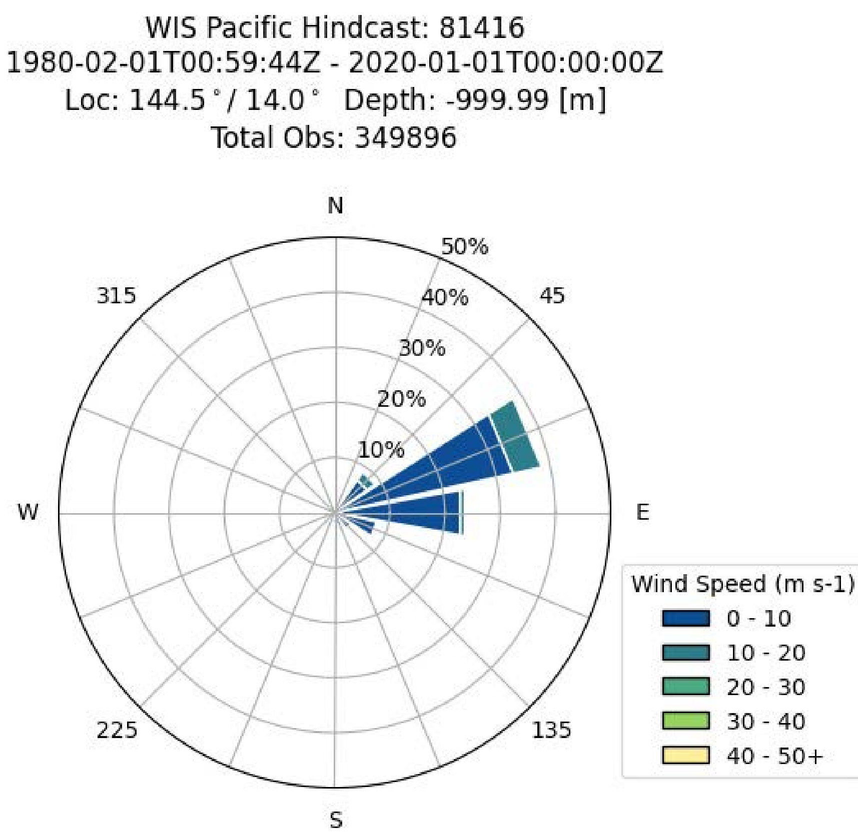

Figure 6. Wind rose from WIS Station 81416 near Guam

From 1999 to 2020, the average yearly max wind speed recorded at NOAA Station 630000 located in Apra Harbor, was 50 mph. The average wind speed was 12 mph, with a modal wind speed of 3 mph. During this twenty-one-year record there were three incidences of recorded sustained wind speeds with typhoon intensities - in December 1999 (142 mph), November 2000 (169 mph), and December 2001 (142 mph). This indicates that while Guam is affected by one or more typhoons almost every year, they often do not pass directly over Guam, and/or that high winds can be very localized. Data records can also be limited by failure of the measurement equipment during high winds.

2.5. Tsunamis and Earthquakes

An earthquake is a series of seismic waves created by the sudden release of stored energy in the Earth's crust. A tsunami is a long period open ocean wave or series of waves typically caused by an earthquake or underwater landslide. There have been 12 major earthquakes and 4 tsunamis recorded in Guam. The most significant earthquake event occurred in August 1993, with an 8.1 magnitude. No deaths were reported, but approximately 50 people were injured and more than $200 million in property damage were reported (Brunsdon, 1993). The 1993 earthquake caused land subsidence, affecting Guam’s relative sea level change rates (see Section 2.8.2). This earthquake also generated a minor tsunami. A report from Lander et al. (2002) that considered the risk of destructive tsunamis in Guam, notes that locally generated tsunamis are most likely to affect the less populated east coast due to the location of the Marianas Trench, which is the main origin of Guam’s earthquakes. The most recent tsunami event to affect Guam occurred in February 2010. The tsunami was generated from an 8.8 magnitude earthquake near Chile and measured 0.5 ft at Apra Harbor.

2.6. Bathymetry and Topography

The recently available 2020 National Ocean and Atmosphere Administration (NOAA) National Geodetic Survey (NGS) topography and bathymetry (topobathy) LiDAR was retrieved from the NOAA digital coast data access viewer(https://coast.noaa.gov/digitalcoast/tools/dav.html) for evaluation of nearshore and foreshore elevation conditions. The 1m resolution topobathy LiDAR was also used in the numerical modeling effort.

The topobathy water depths and elevations range from deep water (158 ft depth) to landward elevation of +148 ft. Figure 7 illustrates the bathymetry and topography contours of the project site and surrounding areas.

The Guam Vertical Datum of 2004 (GUVD04) is the official vertical datum for Guam and is approximately equal to Mean Sea Level (MSL). The following describes the data’s coordinate system and datums:

- Coordinate System: UTM (Universal Transverse Mercator)
- Horizontal Datum: NAD83 Zone 55N
- Vertical Datum: GUVD04 (~MSL)

From the bathymetry data, the depth of a consolidated limestone layer fronting the project area and underlying sandy shoreline was determined to be at 1.6 to 2.6 ft. (-0.5 to -0.7 m) below MSL. Also determined was the approximate elevation of the existing wall at 7.5 to 8.9 ft. (2.3 to 2.7m) above MSL. Based on this information for a typical section of the proposed alternatives, -2.5 ft. MSL will be used as the assumed elevation for the limestone layer, and +8.0 ft. MSL will be assumed as the existing wall’s crest elevation. The topobathy profiles along the project area are shown in Figure 8.

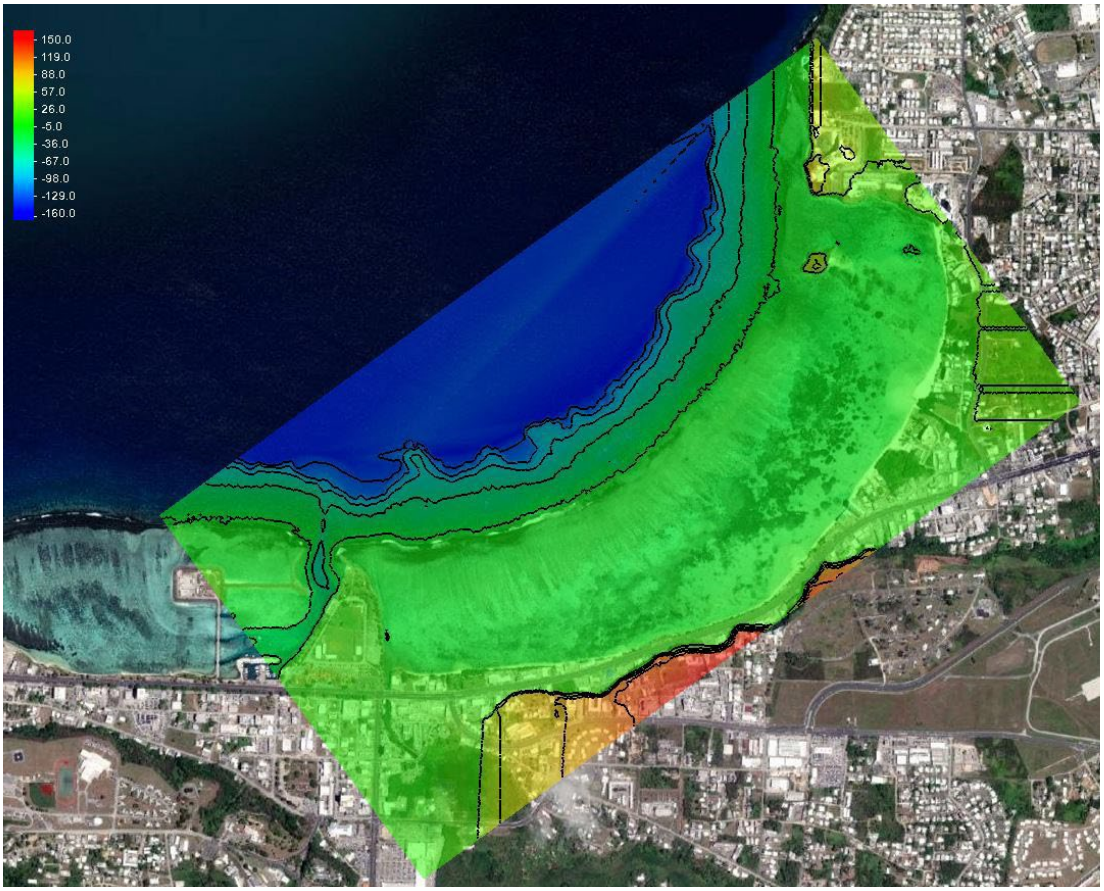

Figure 7. East Hagåtña Shoreline Bathymetric and Topographic contours in feet

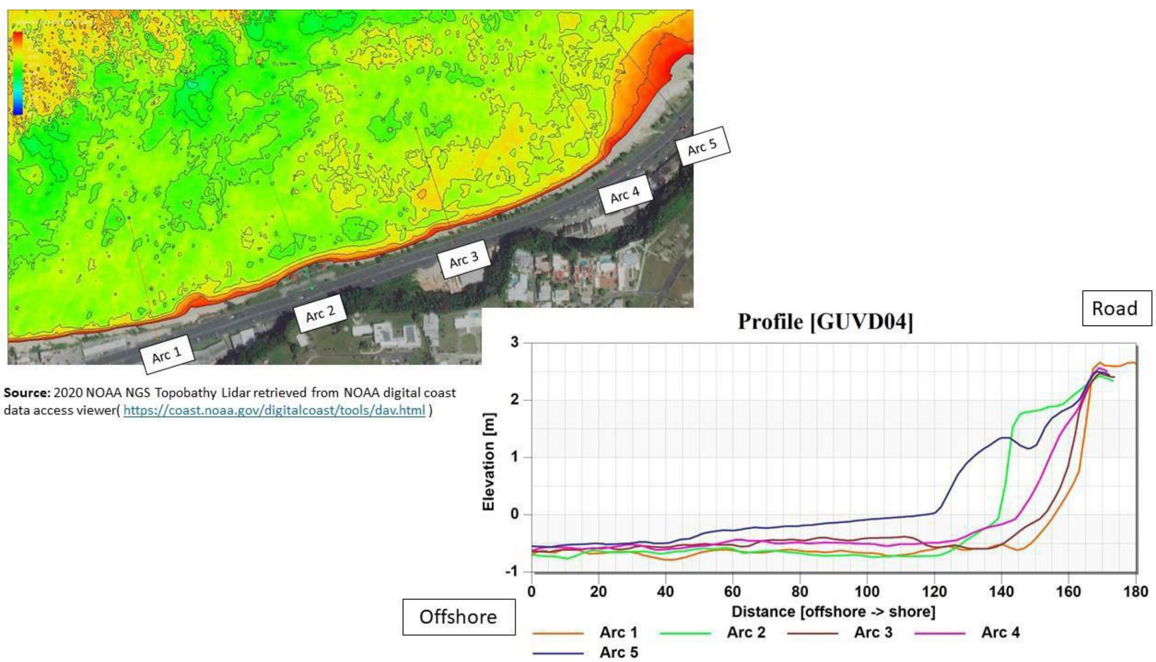

Figure 8. Typical Elevation Profiles along the Project Area

2.7. Water Levels

The closest water level station to the study area, maintained by the National Oceanographic and Atmospheric Administration (NOAA), is Apra Harbor, Guam (Station 1630000). The tidal station is located 8.3 miles southwest of the project area, within Apra Harbor. Due to this protected location, the water level station would be expected to capture water level components including astronomic tide, sea level rise, seasonal fluctuations and some storm surge due to wind setup and reduced central pressure during a tropical cyclone. It is not expected to capture elevation of the water level due to wave setup caused by wave breaking, which is experienced at the project area during both tropical and extratropical events. This introduces a potential source of uncertainty in the use of this station to fully represent extreme water levels.

2.7.1. Tides

Tides in the western Pacific are mixed-type, semi-diurnal with two highs and two lows of different levels every lunar day. Tides in the open ocean typically have spatial characteristics on the order of hundreds of miles. Tidal ranges tend to be small, on the order of 2 feet, and are spatially uniform.

The Apra Harbor, Guam tidal gauge was established in 1948 and has been in continuous operation since 1989. Tidal datums relative to Mean Sea Level (MSL) from this station are summarized in Table 1. The local vertical datum, GUVD04, is 0.01 feet above MSL, and the two datums are used interchangeably throughout this analysis.

Table 1. Tidal Datums at Apra Harbor, Guam

Station: 1630000, Apra Harbor, Guam		
Epoch: 1983-2001		
Units: Feet	**Datum:** MSL	
Datum	**Value**	**Description**
MHHW	0.97	Mean Higher-High Water
GUVD04	0.01	Guam Vertical Datum of 2004
MSL	0.00	Mean Sea Level
MLLW	-1.37	Mean Lower-Low Water
Max Tide	2.92	Highest Observed Tide
Max Tide Date & Time	08/28/1992 18:54	Highest Observed Tide Date & Time
Min Tide	-3.71	Lowest Observed Tide
Min Tide Date & Time	10/24/1972 00:00	Lowest Observed Tide Date & Time

2.7.2. Sea Level Change

The USACE considers potential relative sea level change in every project undertaken within the tidally influenced zone. Engineering Regulation (ER) 1100-2-8162 (Dept. Army, 2019) establishes procedures for projecting sea level change into the future based on global sea level change rates, local historic sea level change rate, base year of project analysis, and the number of years in the period of analysis. It is generally accepted that sea level will continue to rise and that the rate of rise may accelerate due to climatic changes. The USACE provides guidance on the calculation of sea level change and its application to the planning process. This regulation requires that three scenarios be evaluated which result in low, intermediate, and high predictions of sea level rise. The low value is based on an extrapolation of the local historic sea level rise rate. The intermediate and high values are based on the National Research Council (NRC) sea level rise predictive Curves I and III, respectively.

Over the past two decades, sea level trends have increased in the western tropical Pacific Ocean with rates that are approximately three times the global average. Several papers including Merrifield and Maltrud (Merrifield and Maltrude, 2011) have shown that the high rates of SLC recorded are caused by a gradual intensification of Pacific trade winds since the early 1990s. Multi-decadal tradewind shifts cause sea level variations which can lead to linear trend changes over 20 year time scales that are as large as the global SLC rate, and even higher at individual tide gauges, such as Apra Harbor, Guam (Merrifield 2011, Merrifield et al. 2012). Due to the variability in MSL trends in the western Pacific, and the short post-earthquake trend (1993-present) at Apra Harbor, Guam, the rate of relative SLC in Guam is estimated by using the global eustatic rate of SLC, +1.7 mm/year, added to a measured rate of Vertical Land Movement (VLM) rate of -0.889 mm/year (as reported by the NASA Jet Propulsion Laboratory website https://sideshow.jpl.nasa.gov/post/series.html – an average of two monitoring stations on Guam). Since eustatic sea level is rising, and the land is subsiding, this results in a relative SLC rate of 2.59 mm/year (= +1.7 mm/year – (-0.89 mm/year)) or 0.0085 feet/year for Guam.

The USACE SLC calculator was used to plot the three potential curves based on this rate, shown in Figure 9. The curves show that by the end of the project planning horizon in 2072, the relative SLC in the area will be 0.68 feet (low curve), 1.22 ft (intermediate curve), or 2.99 ft (high curve) relative to the existing MSL datum (as well as GUVD04). By the end of the adaptation planning horizon in 2122, the relative SLC in the area is projected to be 1.10 ft (low curve), 2.57 ft. (intermediate curve), or 7.27 ft. (high curve). Also shown on the plot is the +8.0 ft MSL elevation of the existing sea wall crest. This threshold is not exceeded by still water elevation over the course of the adaptation planning horizon. The USACE Sea Level Tracker tool was also utilized to compare existing recorded water levels at Apra Harbor with SLC projections. Figure 10 shows the SLC curves, the 5-year moving average in cyan, and the 19-year moving average in dark blue. The moving averages illustrate the significant variability in the SLC rate as described above. Since the 1993 earthquake, the 19-year moving average trend has exceeded the “high” curve due to land subsidence and tradewind intensification. The 5-year moving average suggests that this trend may be reversing in recent years, and is more closely tracking the “intermediate” curve. Sensitivity to the various SLC scenarios was evaluated in will be discussed in later sections.

Figure 9.USACE SLC Curves for Guam Including 50-year Planning Horizon and 100-year Adaptation Horizon

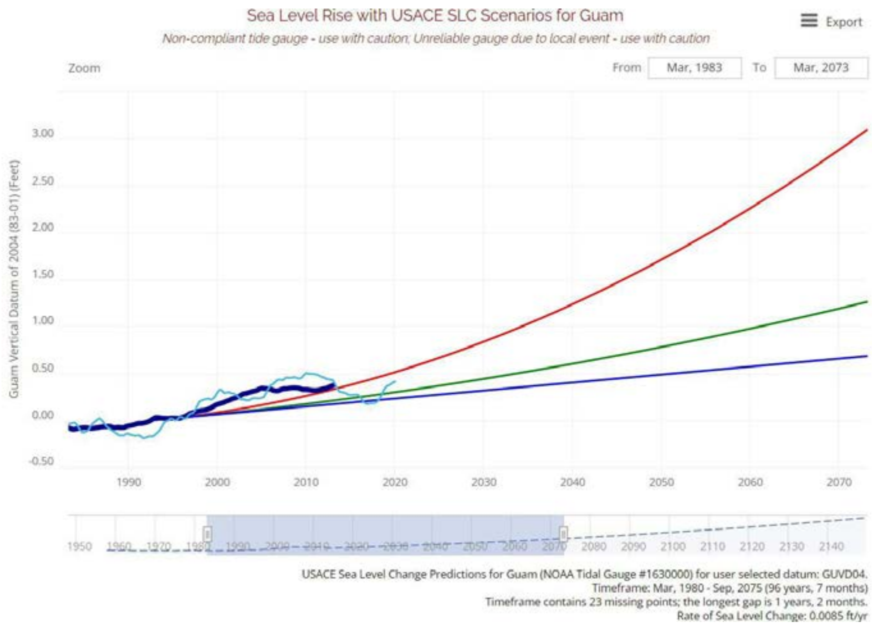

Figure 10. USACE Sea Level Tracker for Guam Including 5-year (cyan) and 19-year (blue) Moving Avg

2.7.3. Extreme Water Levels

The extreme water level (EWL) is comprised of short-term, storm-driven water level changes superimposed on the astronomical tides. The probabilistic frequency of extreme water levels for the project region are shown in the annual exceedance probability (AEP) curves, determined at the NOAA water level station in Apra Harbor Guam (Figure 12). The annual exceedance probability curves show the extreme water level elevations as a function of return period in years. These elevations are determined after the Mean Sea Level (MSL) trend is removed. As shown, the 2% AEP or 50-year return period water elevation at Apra Harbor Guam is approximately 1.5 ft (0.46 m) relative to MHHW or 2.5 ft (0.76 m) relative to MSL. This additional water level component is superimposed on the intermediate curve shown in Figure 11 to assist with visualization of extreme water level occurrences on top of rising sea level for present day and throughout the project planning horizon.

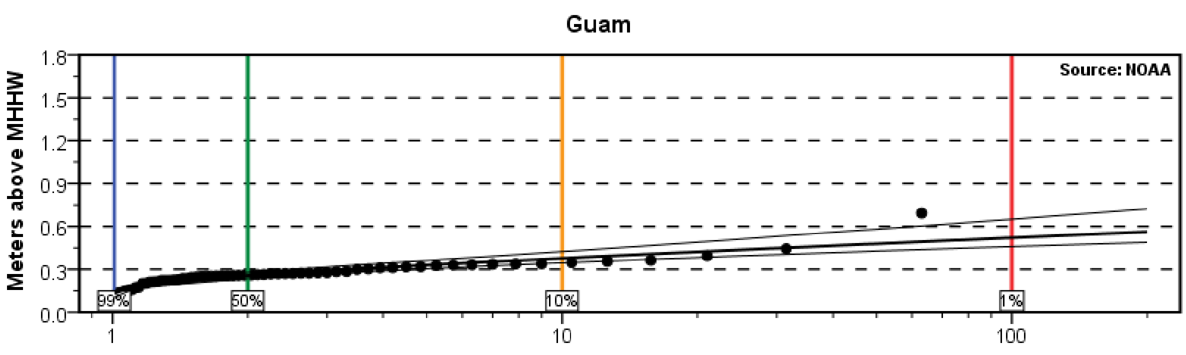

Figure 11. AEP curves relative to MHHW

2.8. Waves

There are three distinct wave patterns near Guam: local wind (trade wind) generated waves, long period swell energy generated by distant storms, and waves associated with tropical cyclones. Trade wind waves are typically from northeast through east-southeast, with wave heights in the range of 1 to 6 feet (0.3 to 2m) and wave periods between 5 to 10 seconds. Swell waves from distant storms (usually in the north Pacific) can range from 6 to 18 feet (2 to 6 m) in height and have wave periods from 10 to 16 seconds. Tropical storm and typhoon waves can approach from almost any direction (though the storms typically track east to west or southeast to northwest), resulting in waves up to 40+ feet (13+ m) in deep water and wave periods in the 8 to 14 second range. The most common condition is trade wind generated waves, which due to the orientation of Guam's coastline, do not affect the western side of the island. Due to incident wave direction and shoreline orientation within the project area, only swells originating in the west and tropical cyclones have the potential to cause damages to the project area.

2.8.1. Typical Conditions

The USACE's Wave Information Study (WIS) is a 39-year (1981– 2019) wave hindcast, which can be used to perform wave climate analysis at a given station location. The water depths at the station are greater than 10,000 ft. Basic statistics of information recorded at this virtual point is shown in Table 2. The largest calculated wave height was generated from a tropical storm (Typhoon Yuri – 1991).

Table 2. Statistics for WIS Station 81416 (1981-2019)

Statistic	Value
Average wave height:	6.1 ft
Standard deviation of wave height:	2.2 ft
Average wave period:	9.6 sec
Standard deviation of wave period:	1.5 sec
Maximum wave height:	49.5 ft
Period associated w/ max wave height:	15.1 sec
Direction associated w/ max wave height:	99.0 deg
Date associated w/ max wave height:	11/27/1991 17:00
Total number of wave records:	280,511

Using WIS Station 81416, the typical wave climate oceanward of the northwestern side of Guam can be determined. Figure 12 shows the frequency of occurrence for various wave heights and associated wave directions in the area. As previously discussed, the shoreline orientation within the project area and the presence of the fringing reef significantly reduces the amount of wave energy that reaches the project area.

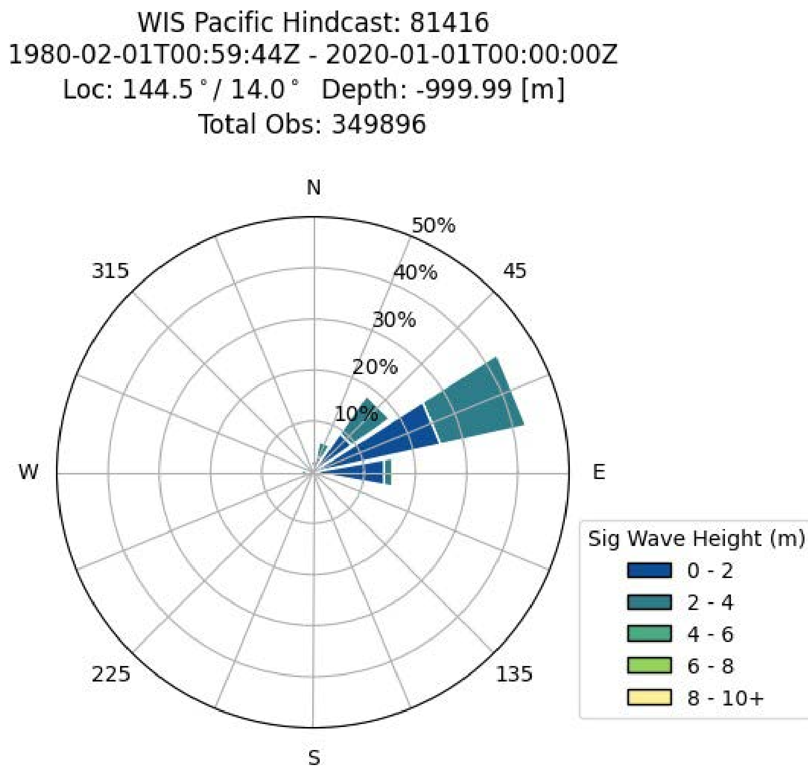

Figure 12. Wave Height Rose for WIS Station 81416

Only typhoons and swells generated from the west through north are included in this analysis as they have a potential to produce damages to island infrastructure.

2.8.2. Extreme Wave Frequency Analysis

Waves generated from the west to north of Guam, regardless of the generation source, may impact the project location. To perform an extremal analysis of return wave heights the WIS wave hindcast record was separated to include only those wave directions that will directly impact the shoreline. Waves arriving from mean directions between 270° to 0° are considered. A schematic of this wave window is shown in Figure 13. For this analysis, WIS Station 81416 maximum wave heights with a wave height over 3.2 meters (twice the standard deviation of the subset hindcast waves) were selected.

Figure 13. East Hagatna Wave Exposure Window

A total of 107 monthly maximum wave heights over a 30-year period match these criteria. The extreme value distribution provides for wave height estimates from 1 to 100-year return period (100 to 1 percent occurrence), shown in Figure 14. Typical wave periods and wave directions based on frequency analysis were paired with these extreme values of significant wave height in Table 3.

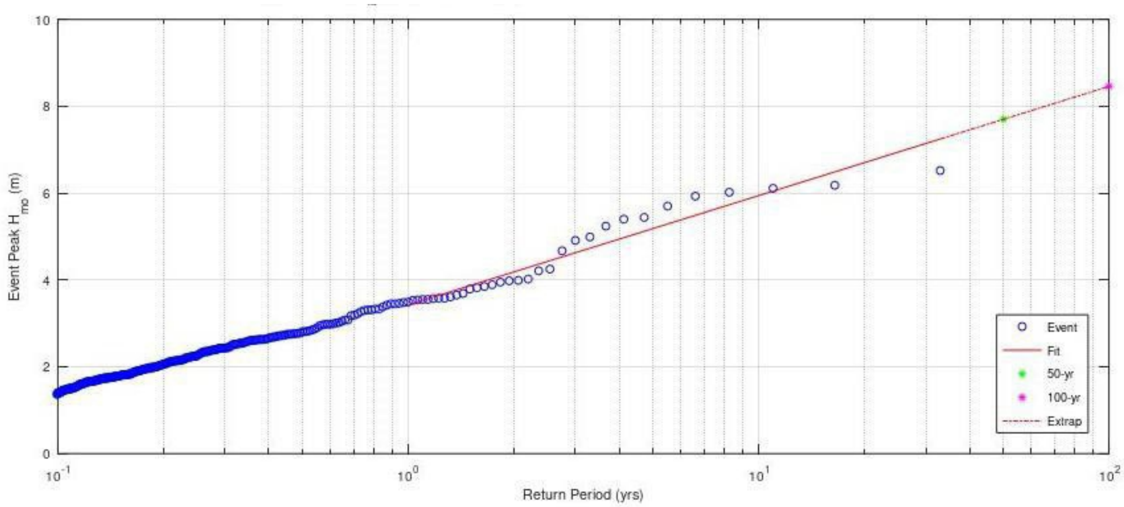

Figure 14. Extremal Analysis for West to North Generated Events

Table 3. Return Period of Filtered Wave Events

Return Period	Wave Height		Period	Wave Direction
2-year	4.0 m	13.12 ft.	10.0 sec	353 (NNW)
5-year	5.5 m	18.04 ft.	11.0 sec	358 (NNW)
10-year	6.0 m	19.68 ft.	11.0 sec	271 (W)
30-year	6.5 m	21.32 ft.	12.0 sec	357 (NNW)
50-year	7.7 m	25.26 ft.	11.5 sec	329 (NW)
100-year	8.5 m	27.88 ft.	12.0 sec	331 (NW)

2.9. Design Waves & Water Levels

Nearshore wave modeling was conducted using the nearshore steady state wave model, STWAVE. The water level and wave conditions must be known to supply boundary conditions to STWAVE. The deep-water incident wave conditions used were based on the extremal analysis values (Table 3), as described in section 2.6.2. Using the water level AEP exceedance curves (section 2.5.3) and the USACE low, intermediate, and high sea level change curves (section 2.5.2), five water levels were identified for simulation summarized in Table 4.

The first water level simulated was the MSL datum with no sea level change, in order to provide a lower-bound value of "waves only" for comparison purposes. The second water level simulated was representative of present-day water level conditions and included the linear superposition of the 2% AEP water level and the SLC intermediate curve at 2022, which totaled to a water elevation of 2.8 ft (0.86m) relative to MSL. The intermediate SLC curve was selected to represent present day because it is the "middle ground" between the high and low curves and averages the significant variability seen in the water level records. The remaining water levels identified were representative of the linear superposition of the 2% AEP water level and the SLC for the low, intermediate, and high curves at 50 years from present (2072). The resulting water elevations were 3.2 ft. (0.97 m) for the 2% AEP water level plus low SLC curve; 3.7 ft. (1.1 m) for the 2% AEP water level plus intermediate SLC curve; and 5.5 ft. (1.67 m) for the 2% AEP water level plus high SLC curve. The 2% AEP water level was selected in order to represent the most likely extreme condition to be observed over the 50-year planning horizon. Using these parameters, modeled boundary conditions consisted of 5 water levels and 6 wave conditions with return periods from 1 to 100 years producing 30 model runs to represent incident conditions within the project area.

Table 4. Design Water Levels

Scenario	Water Elevation
MSL	0.0 ft. (0.0m)
2% AEP water level + 2022 intermediate SLC curve	2.8 ft (0.86m)
2% AEP water level + 2072 low SLC curve	3.2 ft. (0.97 m)
2% AEP water level + 2072 intermediate SLC curve	3.7 ft. (1.1 m)
2% AEP water level + 2072 high SLC curve	5.5 ft. (1.67 m)

3. Numerical Modeling

Accurate and representative numerical modeling requires that wave and water level conditions are generally known in deep water, far away from the shoreline and the area of interest. To account for this, the numerical model, STWAVE, was used to transform waves from deep water to the nearshore water depths at the project site. This model has been extensively used thought the United States and the Pacific Ocean, including Guam.

3.1. STWAVE

STWAVE is a phase-averaged spectral wave model for nearshore wave generation, propagation, transformation, and dissipation (Smith et al. 2001, Smith 2007, Massey et al. 2011). Phase-averaging models determine the average conditions over multiple wavelengths. STWAVE numerically solves the steady-state conservation of spectral wave action for the following equation:

$$\left(C_g\right)_i \frac{\partial}{\partial x_i} \frac{\left(C_g\right)_i C \cos(\alpha) E(\sigma, \theta)}{\sigma} = \sum \frac{S}{\sigma}$$

Where,

i is tensor notation for x- and y- components, Cg is group celerity, θ is wave direction, C is wave celerity, σ is wave angular frequency, E is wave energy density, and S is energy source and sink terms. Source and sink mechanisms included surf-zone wave breaking, wind input, wave-wave interaction, whitecapping, and bottom friction.

STWAVE is formulated on a Cartesian grid, with the x-axis oriented in the cross-shore direction (I) and the y-axis oriented alongshore (J), parallel with the shoreline. Angles are measured counterclockwise from the grid's x-axis.

3.2. Model Domain

A single grid was created to transform the incident deep water waves from the WIS station to the nearshore environment at the project area. The model domain was developed using the available 2020 NOAA LiDAR (section 2.6) and a grid cell resolution of 32.8 ft (10 m) to incorporate the fetch and fringing reef characteristics of the area. The grid was comprised of 180 cells in the cross-shore direction (I) and 325 cells in the alongshore direction (J). The projection of the grid was UTM NAD83 Zone 55 with a vertical datum relative to MSL. The model domain extends north to just below Oka Point, and south to Agana Harbor. The domain stretches west to east about 2 miles.

The properties of the STWAVE domains are provided in Table 5, and the extents are shown in Figure 15.

Table 5. Model Domain Parameters

Grid	Projection	Grid Origin (x,y) [m]	Azimuth [deg]	Δx and Δy [ft]	Number of Cells	
					I	J
STWAVE	UTM Zone 55 NAD83 MSL	(256013.93, 1491713.41)	306	10	180	325

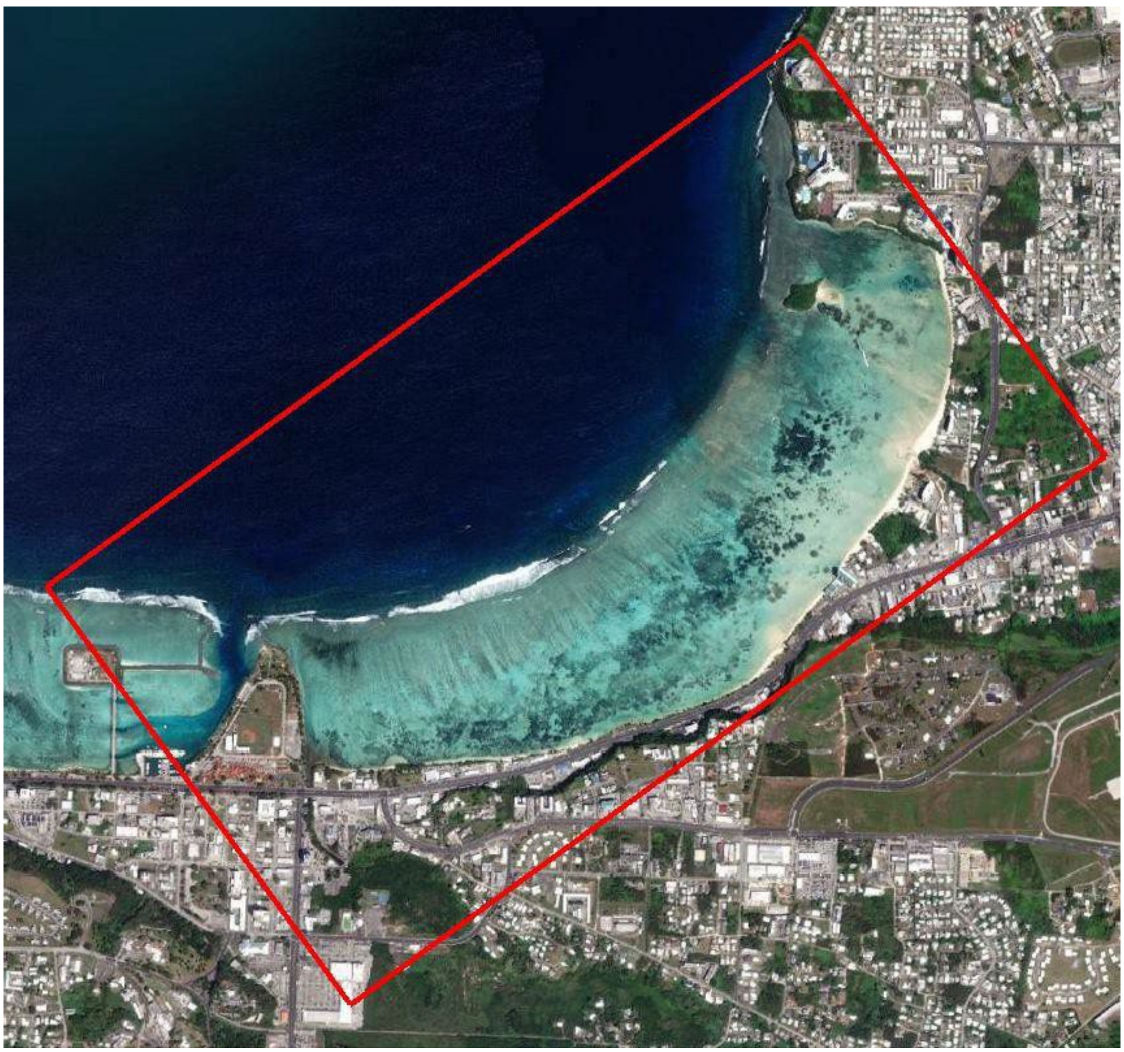

Figure 15. STWAVE Domain Extents

3.3. Offshore Boundary Spectra

The six identified return period wave events (wave height, period, and direction) from Table 3 were used to create a shallow water self-similar spectral form, referred to as a TMA spectrum, which substitutes an expression for the shallow water equilibrium range into the JONSWAP equation for spectral energy density. This spectral form is intended to describe single peaked wind seas, or wind seas which have reached a growth equilibrium in finite depth water. The resolved spectra were represented by 30 frequency bands, ranging from 0.04 Hz (25 sec) to 0.33 Hz (3.03 sec), and 72 directional angle bands, from 0° to 355° with respect to the x- axis (306.0°). Additional offshore inputs included were the five identified water elevations from section 2.9. The 30 total combinations of wave and water levels that are simulated within the STWAVE model domain are referred to as “idds”.

3.4. Model Execution

The STWAVE simulation used the full-plane mode of STWAVE to allow for wave generation and transformation in a 360-degree plane. The full-plane version of STWAVE uses an iterative solution process that requires user-defined convergence criteria to signal a suitable solution. Boundary spectra information is propagated from the boundary throughout the domain during the initial iterations. Once this stage converges, winds and water levels are added to the forcing, and this final stage iteratively executes until it also reaches a convergent state. The convergence criteria for both stages include the maximum number of iterations to perform per time step, the relative difference in significant wave height between iterations, and the minimum percent of cells that must satisfy the convergence criteria (i.e., have values less than the relative difference.) Convergence parameters were selected based on a previous study by Massey et al. (2011) in which the sensitivity of the solution to the final convergence criteria was examined.

The relative difference and minimum percent of cells were set as (0.1, 100.0) and (0.1, 99.8) for the initial and final iterations, respectively. STWAVE was set up with parallel in-space execution whereby each computational grid is divided into different partitions (in both the x- and y-direction), with each partition executing on a different computer processor. The number of partitions in the x-direction was 3, while the number of partitions in the y-direction was 5. The maximum number of initial and final iterations was set to a value of 20, higher than the largest partition size.

3.5. Model Outputs

STWAVE transformed the extreme waves and combined water levels discussed in section 2.9. The modeling outputs were analyzed directly seaward from the project location at approximately the 2.5-foot (0.76 m) contour. Due to the presence of the fringing reef, which creates a shallow nearshore environment, the wave heights at the project area are roughly depth limited on the order of 0.6 times the water depth. The top and bottom plot in Figure 16 are the same simulation output from the model, but on different scales, demonstrating how the waves are depth limited and the majority of the wave energy is dissipated on the reef. Given the greatest water elevation simulated by STWAVE was 5.4 ft representing the 2% AEP curve and the 2072 USACE High SLC curve (section 2.7.3) and the depth at the transect was approximately -2.5 ft MSL, the total water depth along the observation transect, shown in Figure 17, is roughly 7.9 ft. Applying the depth limited approximation for the effects of the fringing reef, the wave heights generated at this location should be no larger than 4.74 ft.

The output wave heights along the observation transect (shown in Figure 18) were delineated at every grid cell or every 33 ft (10 m). Per each combination of waves and water levels, the observed significant wave heights along the transect gave values that were similar, with the largest differences observed no greater than 0.6 ft. Given the low to negligible differences in the observed significant wave heights along the transect, the maximum significant wave height was selected from the transect to represent each wave and water level combination. These values are shown in Figure 18 and Table 6.

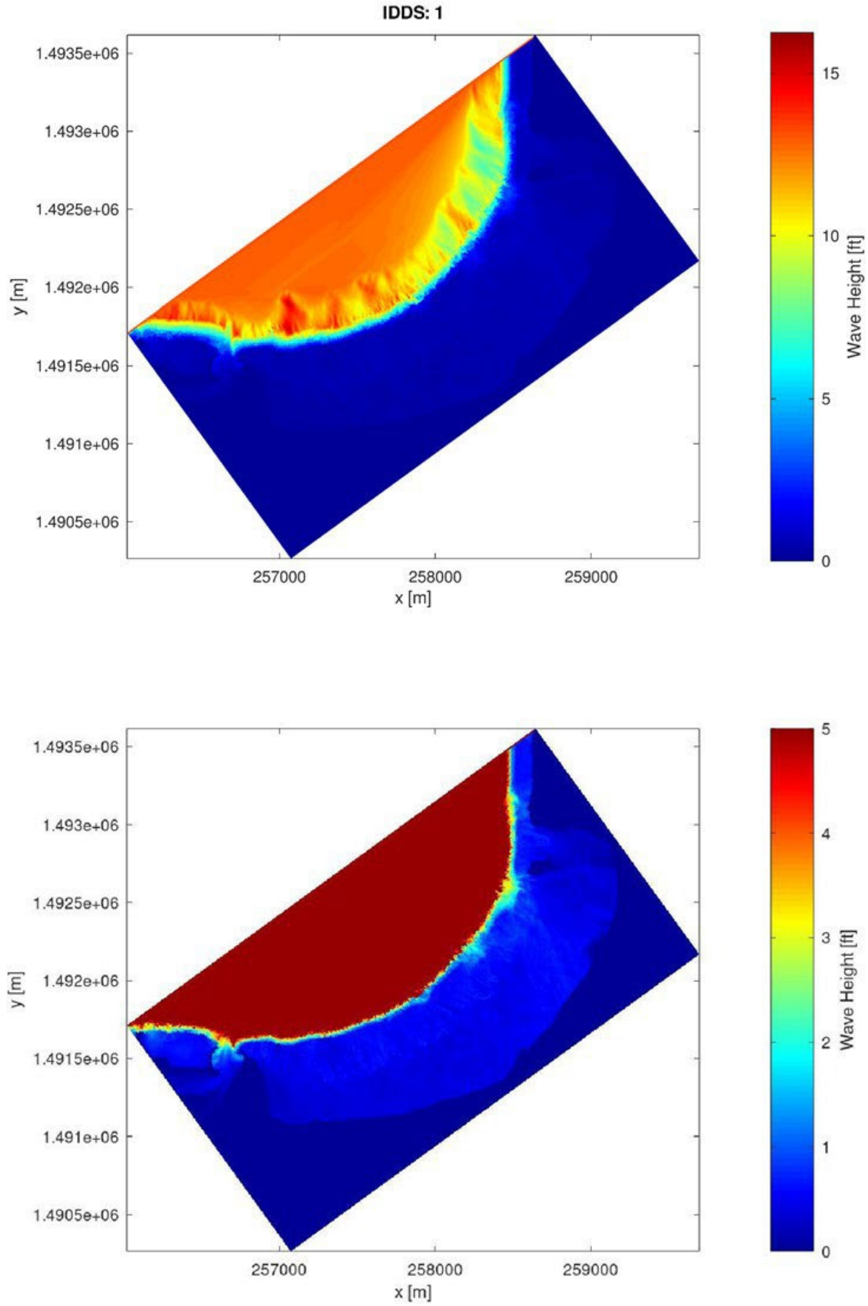

Figure 16. Effects of the Fringing reef on wave height.

Figure 17. Location of Observation transect in front of Project Area

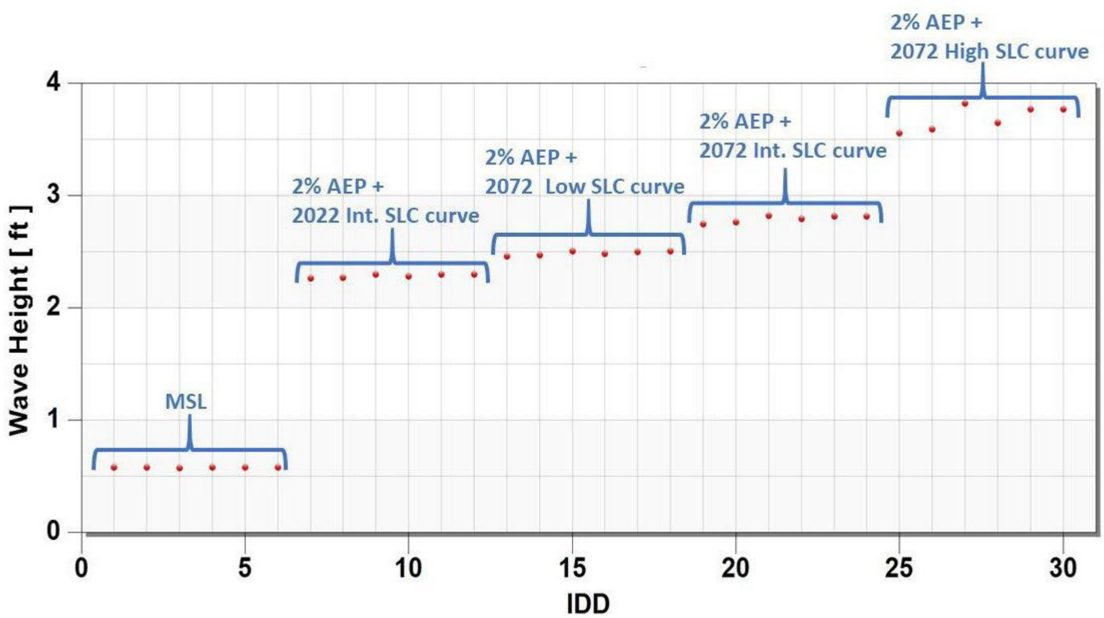

Figure 18. Observation Transect Max Significant Wave Height Results.

Table 6. Observation Transect Max Significant Wave Height Results

	MSL		2% AEP + 2022 Int. SLC curve		2% AEP + 2072 Low SLC curve	
Return Period	**IDD**	**Ft.**	**IDD**	**Ft.**	**IDD**	**Ft.**
2-year	1	0.58	7	2.26	13	2.46
5-year	2	0.58	8	2.27	14	2.47
10-year	3	0.57	9	2.29	15	2.50
30-year	4	0.58	10	2.28	16	2.48
50-year	5	0.58	11	2.29	17	2.50
100-year	6	0.58	12	2.30	18	2.50
	2% AEP + 2072 Int. SLC curve		**2% AEP + 2072 High SLC curve**			
Return Period	**IDD**	**Ft.**	**IDD**	**Ft.**		
2-year	19	2.74	25	3.56		
5-year	20	2.76	26	3.59		
10-year	21	2.81	27	3.82		
30-year	22	2.79	28	3.65		
50-year	23	2.81	29	3.77		
100-year	24	2.81	30	3.77		

The maximum significant wave height results from the model show that water elevation has the greatest impact on wave height at the project location, due to controlling nature of the fringing reef. Larger waves break on the reef edge, allowing only smaller waves to reach the project site (Figure 1***6***). As water levels over the reef increase, larger waves can reach the shoreline. As such, there is minimal difference between the wave heights under the 2% AEP+2022 SLC intermediate curve (present day) water level and the 2% AEP+2072 SLC low curve water level. A slight increase in wave height is observed under the 2% AEP +2072 SLC intermediate water level, with the biggest increase occurring under the 2% AEP +2072 SLC high curve water level. The highest observed wave height was the 10-year event under the 2% AEP +2072 SLC high curve water level, with a wave height value of 3.82 ft. The 10-year event gave the maximum value for all water levels and is the only return period with a westward approach. As shown in the wave rose in Figure 12, westward approaching waves have a maximum wave height of 6m which is equivalent to the offshore wave height used in the 10-yr return period event and has a less than 10% frequency of occurrence. Across all water levels, the difference between the return period conditions is minimal and on the order of 0.01 ft. to 0.26 ft.

The design wave height selected was 2.8 ft, which was the resulting wave height at the project area from the 50-yr return period wave height under the 2% AEP +2072 SLC intermediate water level simulation.

Figures of the wave fields from each idd of the model simulation are in the Model Output Appendix.

4. Engineering Alternatives

4.1. Preliminary Array of Measures

To develop preliminary costs and layouts to assist project analysis for other disciplines, a preliminary array of measures consists of:

1. No action
2. Revetment
3. Precast Concrete Wall
4. Concrete Rubble Masonry (CRM) Wall
5. Secant Wall
6. Permeation Grouting
7. Beach nourishment

Descriptions and details of all the measures are provided in the following sections. However, the Secant Wall, Permeation Grouting, and Beach Nourishment measures were screened out for costs of equipment, labor, and materials (details of the screening are provided within their section). The no action, revetment, precast concrete wall, and Concrete Rubble Mason Wall measures were carried forward, with the revetment as the tentatively selected least cost environmentally acceptable plan.

4.2. No Action

The no action alternative assumes the existing conditions would continue unchanged into the future. This alternative would not include shoreline protection or stabilization. Erosion would continue and the shoreline will approach Marine Corps Drive. This would eventually lead to undermining and failure of the existing wall and ultimately damages to roadway.

4.3. Revetment (Tentatively Selected Plan)

A revetment consists of armoring a shoreline slope designed to hold-the-line (**Figure 19**) and protect the shoreline slope from wave impacts and erosion. A revetment is suitable in areas of pre-existing hardened shorelines and in some cases along chronically eroding shorelines with limited sediment supply. It may also be appropriate where shoreline recession threatens infrastructure that is not able to be relocated. Materials that are commonly used in revetment construction include stone, concrete armor units, sand/concrete filled geotextile bags, geo-tubes, and rock-filled gabion baskets. Revetments mitigate wave action, there is limited maintenance, and have an indefinite lifespan. Disadvantages however include significant land area requirement, loss of intertidal habitat, erosion of adjacent unreinforced shoreline, limited high water protection, and prevention of the upland from being a sediment source to the system. Environmental considerations include large impact in and out of water, impacts are not reversible, minimal maintenance required, and permits are required.

Revetments were determined to be an acceptable option for the East Hagåtña shoreline. Both rock and tribar revetments have been used successfully to protect critical infrastructure such as roadways. Contractors in Guam are familiar with the construction methods and the work can be completed without specialized equipment. Both a rock revetment and tribar revetment were carried forward into the final array of alternatives, so that armor unit size, availability, cost, and environmental impacts could be fully evaluated.

The revetment design was created as to replace the existing seawall and extend seaward. The proposed revetment footprint is shown in Figure 20.

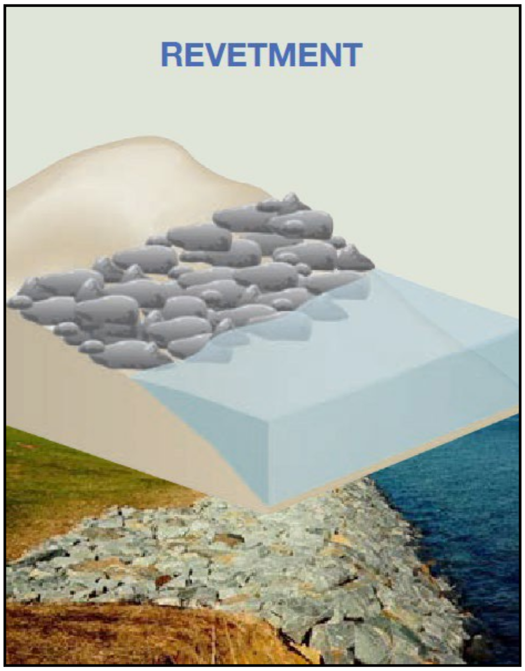

Figure 19. Revetment Measure

Figure 20. Revetment Preliminary Alternative Footprint

4.3.1 Design Considerations

Although the design was not optimized to reduce runup and overtopping from all future sea level rise scenarios, estimates of runup and overtopping were calculated to evaluate the performance of the alternative, as runup and overtopping can result in backshore erosion. Wave runup and overtopping are complex physical processes occurring in the surf and backshore zones where waves encounter the shoreline and break, resulting in an uprush of water. They depend on the local water level, incident wave conditions, and the nature of the beach or structure encountered. inundation of water over the structure top.

The lidar determined topobathy elevations, the AEP curves, SLC curves, and results of the wave modeling were used to inform the crest elevations of the revetment and the other proposed structural alternatives based on computed runup and overtopping.

To compute runup and overtopping, two approaches were used. The first approach used the USACE's Automated Coastal Engineering System (ACES) tool, which computes estimates of wave runup and overtopping on rough slope structures that are assumed to be impermeable. ACES incorporates the empirical equations suggested by Ahrens and McCartney (1975) for runup and the Ahrens (1977) equations to predict overtopping. The Ahrens and McCartney (1975) estimated runup empirical method is predicted as a nonlinear function of the surf parameter, $\xi\xi$.

$$RR = HH_{ii}\frac{aa\xi\xi}{1 + bb\xi\xi}$$

Where,

R is runup, HH_{ii} is the incident wave height, a and b are empirical coefficients.

Ahrens (1977) estimates the overtopping rate by summing the overtopping contributions from the individual members of the run-up distribution:

$$QQ = \frac{1}{199}\sum_{ii=1}^{199} QQ_{ii}$$

Where,

Q is the volume rate of overtopping, and QQ_{ii} is the volume rate of overtopping caused by one runup on the run-up distribution.

The second approach used the EurOtop Manual (2018) equations, which describes runup as:

$$\frac{R_{u2\%}}{H_{m0}} = 1.65 \cdot \gamma_b \cdot \gamma_f \cdot \gamma_\beta \cdot \xi_{m-1,0} \qquad 5.1$$

with a maximum of

$$\frac{R_{u2\%}}{H_{m0}} = 1.0 \cdot \gamma_f \cdot \gamma_\beta \left(4 - \frac{1.5}{\sqrt{\gamma_b \cdot \xi_{m-1,0}}}\right) \qquad 5.2$$

Where,

$RR_{uu2}\%$ is the wave run-up height exceeded by 2% of the incoming waves, HH_{mm0} is the incident significant wave height, $\gamma\gamma_{bb}$ is the influence factor for a berm, $\gamma\gamma_{ff}$ is the influence factor for roughness elements on a slope, $\gamma\gamma_{\beta\beta}$ is the influence factor for oblique wave attack and $\xi\xi_{mm-1,0}$ is the breaker parameter.

As input conditions, four water levels at the structure representing the 2% AEP + 2022 SLC intermediate curve, and the 2% AEP + 2072 SLC low, intermediate, and high curves in conjunction with the 50-yr return period wave height and peak period for those water elevations were used. Two crest elevations were also considered, both with a structure slope of 1:1.5. The first is the existing wall crest elevation of + 8 ft. MSL and an increased crest elevation of + 9 ft. These values with their corresponding runup and overtopping values are summarized in the table below.

	2% AEP + 2022 SLC int curve	2% AEP + 2072 SLC low curve	2% AEP + 2072 SLC int curve	2% AEP + 2072 SLC high curve
Water Level (ft.)	2.7	3.1	3.6	5.4
50-yr wave height (ft.)	2.3	2.5	2.8	3.8
50-yr peak period (s)	10.5	10.5	10.5	10.5
ACES runup (crest +8 ft. MSL)	4.5	4.8	5.3	6.9
ACES overtopping (crest +8 ft. MSL)	0.0	0.0	0.1	1.3
ACES runup (crest +9 ft. MSL)	4.5	4.8	5.3	6.9
ACES overtopping (crest +9 ft. MSL)	0.0	0.0	0.0	0.7
EurOtop runup (crest +8 ft. MSL)	4.6	4.8	5.2	6.8
EurOtop overtopping rate (crest +8 ft. MSL) ft^3/s/ft	0.0	0.0	0.0	0.6
EurOtop runup (crest +9 ft. MSL)	4.6	4.8	5.2	6.8
EurOtop overtopping rate (crest +9 ft. MSL) ft^3/s/ft	0.0	0.0	0.0	0.3

As shown, runup for this structure under all water level scenarios ranges from approximately 4.5 ft. to 6.9 ft. with overtopping rates of 0.0 ft^3/s/ft to 1.3 ft^3/s/ft. Given sea level rise, conditions likely to cause overtopping will occur more frequently. Constructing the crest elevation to +9 ft MSL, a one-foot increase above the existing seawall, can be considered a preventative adaptation measure that will address uncertainty in future sea level rise scenarios, as well as temporal variability in water levels as described in section 2.7.

Note: The same analysis was conducted for the vertical wall alternative measures such as the precast concrete wall, concrete rubble masonry wall, and secant wall (for which the designs are discussed in detail in Sections 4.4 through 4.6), and the assumption of a complete vertical angle increases the runup by a maximum of 0.4 ft.

4.3.2. Preliminary Design

The site-specific revetment design is typical for such a structure and is shown in Figure 21. The structure consists of two layers of armor stone, and two layers of underlayer stone, which sit on top of compacted backfill and a geotextile layer. All of which are secured by an oversized toe stone. The crests elevation is expected to be +9 feet (MSL), as discussed in section 4.3.1. The toe will be situated in a trench excavated approximately 1 foot into the limestone bench, at an expected depth of -3.5 ft (MSL). The structure crest elevation and toe depth may need to be adjusted depending on the results of the topo-survey and other design considerations. The revetment would replace the existing sea wall.

The armor stones form the outermost layer and dissipate energy in order to provide protection from waves and water levels along the structure. The Hudson Equation, as shown below, was used to determine the appropriate stone sizing of the armor stones.

$$W = \frac{\gamma_r H^3}{K_D (S_a - 1)^3 \cot\alpha}$$

Where,

W is the weight of the required armor stone, γ_r is the specific weight of the armor units, H is the design wave height, K_D is the damage coefficient, S_a is the specific gravity of the armor stone, and cotα is the angle of the breakwater side slope. The K_D value was selected based upon rough angular stones and random placement for breaking waves.Table 7 provides the assumed variables and coefficients used in the Hudson Equation calculations.

Table 7. Hudson Equation Coefficients

Specific Weight (γ_r)	160 lb/ft^3
Stability Coefficient (K_D)	2
Sideslope Angle (cotα)	1.5
Design Wave Height (H)	2.8 ft
Specific Gravity (S_a)	2.5
Layers	2

The underlayer is added to support the armor layer such that the armor stones are not directly resting on the geotextile fabric. The underlayer is designed in accordance with the USACE's Coastal Engineer Manual (CEM); the weight of the underlayer stone is 1/10 of the armor layer stones. This size requirement prevents underlayer stones from escaping through voids in the armor layer.

The toe stone is the seaward terminus of the structure and provides stability to the structure. Typically these are sized on the order of one and a half times the armor stone (CEM).

Given the waves, water elevations, and expected structure crest elevation, the resulting design of the revetment including stone sizes is as follows. Constructed at a 1.5H:1V slope, the armor layer has a median weight of 350 lbs, a 1.3 ft median diameter, and a layer thickness of 2.6 ft. The underlayer has a median weight of 35 lbs a 0.6 ft median diameter and a layer thickness of 1.2 ft. Scour protection will consist of the underlayer stone, and geotextile fabric to ensure there is no excessive settlement or undermining of the structure. The toe stone has a median weight of 525 lbs and a median diameter of 2.0 ft.

While at the time of this study, there is evidence to suggest there is sufficient quantity and quality stone available in Guam, Tribar armor units were also considered in case of limited stone availability. An example of a typical tribar unit is shown in Figure 22. It was assumed the tribar units would be placed in a single layer, uniformly, as is typical for this type of design. Two weights of tribar were considered 0.5 ton and 1 ton. The average layer thickness for the 0.5-ton and 1-ton units are 2.2 ft and 2.7 ft. The individual arm diameter of the 0.5 ton and 1 ton unit was determined to be 1.1 ft. and 1.3 ft., with a unit diameter of 3.2 ft. and 4.1 ft., respectively. All weights and diameters for both the stone sizing and tribar units are summarized in Table 8.

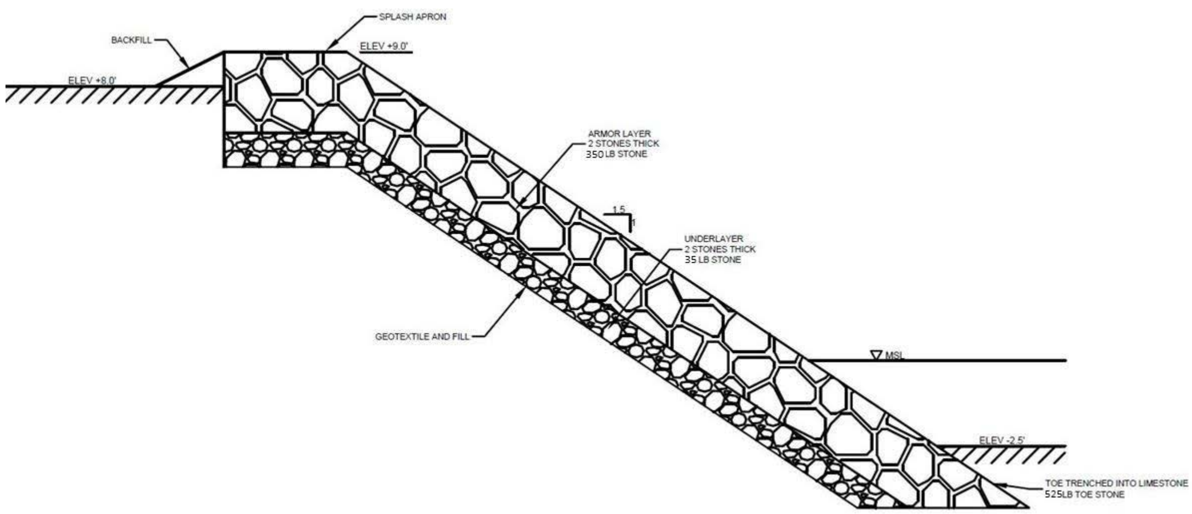

Figure 21.Preliminary Revetment Schematic

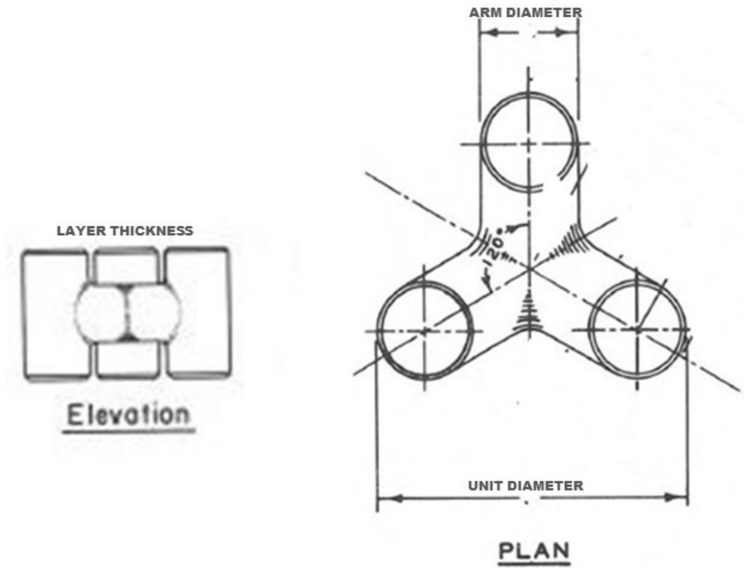

Figure 22. Example of typical tribar unit

Table 8. Preliminary Stone Sizing

Description	Median Weight (lbs)	Median Diameter (ft)	Layer Thickness (ft)
Armor Stone	350	1.3	2.6
Underlayer Stone	35	0.6	1.2
Toe Stone	525	2.0	2.0
Description	Tribar arm diameter (ft)	Tribar unit diameter (ft)	Layer Thickness (ft)
Tribar 0.5 ton unit	1.1	3.2	2.2
Tribar 1 ton unit	1.3	4.1	2.7

4.3.3. Construction

Construction of the revetment would occur using conventional land-based earth moving equipment. The revetment would be constructed from the toe (-3.5 ft. MSL) up to the crest elevation (+9ft. MSL). The limestone bench will need to be excavated approximately 1-1.5 ft. to seat the toe stone. To accommodate the crest elevation of the structure, the existing ground will need to be excavated approximately 2.3 ft. to accommodate the 1 ft. increase in elevation. A splash apron of 3 armor stones width (3.9ft) would tie the structure to the existing ground. Some of the excavated material from seating the crest can be used as backfill both underneath the structure and to tie the structure back to the ground elevation. The final footprint would be approximately 22 ft, the widest of all the alternatives.

Vertical Seawall Measures

Differing from the sloped design of the Revetment, the following alternatives (sections 4.4 through 4.6) are vertical in nature. The vertical wall alternatives, or seawalls, are constructed parallel to the shoreline and function as rigid, vertical or near vertical retaining walls (Figure 23). They are intended to hold soil in place, survive the impacts of waves/currents and provide for a stable shoreline. Suitable applications are in high energy settings and sites with pre-existing hardened shoreline structures. These types of structures are commonly used along bay and ocean shorelines. The material options include various types of sheet pile, grouted rock, and prefabricated or cast in place concrete elements. Advantages of the seawall measures include prevention and/or reduction of storm surge flooding, resistance to strong wave forces, shoreline stabilization behind the structure, low maintenance costs, and a limited footprint. Disadvantages include potential erosion in front or to ambient shorelines of the structure due to wave reflection, disruption of sediment transport leading to beach erosion, higher up-front costs, visually obstructive, loss of intertidal zone, prevention of upland from being a sediment source to the system and may be damaged from overtopping. The vertical or near vertical property of these measures creates an increase in runup and overtopping compared to the sloped revetment (~0.4 ft) as the waves are not able to dissipate energy over a slope. They can cause relatively large environmental impacts in and out of the water, impacts may not be reversible, there is minimal maintenance, and permits are required. The vertical measures proposed in the following sections include a precast concrete wall, a rubble masonry wall, and a secant wall.

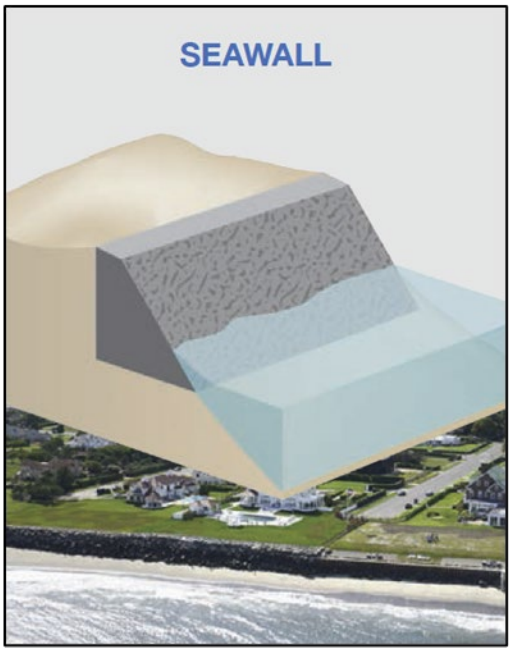

Figure 23. Seawall Measure

4.4. Precast Concrete Wall

The proposed precast concrete wall acts as a cantilever retaining wall. These types of cantilever retaining walls utilize the weight of the backfill to provide resistance to the lateral earth pressures. The precast concrete panel wall consists of individual concrete panels that are installed throughout the length of the project. This type of structure provides adequate structural stability with the buried reinforced section of the panel wall and adequate overtopping protection from the crest elevation. The footprint of the precast concrete wall is shown in Figure 24.

Figure 24. Precast Concrete Wall Preliminary Alternative Footprint

4.4.1. Preliminary Design

This design of the Precast Concrete Wall is as follows. The wall will be constructed of precast concrete panel units. The panels can be cast either on-site or cast off-site and transported to the site. Existing conditions indicate a natural limestone bench at -2.5 feet (MSL) on top of which the panels would sit. This structure relies upon the weight of the structure, and the weight of the earth on top of the buried section to prevent sliding, overtopping due to rotation and resistance to wave forces. Placement would replace the existing seawall.

The concrete panels were determined to be approximately 1 ft. thick and would extend upward from the existing ground level at the limestone bench (-2.5 ft MSL) to +9 ft. (MSL). The buried panel section would extend landward 7 ft. and the entire panel would be no less than 1 ft. thick. A typical cross section of the precast concrete wall is shown in Figure 25.

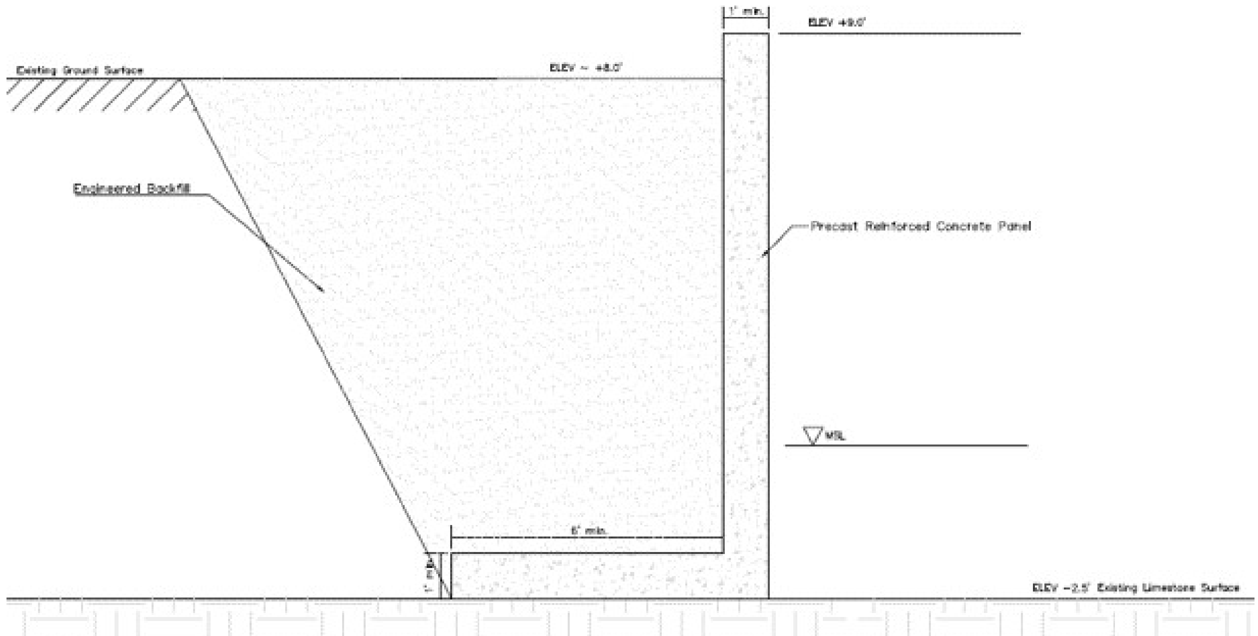

Figure 25. Preliminary Precast Concrete Wall Schematic

4.4.2. Construction

Construction of the precast concrete panel wall will consist of excavating approximately two to three feet of coastal soils and placing the individual wall panels on the limestone shelf. Following the construction of the precast concrete panel wall, the area should be regraded to the elevation of the existing ground surface. It is anticipated that precast concrete panel wall would be installed within the same footprint of the existing wall. The final footprint would be approximately 7 feet at its widest (with 6 ft. buried under ground as shown in Figure 25). The total disturbed area is estimated at approximately 20 feet due to excavation and backfill of the existing soils. In addition to the approximately 20 feet of disturbed area, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

4.5. Concrete Rubble Masonry Wall

A concrete rubble masonry (CRM) wall consists of a CRM wall bearing on a reinforced concrete foundation. The CRM wall would be a vertically oriented structure generally shore-parallel along the shoreline to protect from overtopping due to waves and water levels and to fix the shoreline so erosion cannot occur landward. CRM walls are typical structures used throughout the area. The CRM wall footprint is shown in Figure 26.

Figure 26. CRM Wall Preliminary Alternative Footprint

4.5.1. Preliminary Design

The CRM wall would replace the existing sea wall and be constructed in two parts. The first, a reinforced precast concrete base, and the second, the CRM wall which would sit on top of the concrete foundation. The precast concrete base can be cast either on-site or cast off-site and transported to the site. Existing conditions indicate a natural limestone bench at -2.5 feet (MSL). The concrete base would sit on top of the limestone bench. The proposed CRM wall will act as a gravity retaining wall. Gravity retaining walls use their own weight to resist the lateral earth pressures. The typical cross section for a CRM wall is shown in Figure 27.

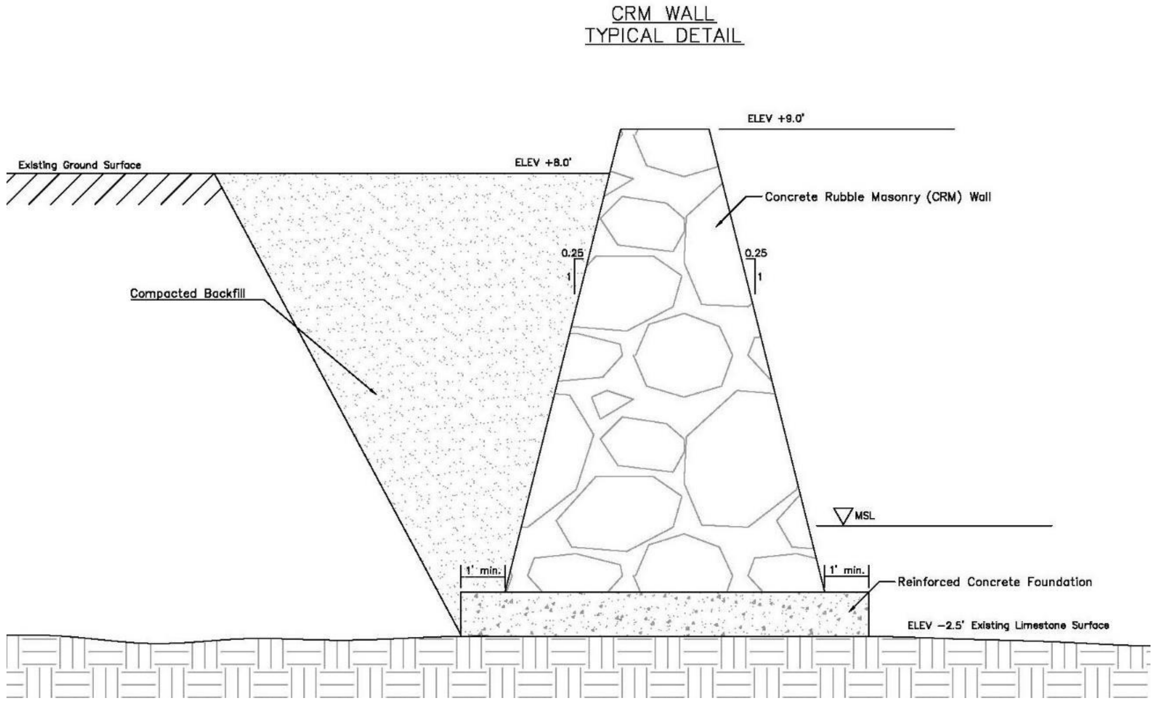

Figure 27. Preliminary CRM Wall Schematic

4.5.2. Construction

Construction of the CRM wall would consist of excavating approximately two to three feet of coastal soils and placing the reinforced concrete foundation on the limestone shelf. Following the construction of the reinforced concrete foundation, a CRM wall will be installed to the planned project heights (+9' MSL). After the CRM wall is constructed on top of the concrete foundation, the area should be regraded to the elevation of the existing ground surface. Based on the proposed CRM cross-section, the final footprint would be approximately 9 feet with the total disturbed area being approximately 20 feet due to excavation and backfill of the existing soils. In addition to the approximately 20 feet of disturbed area, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

4.6. Secant Wall (Screened Out)

Secant piling is a robust, rigid system which can be used to construct earth retention walls. A secant wall is a vertically oriented structure, constructed shore-parallel along the shoreline, to protect from overtopping due to waves and water levels and to fix the shoreline so erosion cannot occur landward. A secant wall is comprised of drilling overlapping concrete columns. The secant wall footprint is shown in Figure 28.

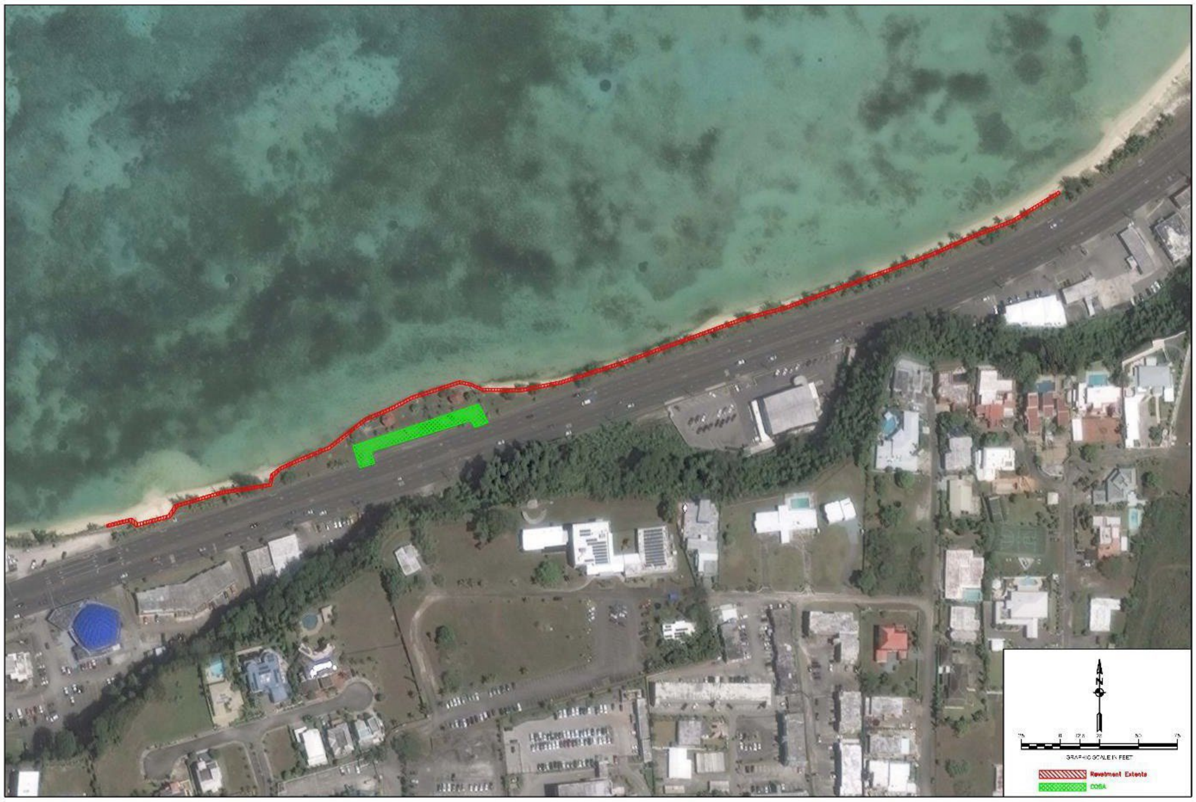

Figure 28. Secant Wall Preliminary Alternative Footprint

4.6.1. Preliminary Design

The Secant wall could replace the existing seawall or the position could also be shifted to the landward side of the seawall. The benefit of placing the secant pile wall behind the existing wall is added flexibility to the construction schedule, and/or a cost savings on demoing the existing seawall. Secant walls overlap individual piles which allows for flexible layouts accommodating linear or curved alignments with multiple corners. Vertical reinforcement is typically installed only in secondary piles and may be either a steel pile or rebar cage. The top elevation of the structure will be +9 feet MSL. The preliminary secant wall schematic is shown in Figure 29.

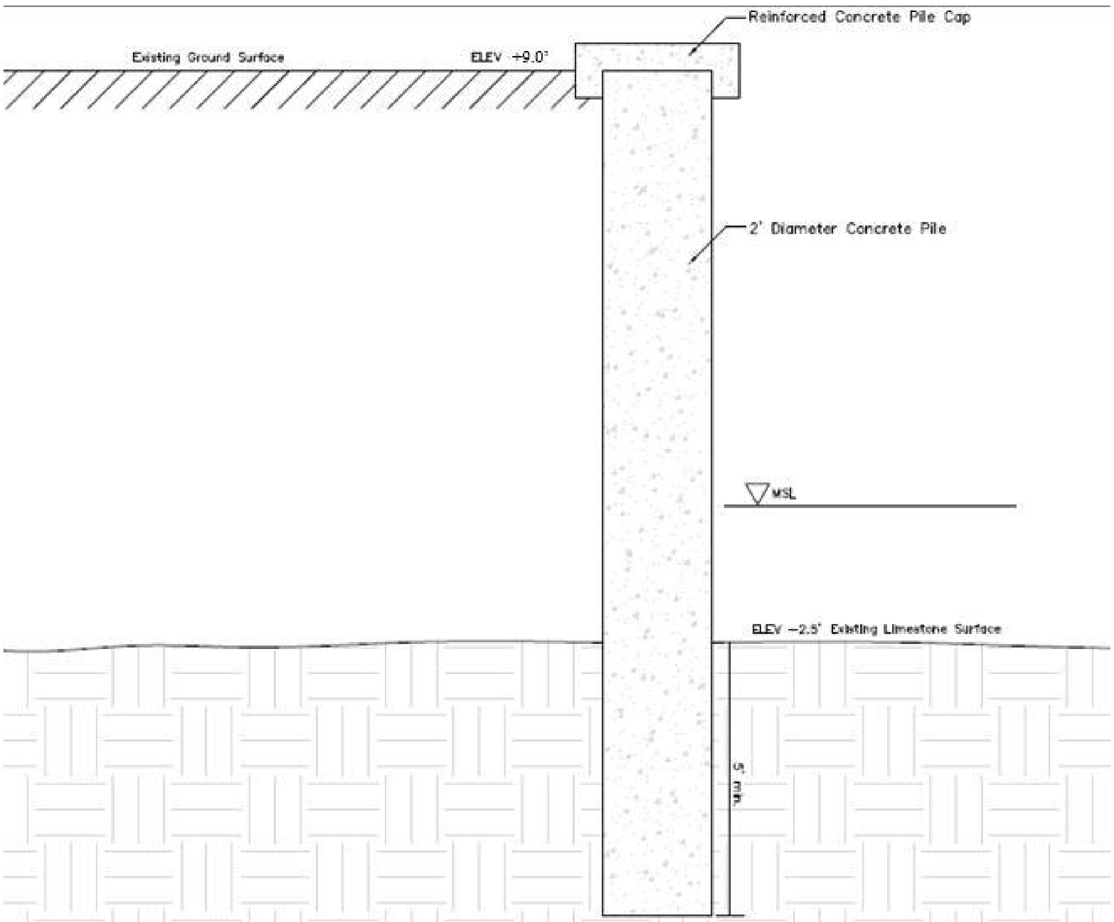

Figure 29. Preliminary Secant Wall Schematic

4.6.2. Construction

The continuous secant wall is constructed by drilling overlapped concrete. A wide range of drilling techniques can be employed allowing the secant pile walls to be constructed in variable ground conditions. The initial or "primary" piles are drilled into existing ground at the selected center spacing. The wall is completed by drilling structurally reinforced "secondary" piles which cut into and overlap with the adjacent primaries.

4.6.3. Screening

The equipment and quantity of concrete required for this measure is significant and would have to be imported from off island. Installation would require specialized drilling equipment that may not be available on island. The import of the specialized equipment and amount of concrete required for this alternative significantly increase the construction costs in comparison to the other measures.

4.7. Permeation Grouting (Screened Out)

Permeation grouting would not replace the existing seawall, but would act to stabilize the foundation of the wall through injection of a flowable grout into granulated soils to fill cracks or voids and form a solid cemented mass. Permeation grouting offers the advantages of being easily performed where access and space are limited, and where no structural connection to the foundation being underpinned is required. A common application of permeation grouting is to provide both excavation support and underpinning of existing structures adjacent to an excavation. It can typically be accomplished without disrupting normal facility operations.

4.7.1. Preliminary Design

Permeation grouting transforms granular soils into sandstone-like masses by filling the voids with low viscosity, non-particulate grout. Sands with low fines content are best suited for this technique. The grouted soil has increased strength, stiffness, and reduced permeability. A full analysis would need to be completed to accurately determine the recommended hole spacing. The current assumption is that a five-foot diamond grid pattern of permeation grout holes would be adequate to repair and support the existing wall. The grout holes would need to be extended a minimum of one foot into the existing limestone shelf. The preliminary permeation grouting schematic is shown in Figure 30.

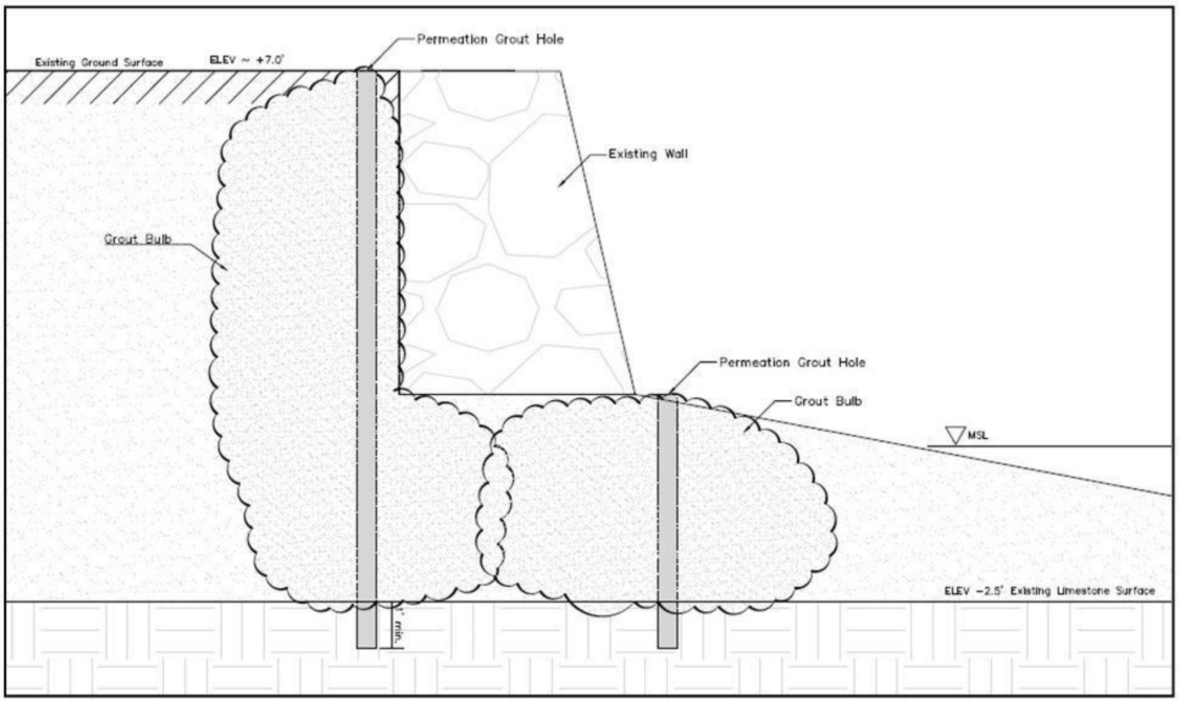

Figure 30. Preliminary Permeation Grouting Schematic

4.7.2. Construction

The permeation grouting would be implemented underneath and behind the existing seawall. Permeation grouting is typically completed by first grouting a sleeve port pipe into a pre-drilled hole. The chemical grout is injected under pressure through the ports. The grout permeates the soil and hardens, creating a sandstone-like mass. The final footprint would be approximately 2 feet landward and 2 feet seaward of the existing wall. In addition, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

4.7.3. Screening

Installation of this measure would require specialized equipment and materials that may not be available on island. Also, given that this measure is typically implemented to provide temporary support, this measure does not meet the standard 50-year engineering design life.

4.8. Beach Nourishment (Screened Out)

Beach Nourishment consists of beach quality sand added from an adjacent or outside source to nourish an eroding beach (Figure *31*). Such nourishment widens the beach and extends the shoreline seaward. Beach nourishment is suitable in low-lying oceanfront areas with available sources of beach quality sand or other native sediments. Vegetated dunes help anchor sand and provide a buffer to protect inland areas from waves, flooding and erosion. Dunes can be strengthened by inclusion of a geotextile tube or rock core. Advantages include the expansion of usable beach area, lower environmental impact than hard structures, flexibility, and ease of redesign along with provision of habitat and ecosystem services. Vegetation can be planted on the dune to increase its resilience to storm events. Disadvantages however include continual sand renourishment required, limited high water protection, application is limited, and there are possible impacts to regional sediment transport. Environmental considerations include large physical footprint requirement, moderate environmental impact, impacts may be reversible, and permitting is required.

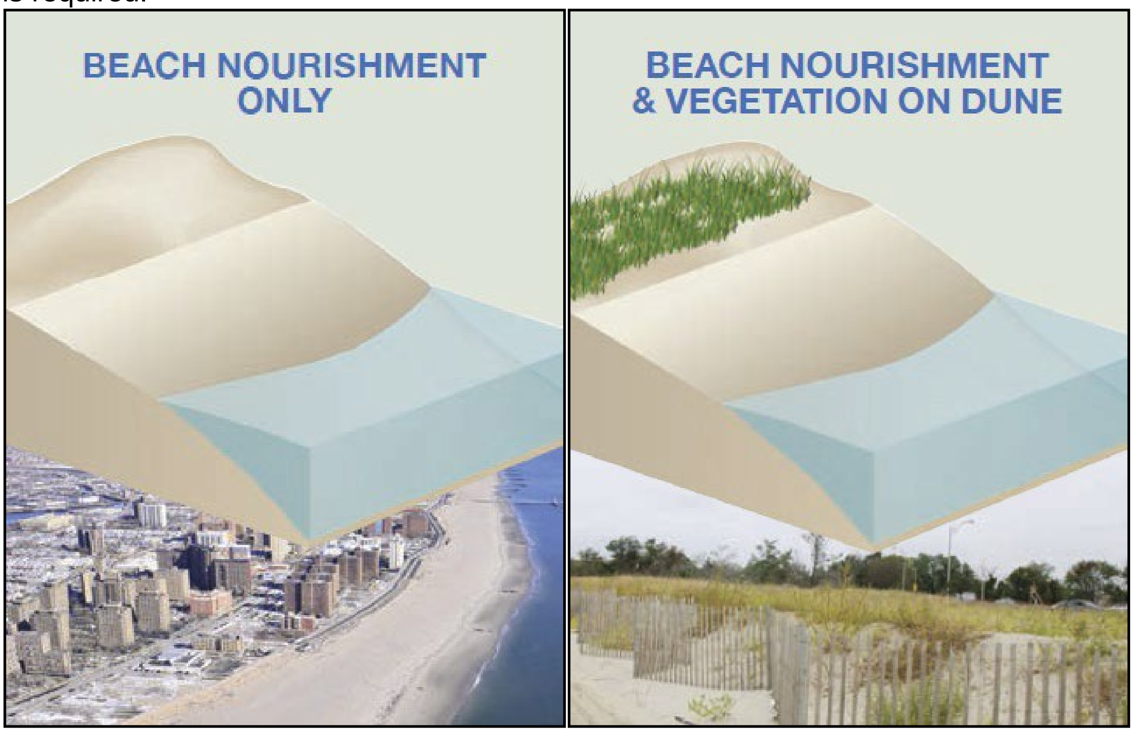

Figure 31. Beach nourishment with and without dune vegetation measure.

4.8.1. Screening

Considering the narrow beach profile of the study area and the observed erosion, widening of the beach footprint, though beach nourishment, could provide some additional protection to the roadway. However, as a location with a limited sediment supply, a source of beach quality sand was not identified. Additionally, the need for regular renourishments would be difficult for the non-federal sponsor to maintain, limiting the longevity of this measure.

5. References

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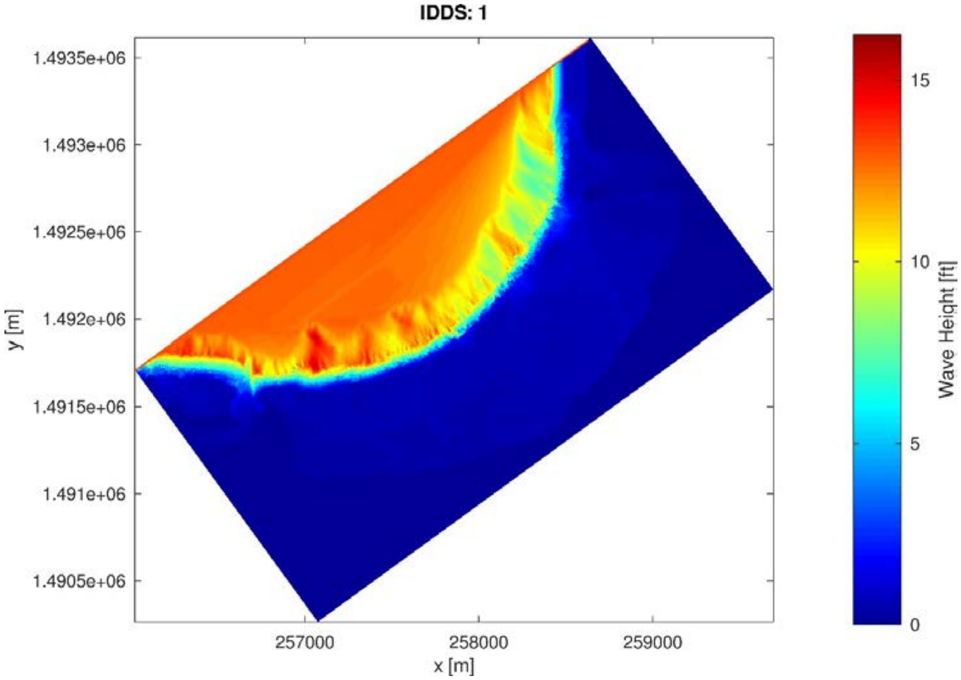
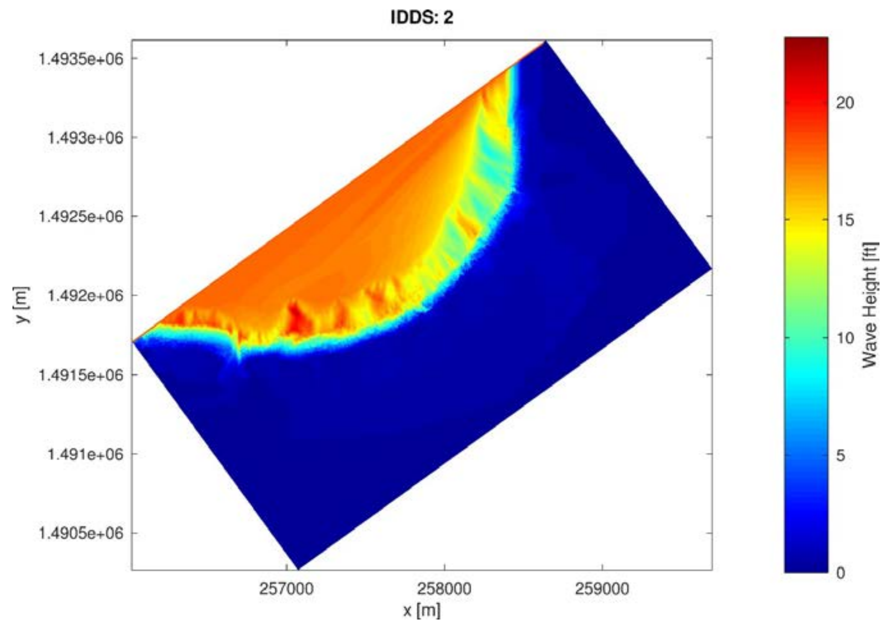
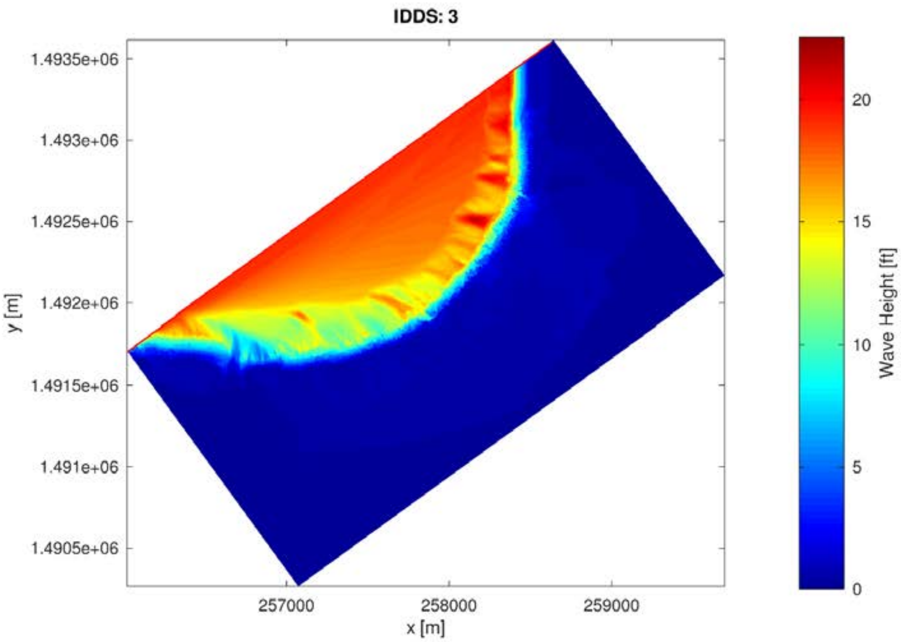
6. Model Output Appendix



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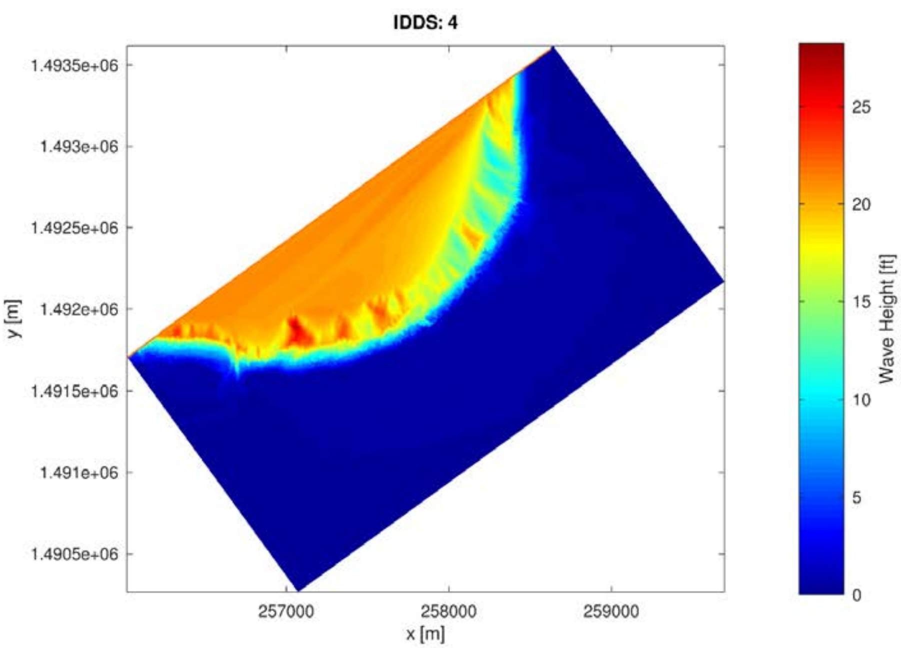
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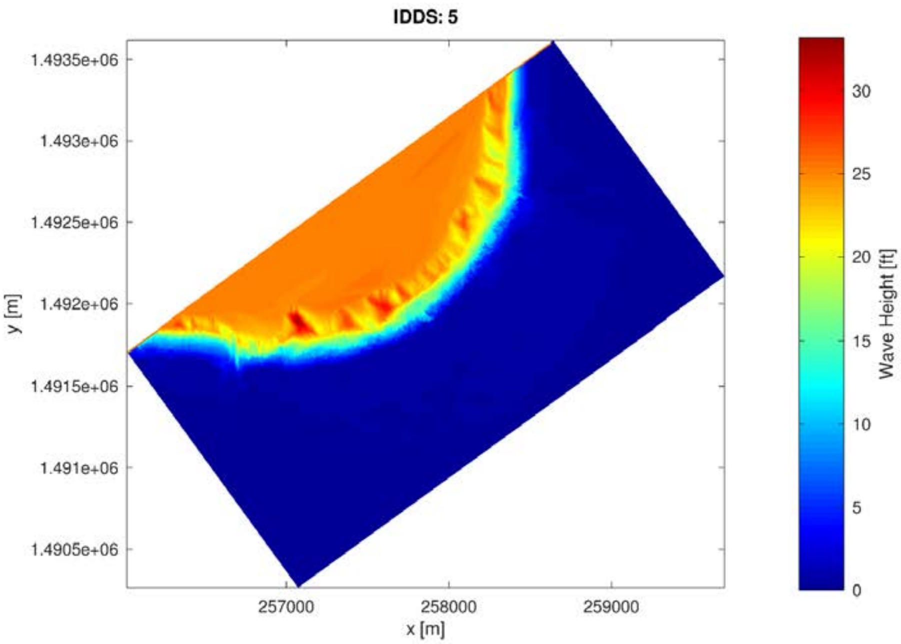
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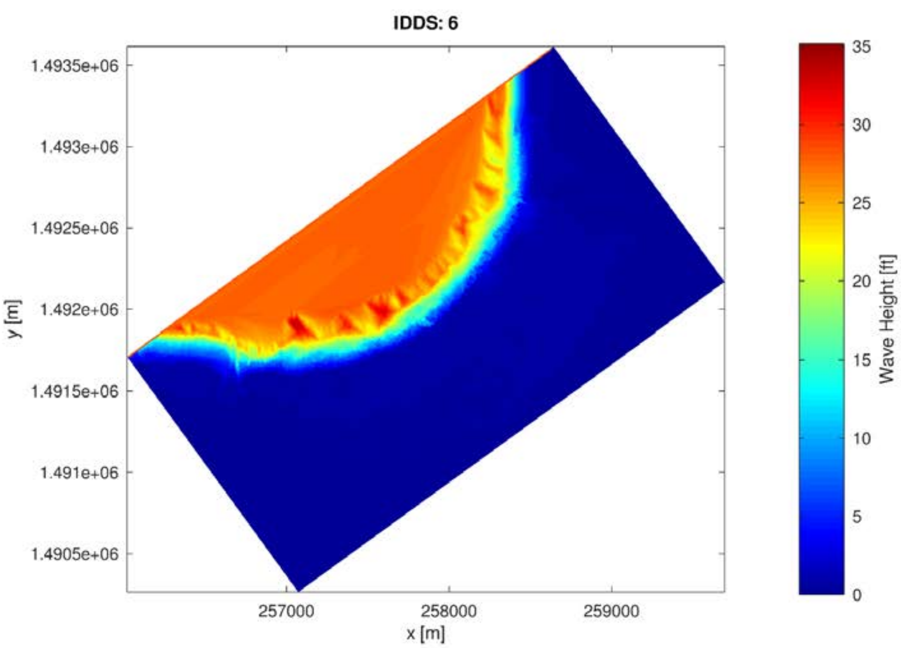
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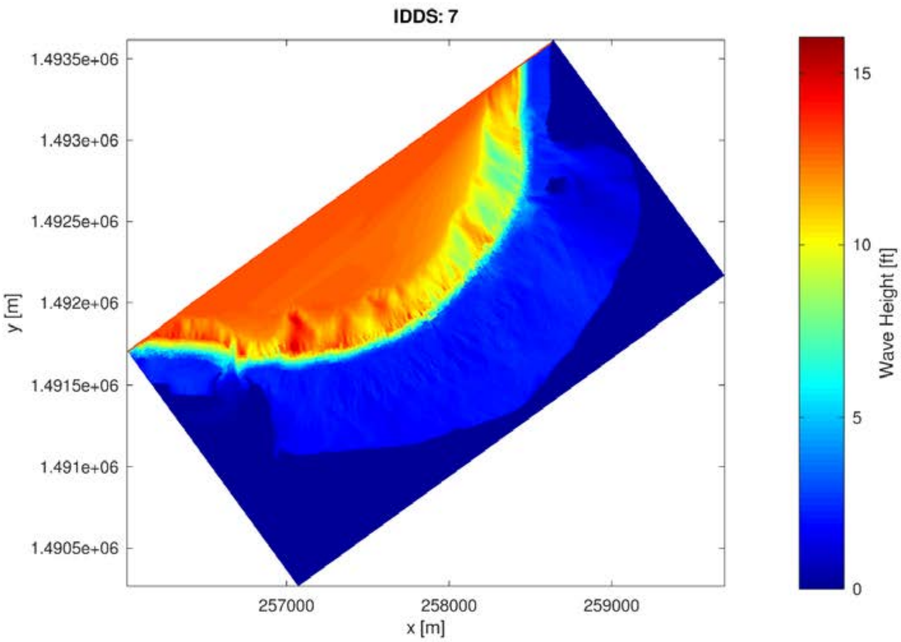
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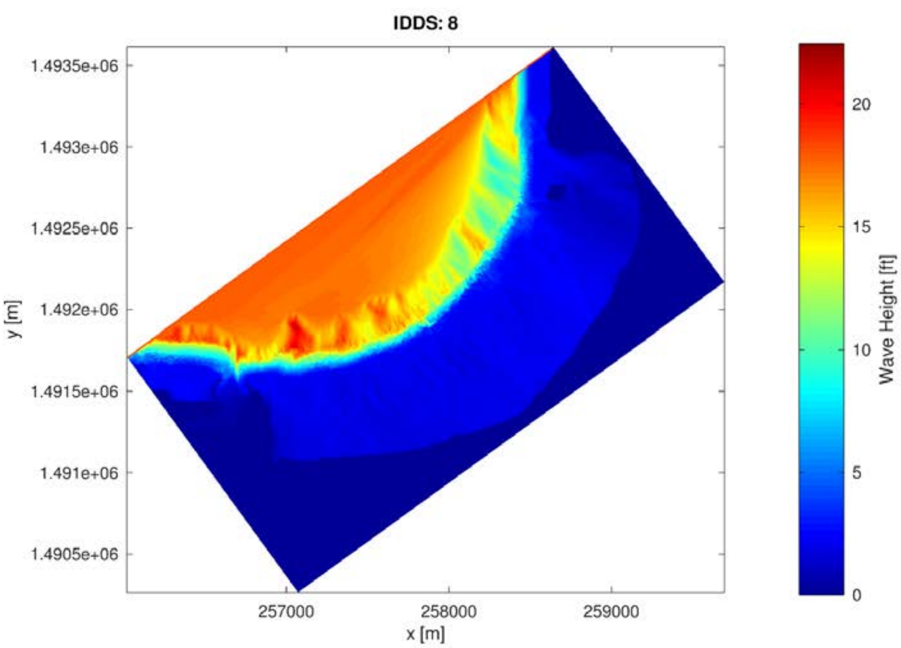
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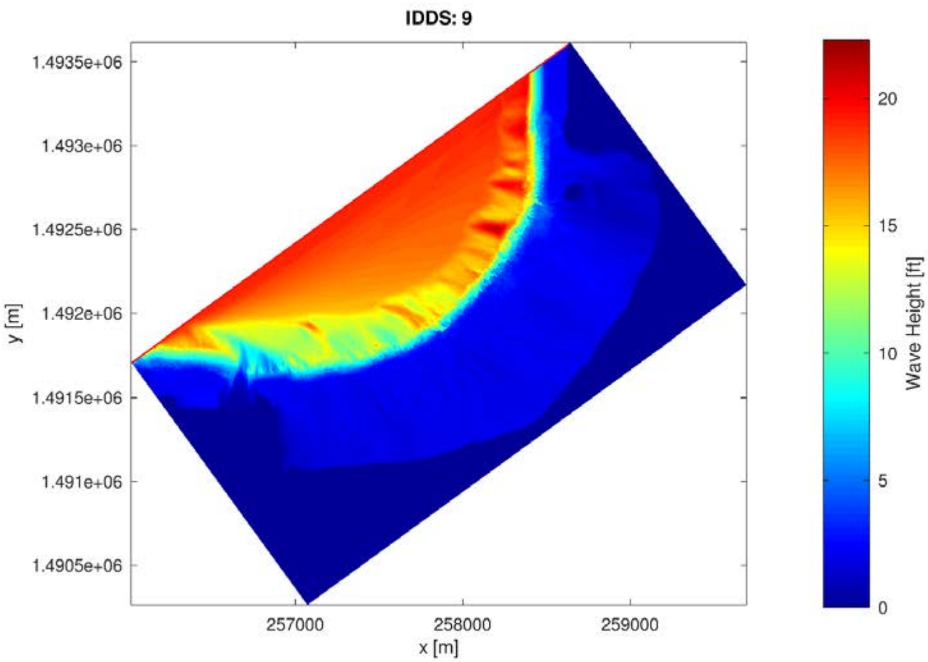
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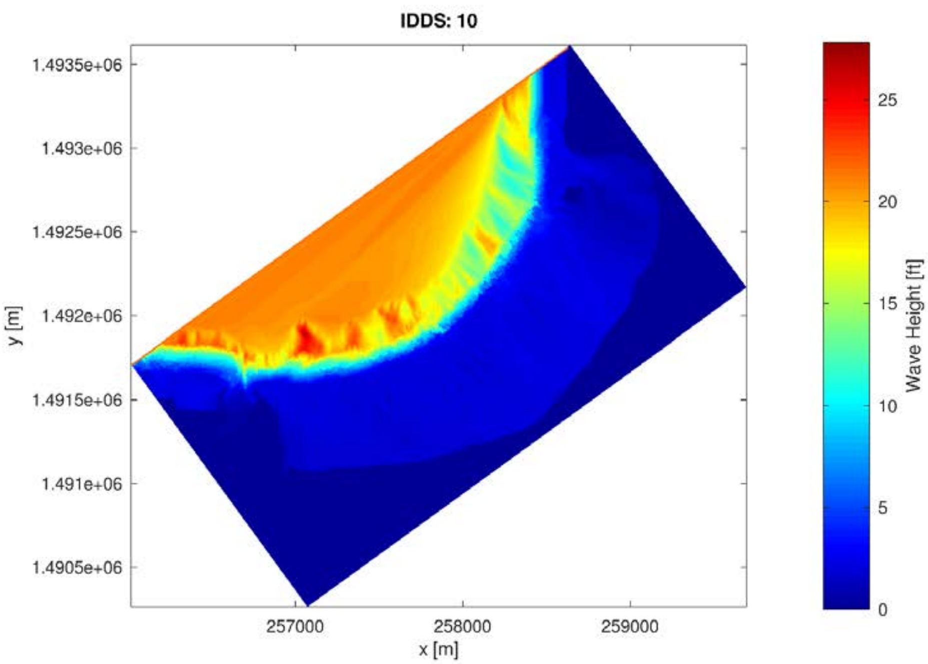
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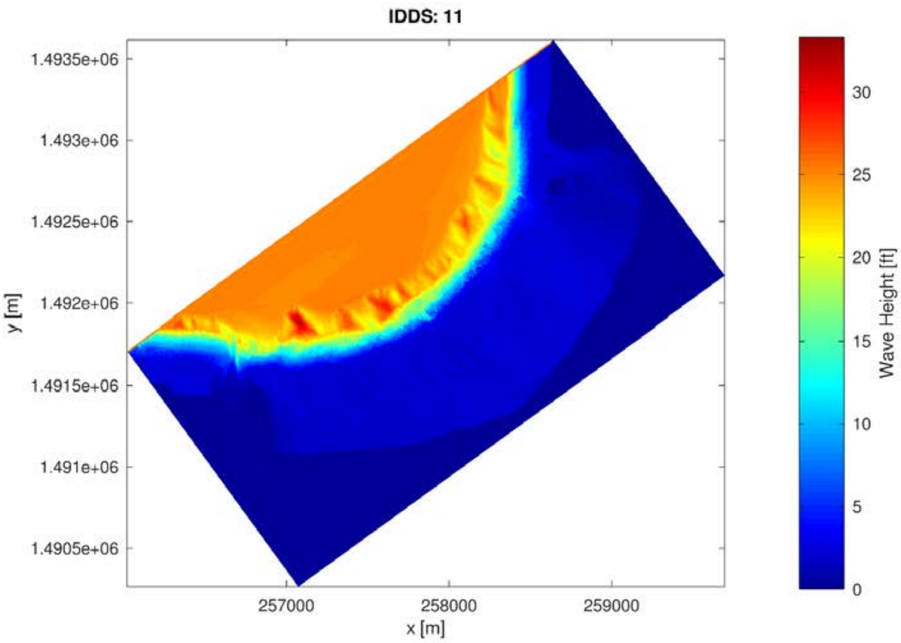

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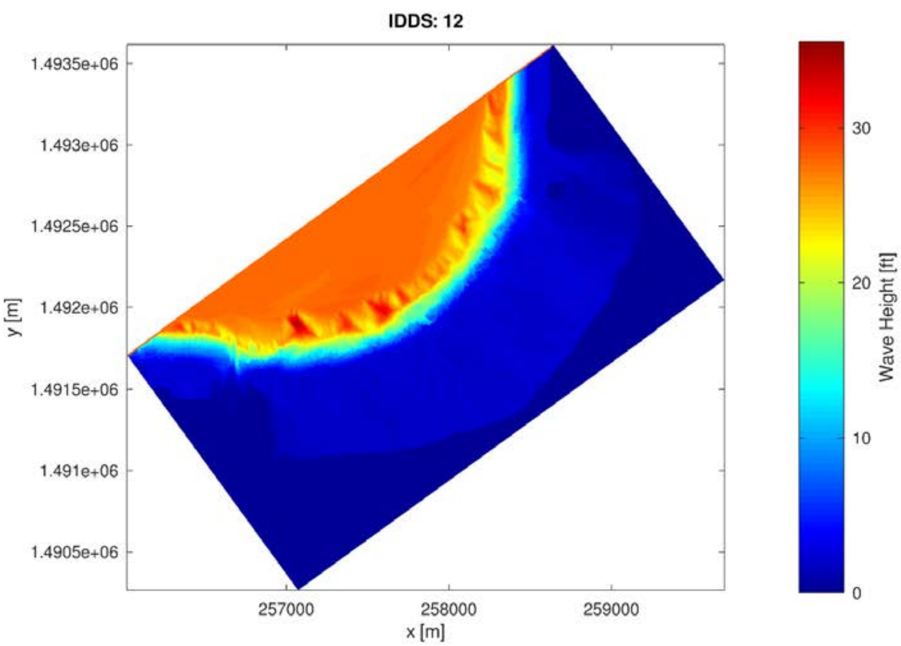

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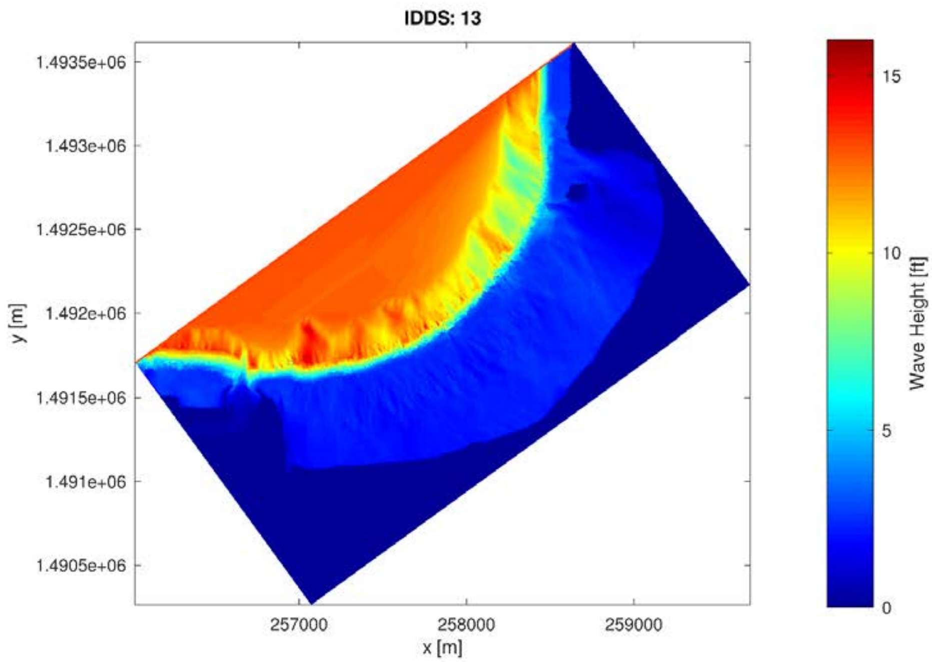
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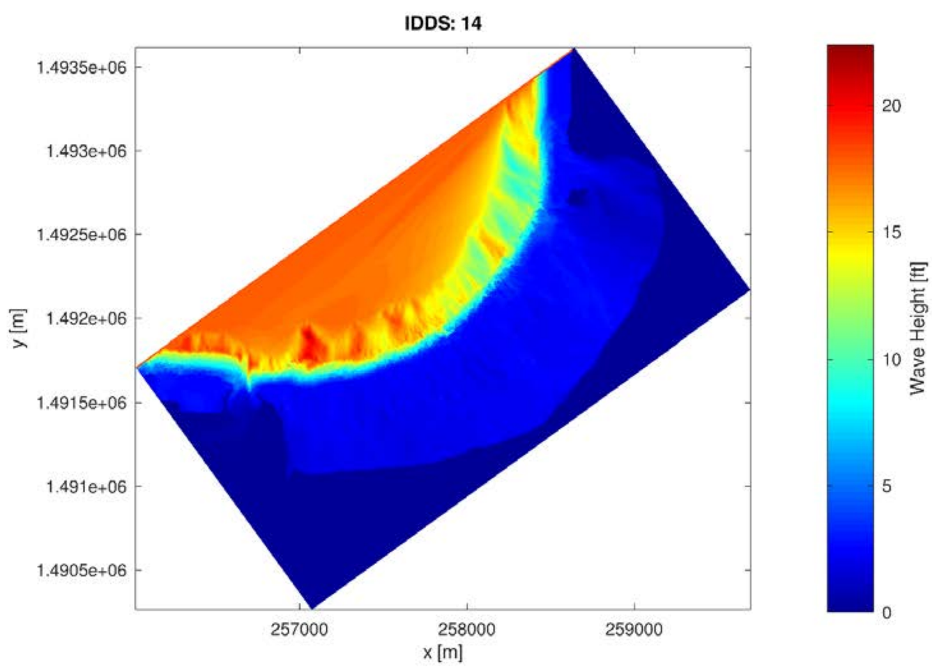
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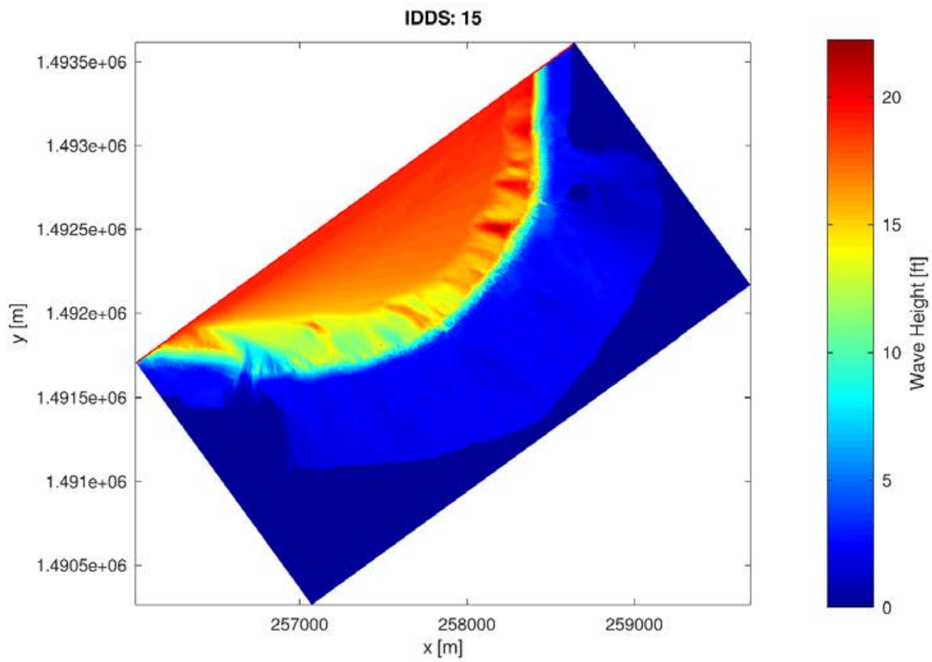
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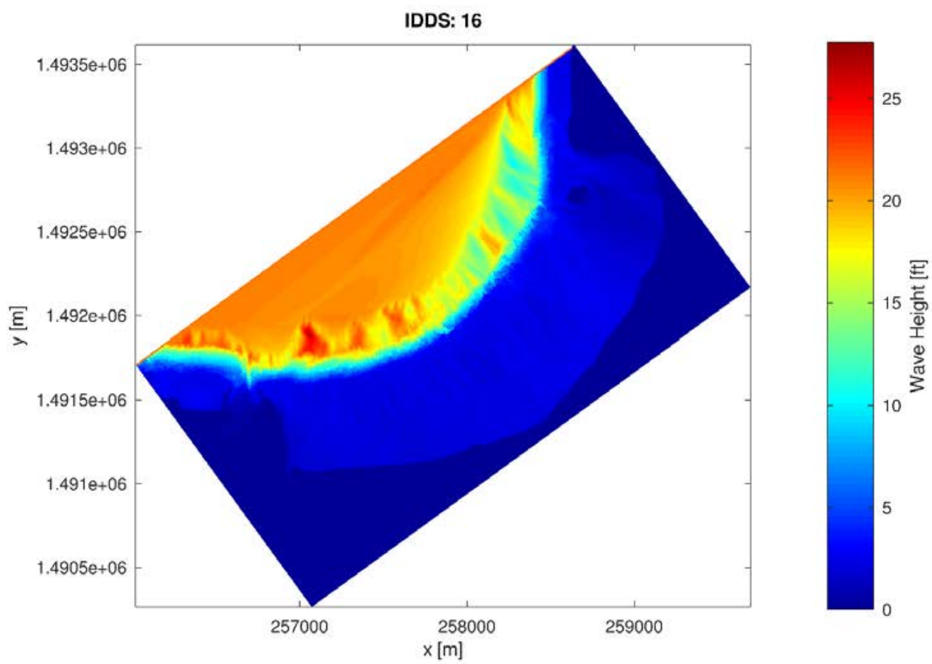
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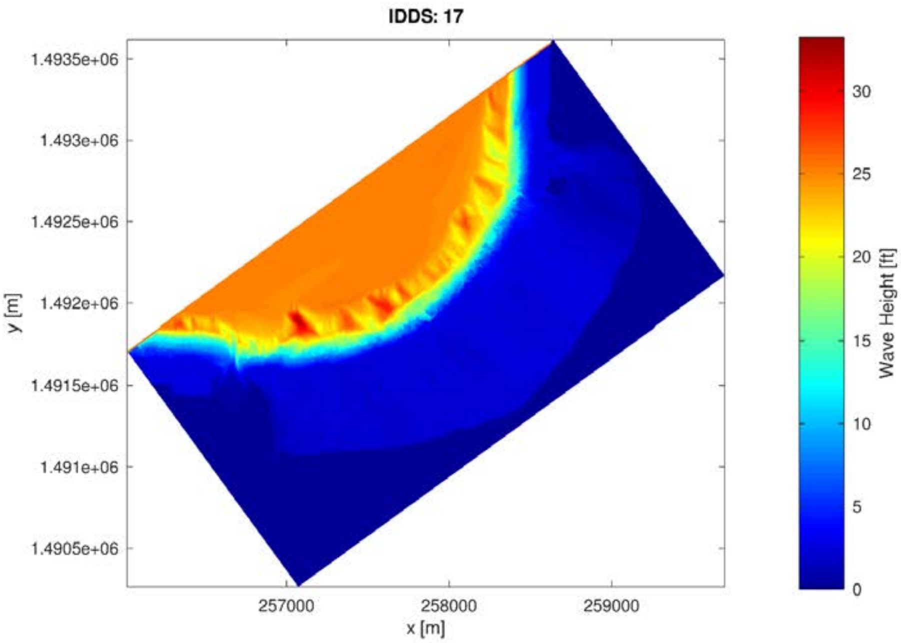
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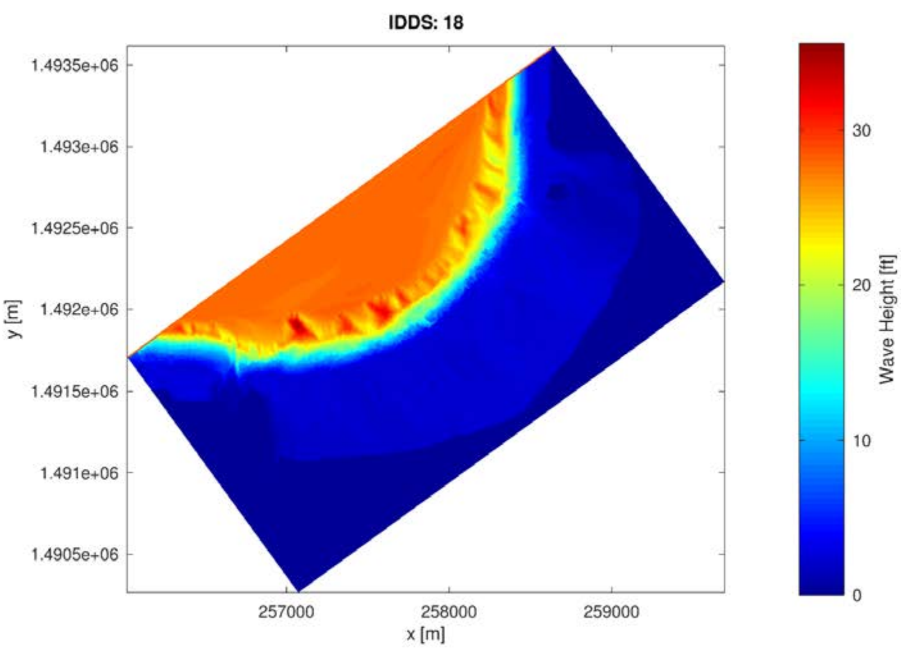
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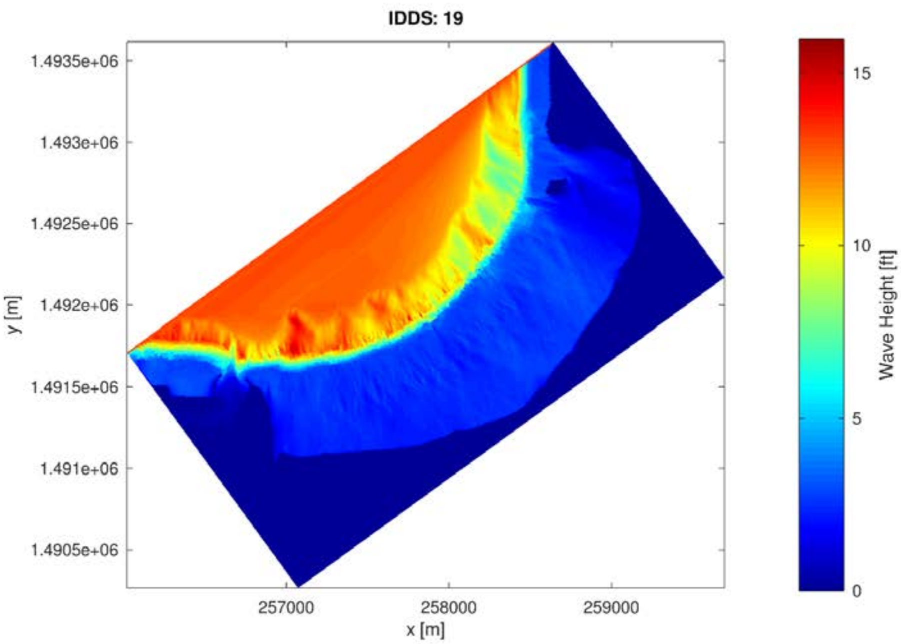
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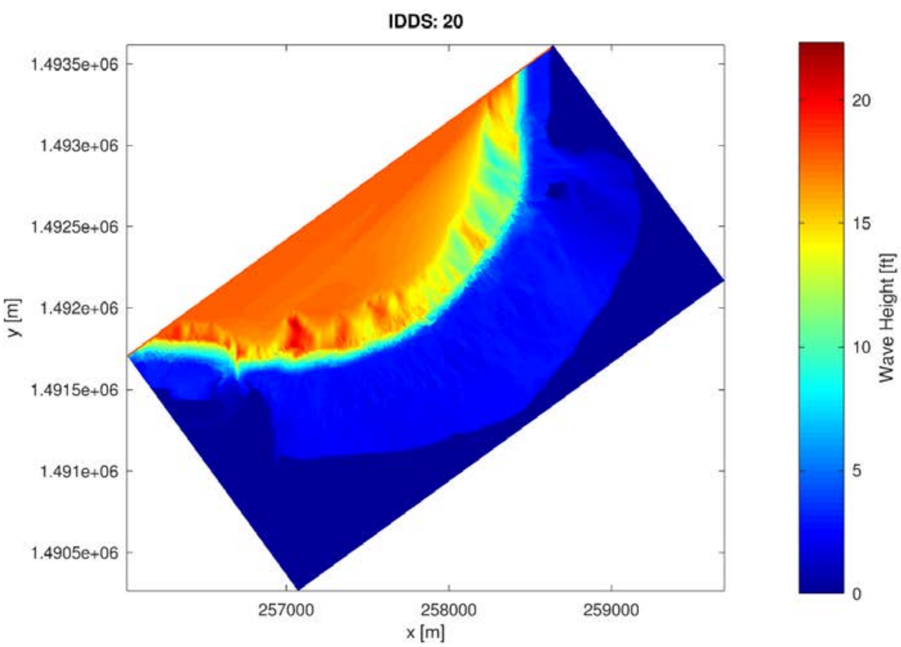
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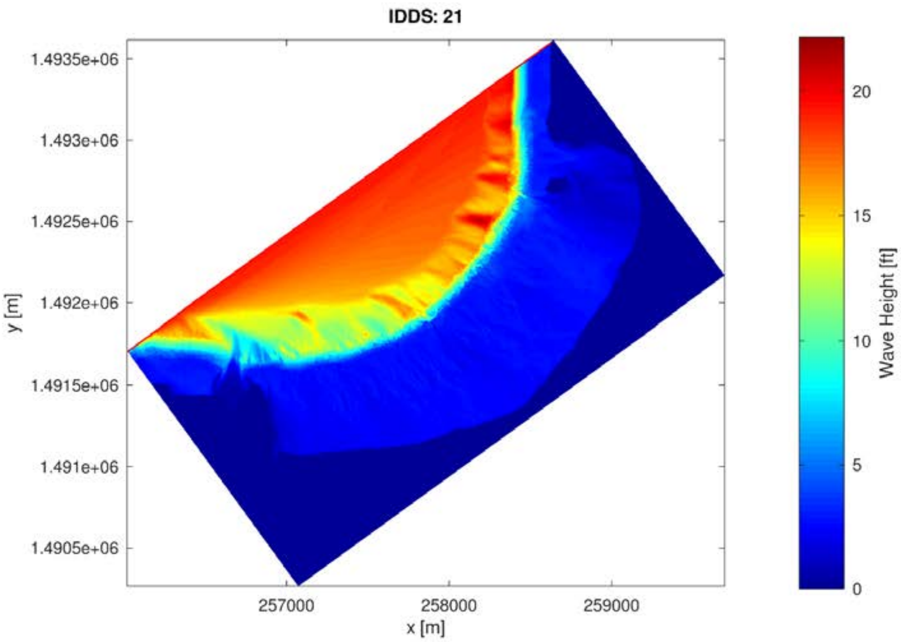
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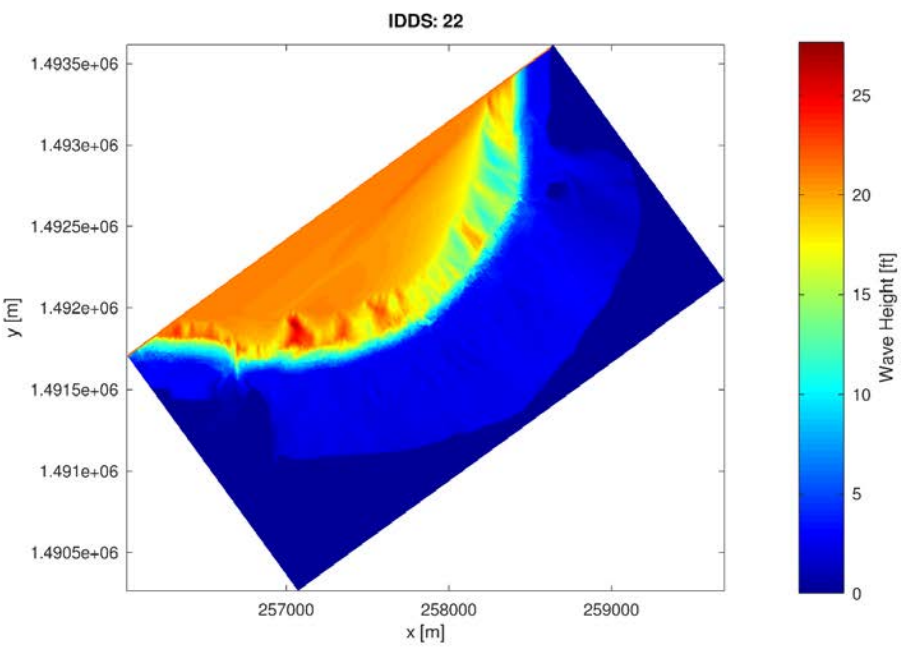
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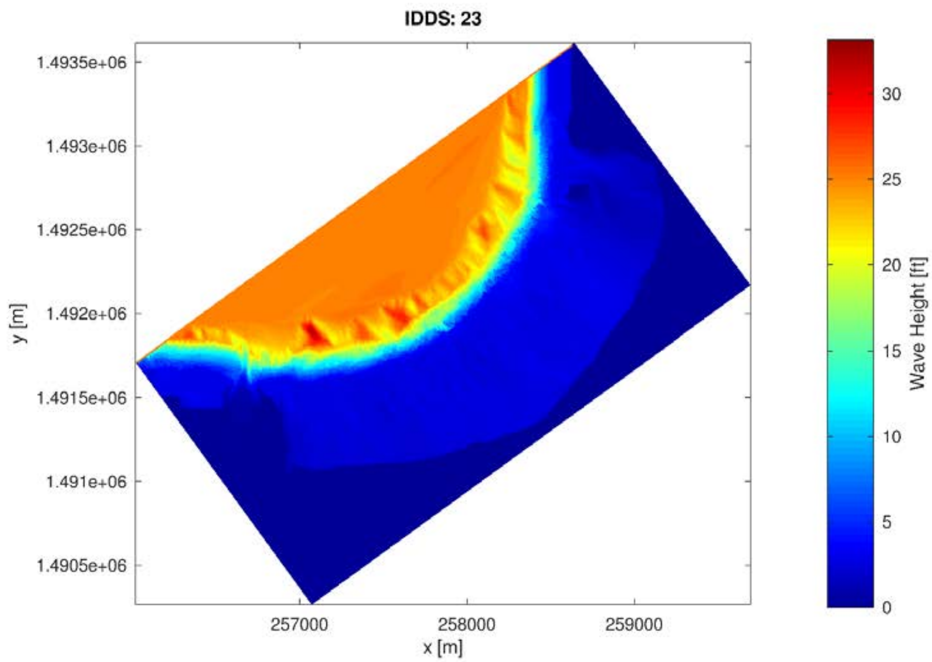
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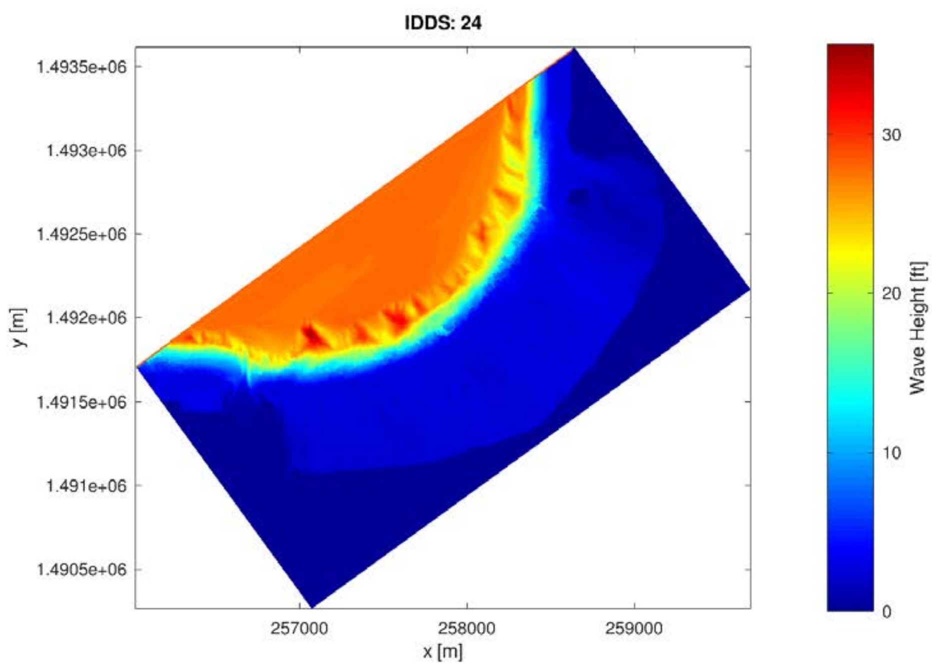
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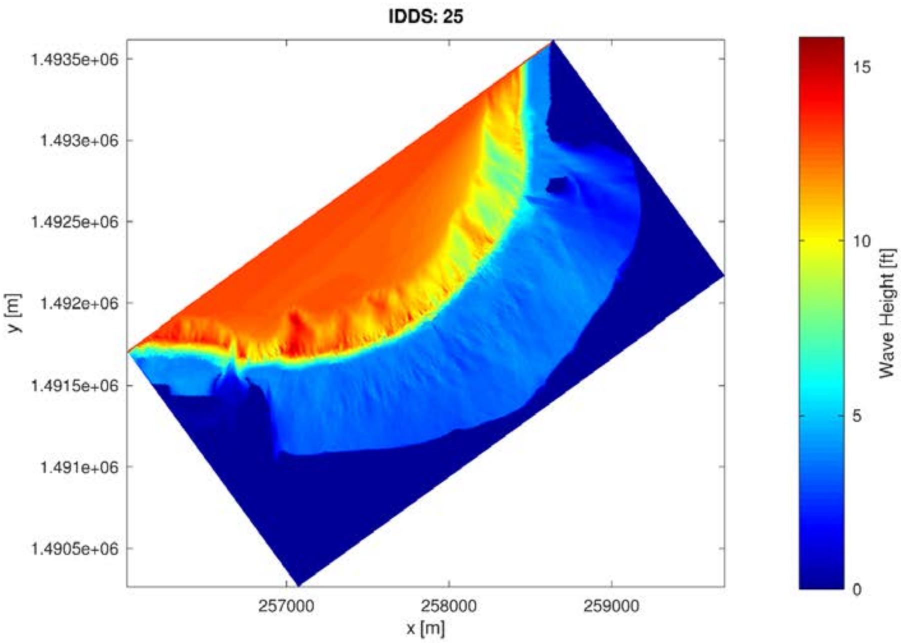
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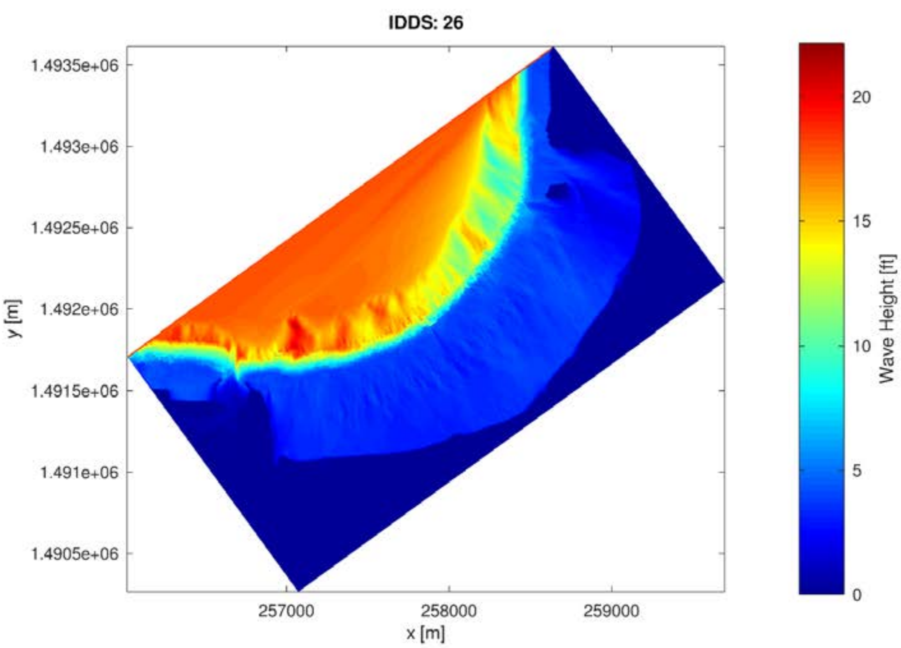
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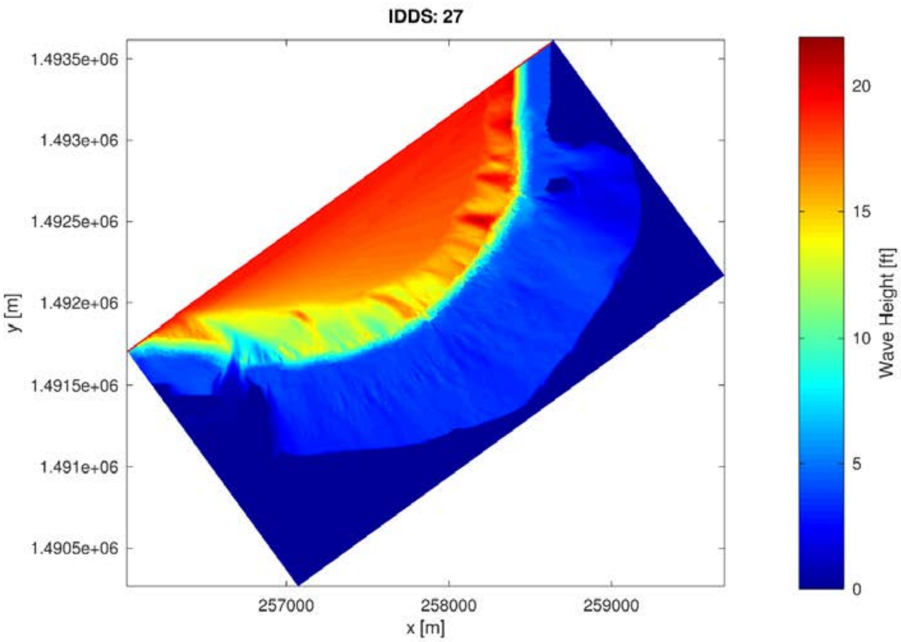
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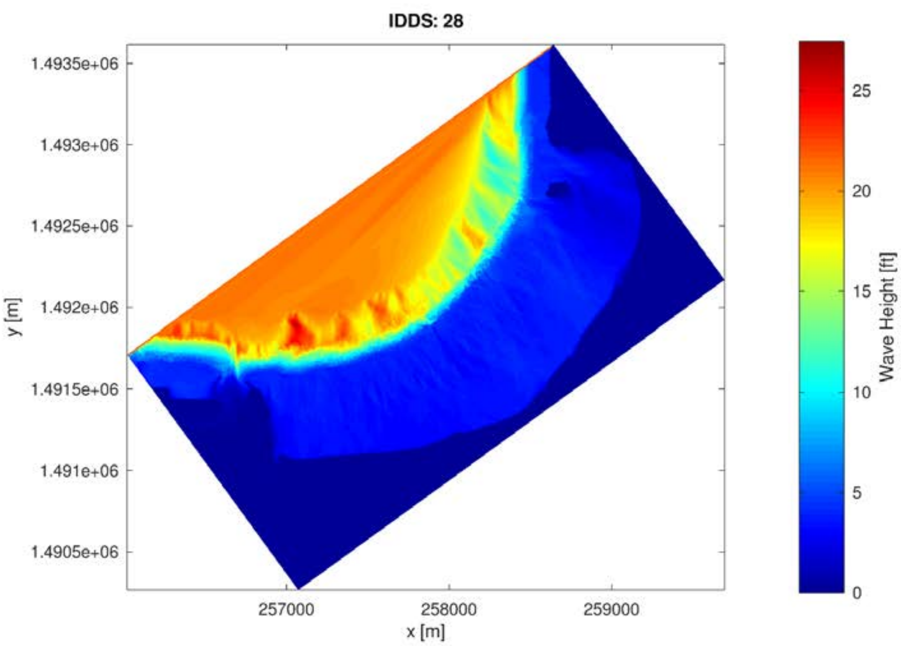
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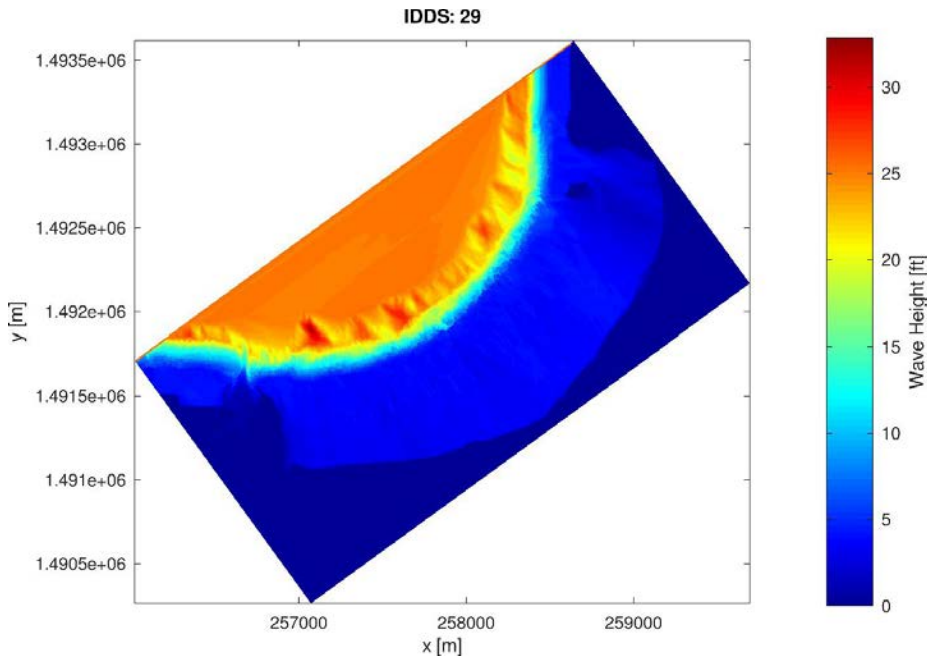
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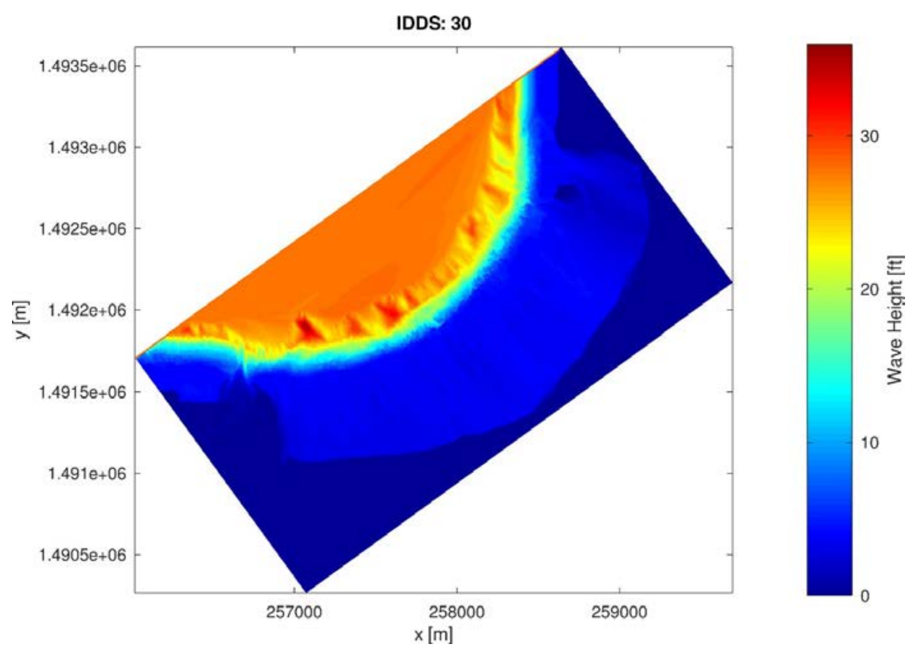
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x [m]
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10
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Wave Height [ft]

Geotechnical Feasibility Report

Section 14 – Emergency Shoreline Protection

East Hagåtña, Guam
Alaska District, Pacific Ocean Division

19 July 2022
Status: Draft

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ALASKA DISTRICT
P.O. BOX 6898
JBER, AK 99506-0898

CEPOA-EC-G-GM 24 March 2022

MEMORANDUM FOR

Civil Works Project Management (CEPOH-PPC), Nickolas Emilio

SUBJECT: Geotechnical Feasibility Report for the Section 14 Emergency Shoreline Protection, East Hagåtña, Guam.

1. Enclosed is the Geotechnical Feasibility Report for the Section 14 Emergency Shoreline Protection in East Hagåtña, Guam. Included with this report are a discussion of existing geotechnical information pertaining to the project and preliminary geotechnical analysis and recommendations.

2. Questions should be addressed to Justin Miller at 907-753-2577 or John Rajek at 907-753-5695.

JUSTIN M. MILLER, P.E.
Geotechnical Engineer
Geotechnical and Materials Section
CEPOA-EC-G-GM

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1. INTRODUCTION

The purpose of this report is to document the anticipated subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to the project described herein, and to introduce a preliminary geotechnical design and construction criteria for the proposed Section 14 Emergency Shoreline Protection in East Hagåtña, Guam. Information and assumptions in this report were developed through a site visit and it is intended for use by design engineers and planners to evaluate the feasibility of proposed flood barrier. Information in this report is not intended for use in construction contract documents.

2. LOCATION AND PROJECT DESCRIPTION

Guam is the largest and southernmost island of the Mariana Islands located South-Southwest of Saipan. Located 3,950 miles west of Hawaii, Guam is the westernmost point of the United States. The island is approximately 30 miles long, 4 to 12 miles wide with an area of 210 square miles and 110 miles of shoreline. Hagåtña Bay is centrally located on the west coast of the island of Guam. The project area is located along Marine Corps Drive in Hagåtña Bay between the villages of Asan and Tamuning and spans approximately 2100 feet.. Coastal flooding and erosion have been investigated by USACE and FEMA under the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 with 8 reports written between 1979 and 1993, but no federally authorized projects exist in the study area.

Figure 1: Approximate Project Location

An existing seawall runs the length of the project area. This wall was built to the elevation of the ground at the time of construction (1990's). However, since then, erosion of the sandy beach underneath the wall has resulted in many sections being critically undercut, and thus degrading the overall performance and functionality of the wall. Due to the continued exposure of the beach to elevated water levels and wave energy, this structure will continue to be susceptible to further damage. **Error! Reference source not found.** shows an example of the damage that exist along the seawall.

Figure 2. Undercutting of Existing Wall

3. FEDERAL INTEREST DETERMINATION

A Federal Interest Determination was conducted in August 2020 authorized under Section 14 of the 1946 Flood Control Act. The authority allows for planning and constructing emergency stream bank and shoreline protection for public facilities in imminent danger of failing. Each project has an expenditure limit of $5,000,000. This study was to determine if a Federal interest exists for creating a cost-shared feasibly study. The study concluded with the following recommendation:

"As the primary north-south route on the island of Guam, Marine Corps Drive plays a significant role in supporting the island's economy as a primary commercial transportation artery, regional and national security connecting Andersen Air Force Base and Naval Base Guam, and access to essential services for the villages to the south. Damage to the existing seawall has put Marine Corps Drive and public utilities in the project area at imminent risk. Future storm events and sea level rise will continue to exacerbate this condition and cause erosion and the resulting damage to accelerate.

The findings of this Federal Interest Determination report are that an implementable solution warranting further Federal involvement has been identified among alternative plans considered. Based on a preliminary project cost and a finding of no feasible option to relocate the public utilities at risk, this report recommends Federal participation in a cost-shared feasibility study for emergency shoreline protection improvements at East Hagåtña, Guam, under Section 14 of the Continuing Authorities Program.

The Government of Guam concurs with the findings of this report and supports continuing to the cost shared feasibility phase of this project."

4. REGIONAL GEOLOGY

Guam is divided across a major fault into two distinct physiographic provinces. To the north is a low-relief limestone plateau with precipitous coastal cliffs standing approximately 200 to 400 feet above sea level. To the south is a deeply dissected west-facing volcanic cuesta with an uplifted limestone unit on its eastern flank, contemporaneous with the cliff-forming unit in the north wand standing approximately 200 feet above sea level. The northern plateau is the detrital Miocene-Pliocene Barrigada Limestone, which extends to the surface in the interior but elsewhere grades laterally and upward into the Pliocene-Pleistocene Mariana Limestone–a reef and lagoonal deposit that dominates the northern plateau. Minor outcrops of Miocene argillaceous Janum Limestone and Holocene reef Merizo Limestone are exposed in coastal areas.

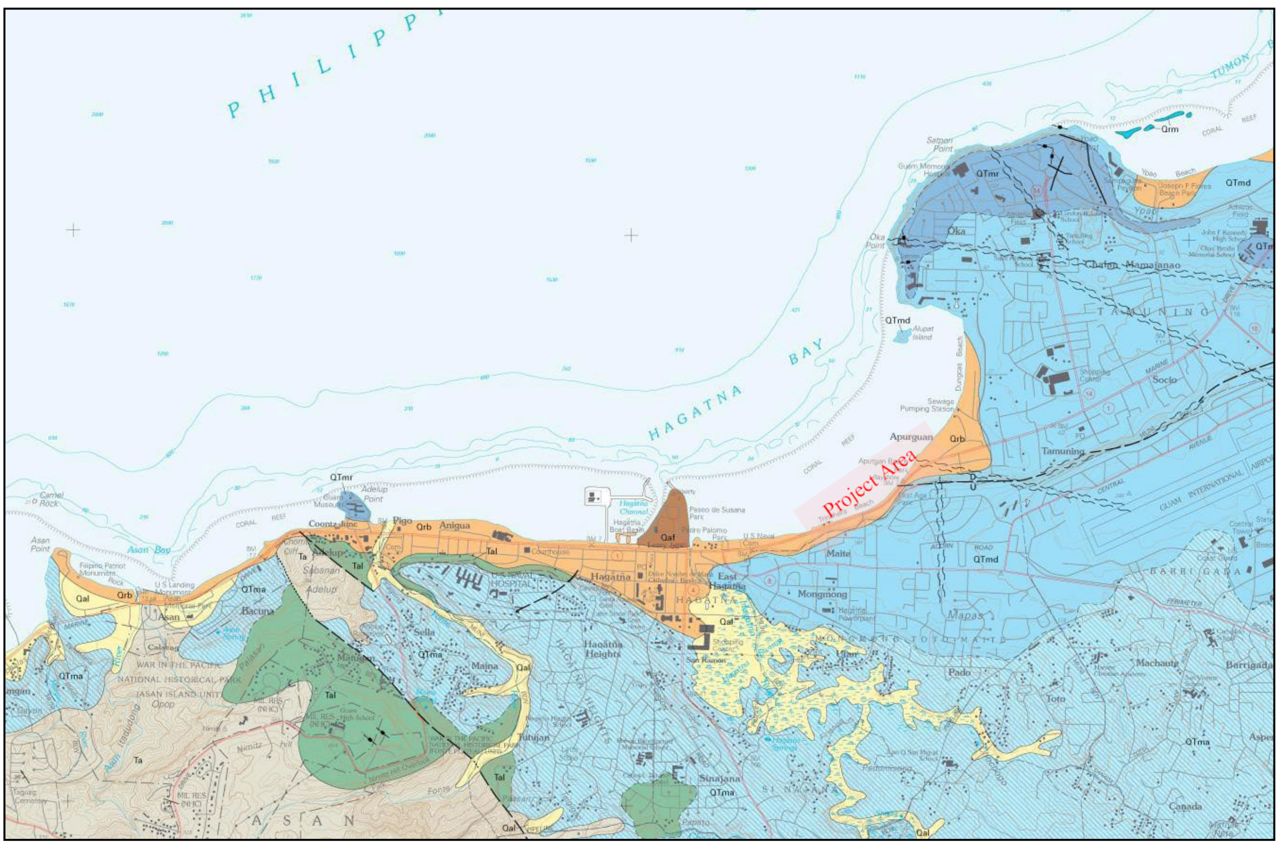


Figure 3: Geologic Map of Hagåtña Quadrangle, Guam

5. GEOTECHNICAL DESIGN CONSIDERATIONS

It is anticipated that the proposed revetment can be constructed successfully for the planned project. However, it is important that prudent consideration be given to certain subsurface conditions and construction aspects. These include foundation soils, stability, seismic concerns, and settlement. This engineering analysis is based on information gathered during the March 2022 site visit. The following sections are based on anticipated conditions and need to be reevaluated following a formal subsurface site investigation.

5.1. Anticipated Soil Profile

Based on conditions encountered during the site visit, it is anticipated that the soils in near the proposed location of the coastal revetment will typically consist of a alluvial soils primarily consisting of loose beach sands transitioning into a limestone shelf approximately 8 feet below the existing ground surface.

5.2. Anticipated In Situ Soil Properties

The soil properties used to design the revetment profile are summarized in Table 1. Typical unit weights from Table 5-2 (Coduto, 2001) and Effective internal friction values were estimated in accordance with Table 3-1 of EM 1110-1-1905, *Bearing Capacity of Soils* (1992). The soil properties in Table 1 are anticipated soil properties and will need to be reevaluated following a formal subsurface site investigation.

Table 1: Anticipated Design Foundation Soil Properties

Interpreted Geology	[1]Approximate Depth (ft)	[2] Engineering Property	Unified Soil Classification Symbol	[3]Unit Weight (pcf)	[3] Friction Angle (degrees)
Alluvial Soils	0 – 8	Loose to Medium Dense	SP, SW	70 – 100 (90)	< 29 (27)
Limestone	8 - 50	Hard / Unweathered	Bedrock	140 – 160 (150)	38 - 55 (48)

[1] Depth is indicated as below the existing ground surface.
[2] Engineering properties are anticipated and should be considered approximate.
[3] Ranges of applicable values are presented, recommended value is shown in parentheses

5.3. Design Factors of Safety

Appropriate factors of safety were utilized to ensure adequate performance of the project throughout its design life. Two important considerations in determining appropriate magnitudes for factors of safety are uncertainties in the conditions being analyzed and consequences of failure and acceptable performance. Table 2 provides applicable factors of safety used in this analysis.

Table 2: Applicable Factors of Safety

Reference	Analysis Condition	Minimum Factor of Safety
EM 1110-1-1904	Settlement Analysis	Conducted to min. crest elevation
EM 1110-1-1905	Bearing Capacity	2.5
EM-1110-2-1902	Slope Stability, End of Construction	1.3
EM-1110-2-1902	Slope Stability, Long Term	1.5
EM-1110-2-1902	Slope Stability, Earthquake Loading	>1.0

5.4. Earthquake Ground Motions

Probabilistic ground motions in Guam (Agana) are summarized in Table 3. The dominant hazard source for all structural periods and all probability levels considered is the upper Benioff-zone seismicity. As the Pacific plate subducts westward, concentrations of Benioff zone earthquakes trade off with depth and distance from the islands, with the result that seismicity at different depths can dominate the hazard at different locations. Overall, the probabilistic ground motions are large, reflecting the high rates of activity and relative proximity of the Benioff-zone, as well as their large maximum magnitudes.

Table 3: Probabilistic Ground Motions (g) for Guam

Parameter	2% in 50 yr	10% in 50 yr
PGA	0.94	0.49
0.2sSA	2.86	1.43
1.0sSA	0.61	0.30

6. ALTERNATIVES AND TENTATIVELY SELECTED PLAN

The study team evaluated seven mitigation alternatives (Alternatives 1 through 7) in the process of recommending a TSP. The seven Alternatives considered are shown in the list below and described is the following sections. Alternative 2, a revetement, was selected as the recommended TSP.

- Alternative 1: No Action
- Alternative 2: Revetment:
- Alternative 3: Precast Concrete Seawall
- Alternative 4: Concrete Rubble Masonry Wall
- Alternative 5: Secant Pile Wall
- Alternative 6: Permeation Grouting
- Alternative 7: Beach Fill with Renourishment

6.1. Alternative 1: No Action

Alternative 1 consist of taking no action to repair the wall. The current wall is not founded on a solid foundation and is undermined by coastal forces. The current condition of the wall does not meet the coastal design requirements and is considered unstable.

6.2. Alternative 2: Revetment (Tentatively Selected Plan)

Engineered revetments reduce the erosive power of the waves by dissipating the wave energy through the interstices of the armor units. It is anticipated that the revetment will be able to be constructed with local quarried limestone bearing on the limestone bench. Construction of the revetment will consist of removing the existing wall and keying the armor stones into the limestone bench. The rock revetment would be constructed from the toe (-2.5 ft. MSL) up to the crest elevation (+9ft. MSL). The rock revetment would be comprised of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of under layer stone, and a double layer of armor stone. To ensure stability of the structure and maintain economic feasibility, the armor stone sizes calculated for the depth limited wave height of 2.8 ft were used in the designs. The expected design life of this system (assuming proper installation and routine maintenance) is on the order of 50 years. An example of a rock revetment is illustrated in Figure 4.

Figure 4. Typical rock revetment

The typical cross section for rock revetment is shown in Figure 5**Error! Reference source not found.**.

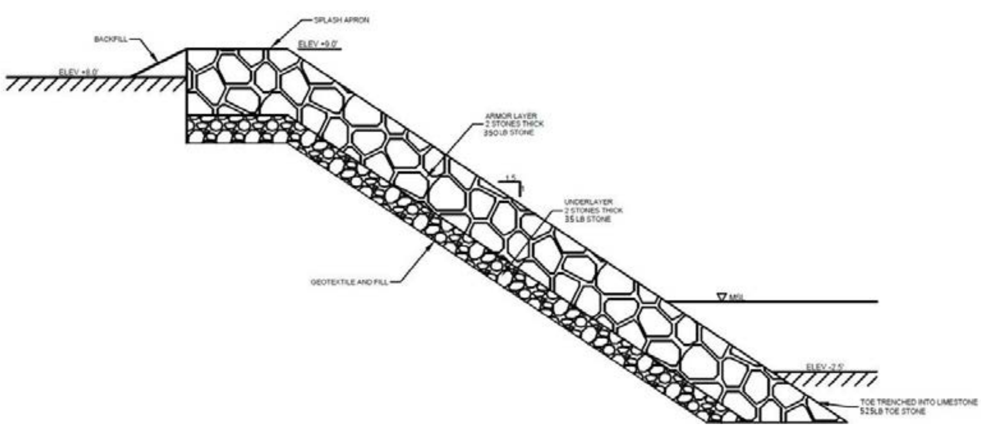


Figure 5. Typical Detail of a Rock Revetment

6.3. Alternative 3: Precast Concrete Panel Wall

A precast concrete panel wall consists individual concrete panels that are installed throughout the length of the project. Construction of the precast concrete panel wall will consist of excavating approximately two to three feet of coastal soils and placing the individual wall panels on the limestone shelf. Following the construction of the precast concrete panel wall, the area should be regraded to the elevation of the existing ground surface. Figure 8 is an example of a precast concrete panel wall.

Figure 6. Typical Precast Concrete Panel Wall

The proposed precast concrete panel wall will act as a cantilever retaining wall. These types of cantilever retaining walls utilize the weight of the backfill to provide resistance to the lateral earth pressures. The typical cross section for a precast concrete panel wall is shown in Figure 7.

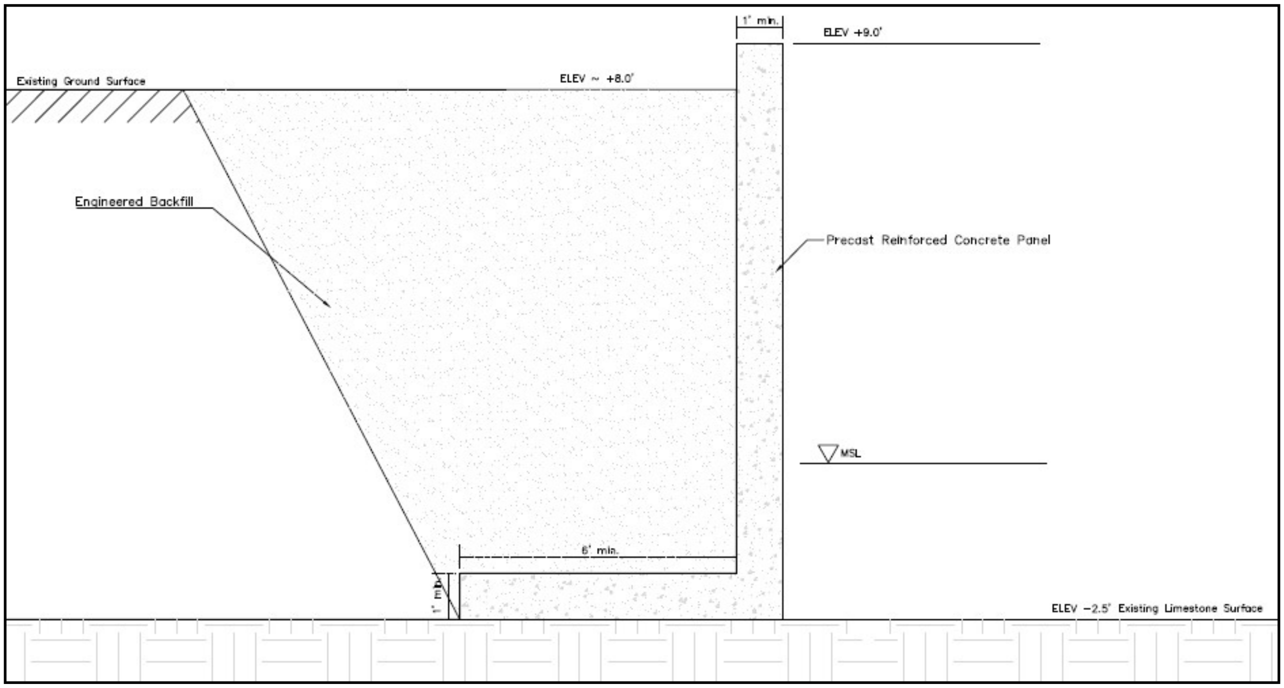


Figure 7. Typical Detail of a Precast Concrete Panel Wall

It is anticipated that precast concrete panel wall would be installed within the same footprint of the existing wall. Based on the proposed precast concrete panel cross-section illustrated in **Error! Reference source not found.** , the final footprint would be approximately 7 feet with the total disturbed area being approximately 20 feet due to excavation and backfill of the existing soils. In addition to the approximately 20 feet of disturbed area, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

6.4. Alternative 4: Concrete Rubble Masonry (CRM) Wall

A concrete rubble masonry wall consists of a CRM wall bearing on a reinforced concrete foundation. Construction of the CRM wall will consist of excavating approximately two to three feet of coastal soils and placing the reinforced concrete foundation on the limestone shelf. The reinforced concrete foundation will need to be keyed into the limestone shelf for slip stability. Following the construction of the reinforced concrete foundation, a CRM wall will be installed to the planned project heights. Following the construction of the CRM wall, the area should be regraded to the elevation of the existing ground surface. Figure 6 illustrates the surface of a CRM wall.

A concrete rubble masonry wall consists of a CRM wall bearing on a reinforced concrete foundation. Construction of the CRM wall will consist of excavating approximately two to three feet of coastal soils and placing the reinforced concrete foundation on the limestone shelf. The reinforced concrete foundation will need to be keyed into the limestone shelf for slip stability. Following the construction of the reinforced concrete foundation, a CRM wall will be installed to the planned project heights. Following the construction of the CRM wall, the area should be regraded to the elevation of the existing ground surface. Figure 8 illustrates the surface of a CRM wall.

Figure 8. Typical surface of a Concrete Rubble Masonry Wall

The proposed CRM wall will act as a gravity retaining wall. Gravity retaining walls use their own weight to resist the lateral earth pressures. The proposed cross section also includes the foundation being keyed into the existing limestone shelf which will increase the structures' ability to resist the lateral loads. The typical cross section for a CRM wall is shown in **Error! Reference source not found.**.

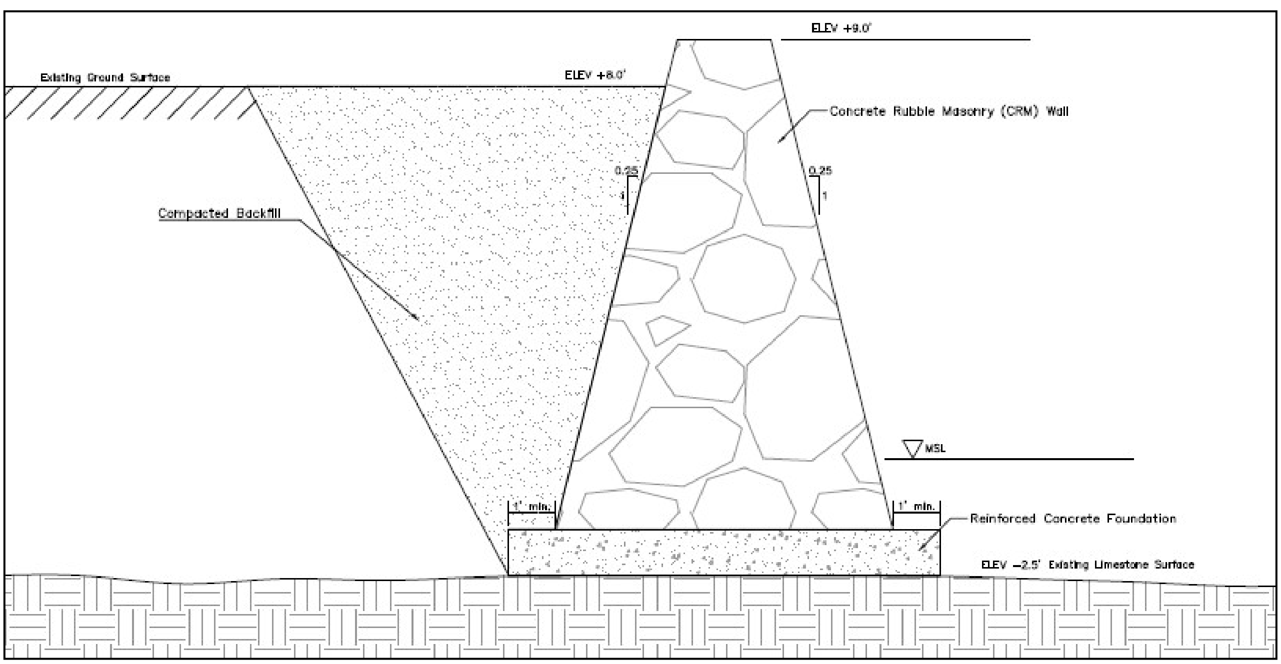


Figure 9. Typical Cross Section Detail of a Concrete Rubble Masonry Wall

It is anticipated that a CRM wall would be installed within the same footprint of the existing wall. Based on the proposed CRM cross-section illustrated in Figure 7, the final footprint would be approximately 9 feet with the total disturbed area being approximately 20 feet due to excavation and backfill of the existing soils. In addition to the approximately 20 feet of disturbed area, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

6.5. Alternative 5: Secant Pile Wall

Secant piling is a robust, rigid system which can be used to construct earth retention walls. The continuous wall is constructed by drilling overlapped concrete. A wide range of drilling techniques can be employed allowing secant pile walls to be constructed in variable ground conditions. The initial or "primary" piles are drilled into existing ground at the selected center spacing. The wall is completed by drilling structurally reinforced "secondary" piles which cut into and overlap with the adjacent primaries. Secant walls overlap individual piles which allows for flexible layouts accommodating linear or curved alignments with multiple corners. Vertical reinforcement is typically installed only in secondary piles and may be either a steel pile or rebar cage.

One benefit of constructing a secant pile wall is that the secant pile wall can be install behind the existing wall. This could add flexibility to the construction schedule, or a cost savings because the existing wall wouldn't necessarily have to be demoed. Figure 10 illustrates the look of an exposed secant pile wall.

Figure 10. Typical Exposed Secant Pile Wall

The proposed precast concrete panel wall will act as a cantilever retaining wall. These types of cantilever retaining walls utilize a rock socket to provide resistance to the lateral earth pressures The typical cross section for a secant pile wall is shown in **Error! Reference source not found.**.

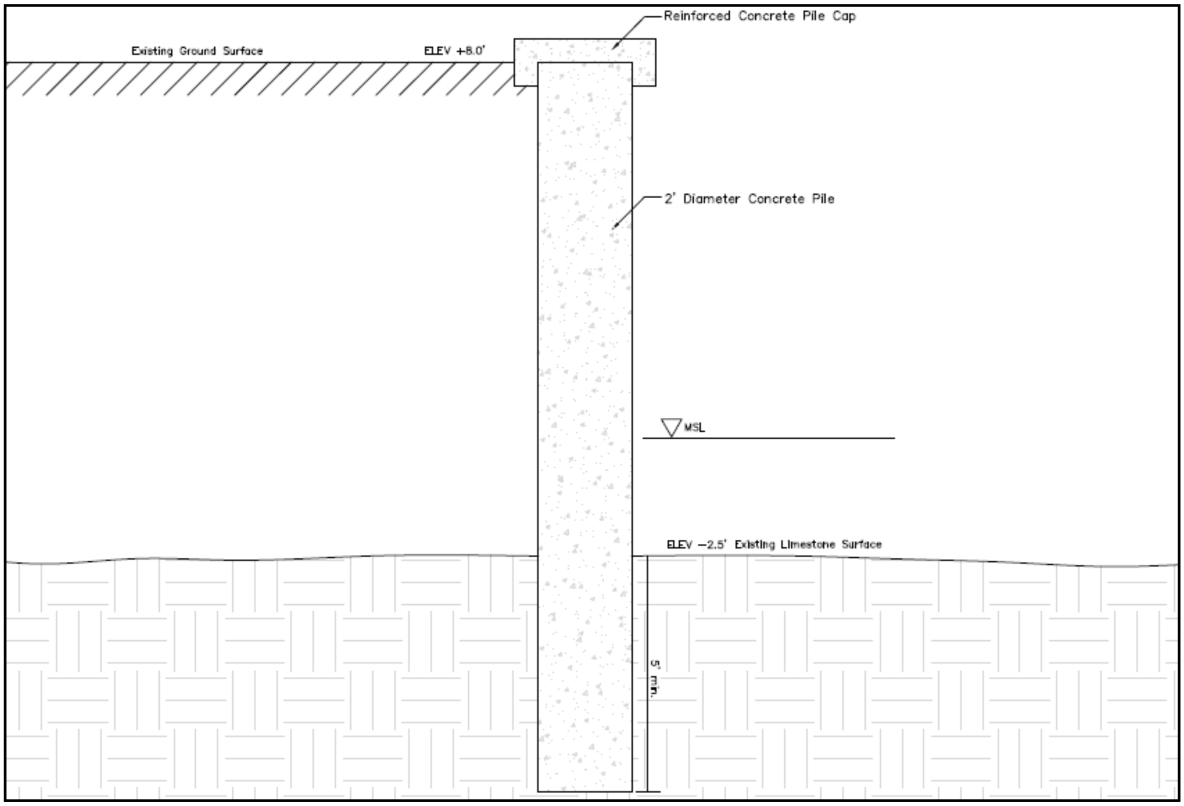


Figure 11. Typical Detail of a Secant Pile Wall

It is anticipated that precast concrete panel wall would be installed landward of the existing wall. Based on the secant pile wall cross-section illustrated in Figure 11, the final footprint would be approximately 3 feet with the total disturbed area being approximately 5 feet. In addition to the approximately 5 feet of disturbed area, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

6.6. Alternative 6: Permeation Grouting

Permeation grouting consists of injecting a flowable grout into granulated soils conditions to fill cracks or voids and form a solid cemented mass. Permeation grouting transforms granular soils into sandstone-like masses by filling the voids with low viscosity, non-particulate grout. Sands with low fines content are best suited for this technique. Typically, a sleeve port pipe is first grouted into a pre-drilled hole. The chemical grout is injected under pressure through the ports. The grout permeates the soil and hardens, creating a sandstone-like mass. The grouted soil has increased strength, stiffness, and reduced permeability. Permeation grouting offers the advantages of being easily performed where access and space are limited, and where no structural connection to the foundation being underpinned is required. A common application of permeation grouting is to provide both excavation support and underpinning of existing structures adjacent to an excavation. It can typically be accomplished without disrupting normal facility operations. Figure 12 illustrates exposed permeation grouting in sandy soils.

Figure 12. Exposed Permeation Grouting in Sandy Soils

One benefit of using permeation grouting to stabilize the existing wall is that this method eliminates the cost for demoing the existing wall.

A full analysis will need to be evaluated in order to accurately determine the recommended hole spacing. It is anticipated that a five-foot diamond grid pattern of permeation grout holes will be adequate to repair and support the existing wall. The grout holes need to be extended a minimum of one foot into the existing limestone shelf.

The typical detail for permeation grout is shown in.

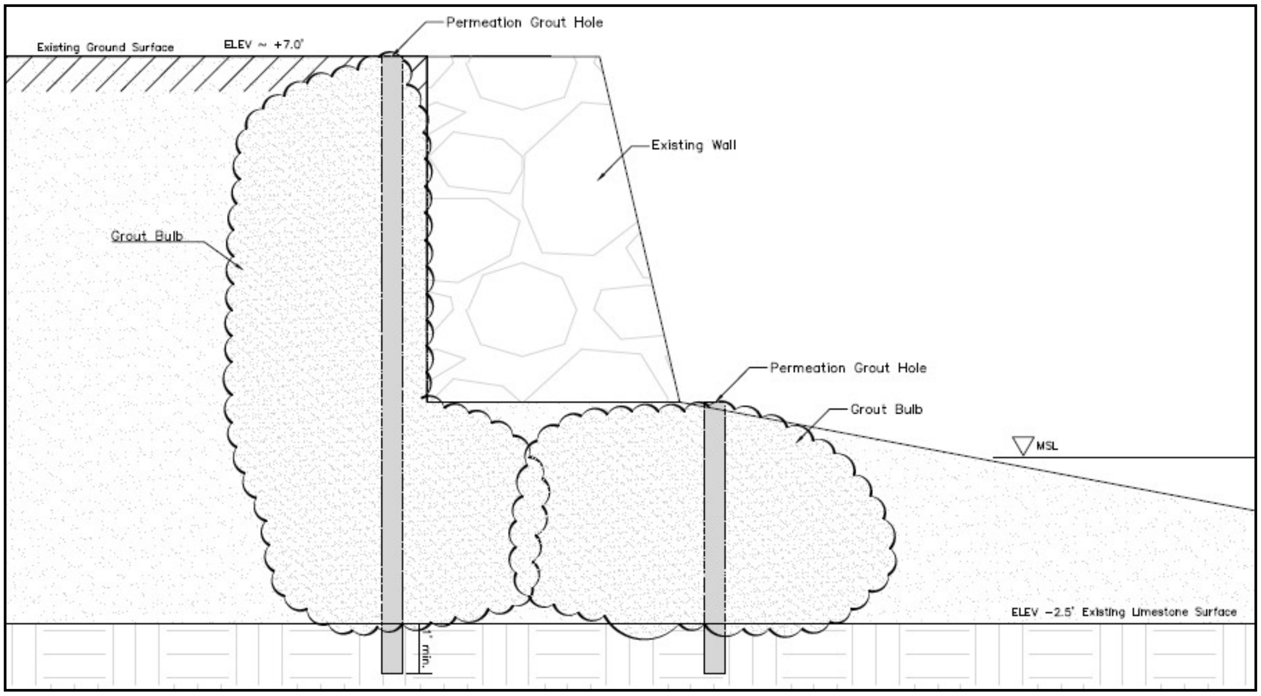


Figure 13. Permeation Grout Typical Detail

It is anticipated permeation grouting would be installed both landward and seaward of the existing wall. Based on the permeation grouting cross-section illustrated in **Error! Reference source not found.**, the final footprint would be approximately 2 feet landward and 2 feet seaward of the existing wall. In addition to the approximately 2 feet landward and 2 feet seaward of the existing wall, a minimal additional 30 feet will be needed landward of the disturbed area for the working platform of the construction equipment.

6.7. Alternative 7: Beach Fill with Renourishment

Beach nourishment is the adding of sediment onto or directly adjacent to an eroding beach. This "soft structural" response allows sand to shift and move with waves and currents. A wide, nourished beach system absorbs wave energy, protects upland areas from flooding, and mitigates erosion. The beach provides a buffer between storm waves and landward areas, and it can prevent destructive waves from reaching the dunes and upland developments. When sediment is naturally moved offshore from a nourished beach, it causes waves to break farther from the shoreline, which weakens their energy before reaching the shore.

7. PRELIMINARY GEOTECHNICAL ANALYSIS OF TSP

The following sections are based on information gathered during the March 2022 site visit and assumptions on the subsurface conditions. These sections should only be as a check of the feasibility of the tentatively selected plan and are not adequate for a formal design analysis. A formal subsurface site investigation needs to be performed in order to evaluate and check the accuracy of the assumptions.

7.1. Bearing Capacity Analysis

A preliminary bearing capacity analysis was performed using the Meyerhoff's general bearing capacity equation in accordance with EM 1110-1-1905 *Bearing Capacity of Soils* (1992). The allowable bearing capacity is the ultimate bearing capacity divided by a factor of safety. Based on the assumptions used in the preliminary analysis, the proposed structures have a factor of safety greater than 2.5 with regards to a bearing capacity failure.

7.2. Slope Stability Analysis

A preliminary slope stability analysis was performed in accordance with EM 1110-2-1902 Slope Stability (2020). The typical cross sections were modeled and analyzed for slope stability using the two-dimensional, limit equilibrium slope stability analysis software, SLOPE/W® Version 10.2.1.19666. Based on the assumptions used in the preliminary analysis, the proposed structures have a factor of safety greater than minimum requirement for all loading criteria with regards to a slope stability failure.

8. GEOTECHNICAL SITE INVESTIGATION RECOMMENDATION

It is recommended a geotechnical site investigation be performed for the subject project. The geotechnical site investigation should consist of consisting of drilling 20-foot test borings approximately every 200 feet along the centerline of the proposed structure The main goal with conducting a geotechnical site investigation at the site would be to properly characterize subsurface conditions and identify any geological conditions that would require special considerations during preconstruction engineering and design.

9. GEOTECHNICAL ENGINEERING EVALUATION

Given the information gathered during the March 2022 site visit and the stated geotechnical assumptions, there are no anticipated height or width limitations on designing or constructing the proposed emergency shoreline protection. There are also no special foundation requirements needed to address concerns of slope stability, bearing capacity, or settlement of the structure.

US Army Corps of Engineers
Honolulu District

Appendix A-2

East Hagatna Emergency Shoreline Protection Project

Draft Integrated Feasibility Report and Environmental Assessment

June 2022

1. Project Description

The study purpose is to identify a plan that will provide emergency shoreline protection from coastal erosion to Marine Corps Drive and public utilities in the area .

1.1 Alternatives:

Six major Alternatives were considered for this study (not including NO ACTION).

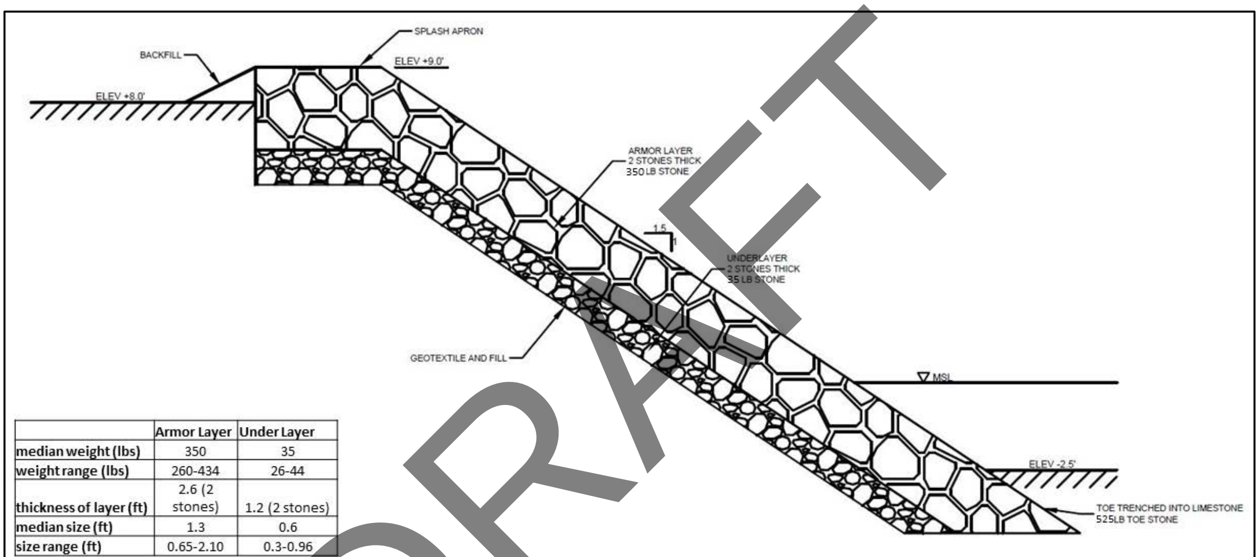
1.1.1 Alternative 1: No-Action

1.1.2 Alternative 2: Revetment

1.1.3 Alternative 3: Precast Concrete Seawall

1.1.4 Alternative 4: Concrete Rubble Masonry (CRM) Wall

1.2 Tentatively Selected Plan



	Armor Layer	Under Layer
median weight (lbs)	350	35
weight range (lbs)	260-434	26-44
thickness of layer (ft)	2.6 (2 stones)	1.2 (2 stones)
median size (ft)	1.3	0.6
size range (ft)	0.65-2.10	0.3-0.96

Alternative 2: Revetment

Components:

- Underlayer Stone
- Armor Stone
- Toe Stone

2. Cost Summary

The following table includes cost summary of the various alternatives. The TSP alternative is shown in YELLOW below as alternative 2: Revetment.

		East Hagatna Alternative Estimates					6/10/2022
		Includes 30 and 31 Account for PED and S&A.					
Alt.		**Measure**	**Quantity**	**U/M**	**Total Direct Cost**	**Contingency**	**Total Project Cost**
Alt. 1	**No Action**				**N/A**	**N/A**	**N/A**
						31%	
Alt. 2	**Revetment**				**$ 7,583,873**	**$ 2,384,340**	**$ 9,968,213**
	01	Lands and Damages	1	LS	**401,400**	**200,800**	**$ 602,200**
	06	Environmental Mitigation	0.82	AC	**204,889**	**20,489**	**$ 225,378**
	18	Cultural Mitigation	1	LS	**500,000**	**155,000**	**$ 655,000**
		Construction					
		Existing Wall Demo	933	CY	708,801	219,728	$ 928,530
		Backfill Wall	311	CY	11,812	3,662	$ 15,473
		Geotextile	5833	SY	57,268	17,753	$ 75,021
		Rock Revetment (Local Limestone)	2100	LF	3,601,324	1,116,410	$ 4,717,734
		Associated Cost	1	EA	68,656	21,283	$ 89,939
		Reseeding	2800	SY	80,206	24,864	$ 105,069
		Backfill behind Revetment	233	CY	8,864	2,748	$ 11,612
		Concrete Stairs	1	EA	31,533	9,775	$ 41,309
		Cultural Resource Monitor	1	EA	58,382	18,098	$ 76,481
	16	**Construction Subtotal**			**4,626,846**	**1,434,322**	**6,061,168**
	30	**Engineering and Design (25%)**			**1,156,711**	**358,581**	**1,515,292**
	31	**Supervision and Admin (15%)**			**694,027**	**215,148**	**909,175**
						35%	
Alt. 3	**Precast Concrete Seawall**				**$ 9,868,527**	**$ 3,475,790**	**$ 13,344,317**
	01	Lands and Damages	1	LS	**365,700**	**146,300**	**$ 512,000**
	06	Environmental Mitigation	1	LS	**70,000**	**28,000**	**$ 98,000**
	18	Cultural Mitigation	1	LS	**500,000**	**175,000**	**$ 675,000**
		Construction					
		Existing Wall Demo	933	CY	708,801	248,080	$ 956,882
		Construct Precast Wall	2,100	LF	5,039,460	1,763,811	$ 6,803,271
		Reseeding	4,667	SY	133,686	46,790	$ 180,476
		Associated Cost	1	EA	68,656	24,030	$ 92,686
		Tree Removal	20	EA	43,042	15,065	$ 58,107
		Culverts	3	EA	17,664	6,182	$ 23,847
		Concrete Stairs	1	EA	31,533	11,037	$ 42,570
		Cultural Resource Monitor	1	EA	337,748	118,212	$ 455,960
	16	**Construction Subtotal**			**6,380,591**	**2,233,207**	**8,613,798**
	30	**Engineering and Design (25%)**			**1,595,148**	**558,302**	**2,153,449**
	31	**Supervision and Admin (15%)**			**957,089**	**334,981**	**1,292,070**
						46%	
Alt. 4	**Concrete Rubble Masonry Wall**				**$16,270,689**	**$ 7,419,206**	**$ 23,689,895**
	01	Lands and Damages	1	LS	**365,700**	**146,300**	**$ 512,000**
	06	Environmental Mitigation	0.48	AC	**120,523**	**12,052**	**$ 132,576**
	18	Cultural Mitigation	1	LS	**500,000**	**230,000**	**$ 730,000**
		Construction					
		Existing Wall Demo	933	CY	708,801	326,049	$ 1,034,850
		Construct CRM Wall	2,100	LF	9,061,255	4,168,177	$ 13,229,432
		Reseeding	2,800	SY	106,931	49,188	$ 156,120
		Associated Cost	1	EA	68,656	31,582	$ 100,238
		Tree Removal	20	EA	43,042	19,800	$ 62,842
		Culverts	3	EA	17,664	8,126	$ 25,790
		Concrete Stairs	1	EA	31,533	14,505	$ 46,039
		Cultural Resource Monitor	1	EA	879,592	404,612	$ 1,284,204
	16	**Construction Subtotal**			**10,917,475**	**5,022,039**	**15,939,514**
	30	**Engineering and Design (25%)**			**2,729,369**	**1,255,510**	**3,984,878**
	31	**Supervision and Admin (15%)**			**1,637,621**	**753,306**	**2,390,927**

3. Basis of Estimate

3.1 Basis of Design

The design details are described in the Saipan Beach Road Coastal Storm Reduction Measure Feasibility Study. The alternatives provide the beach locations, site access, and work limits for each alternative. The plans show the proposed alternative level diagrams and quantities allow comparison of the alternatives.

Alternative 1: No Action
The No-Action Alternative is synonymous with no Federal (Corps) Action. This alternative is analyzed as the future without-project (FWOP) condition for comparison with the action alternatives.

Alternative 2: Revetment
This design involves the removal and replacement of 2,100 ft of existing seawall with revetment. The revetment would consist of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of underlayer stone, a double layer of armor stone, and anchoring by an oversized toe stone. The stone sizing of the underlayer and armor layer was determined to be 15-30 lbs stone for the underlayer, 300-400 lbs stone for the armor layer, and 450-600 lbs stone for the toe. This alternative has the largest footprint of the alternatives included in the final array. At the specified 1.5H:1V slope, the revetment is expected to be 17 feet wide, extending towards the ocean, with a crest elevation of +9 ft MSL.

Alternative 3: Precast Concrete Seawall
This design would involve the use of individual cantilever concrete panels to replace 2,100 ft of existing seawall. Concrete wall panels would be constructed offsite. Installation of the precast concrete panel wall would consist of excavating the existing soils to the limestone shelf and placing the precast concrete panels. After construction, the excavated area would be regraded to the elevation of the existing ground surface. This design has a top elevation of 9 ft above MSL and a base that is 7 ft wide, with the total disturbed area being approximately 20 ft due to excavation and backfill of the existing soils.

Alternative 4: Concrete Rubble Masonry (CRM) Wall
This design consists of a gravity retaining wall composed of concrete rubble masonry (CRM) supported on a reinforced cast-in-place concrete foundation. Construction of the CRM wall would consist of excavating the existing soils to the limestone shelf, placing the reinforced concrete foundation, and then installing the CRM wall on top of the concrete base. After construction, the excavated area would be regraded to the elevation of the existing ground surface.

3.2 Basis of Quantities

Quantities were developed using a typical profile provided by the technical team.

3.3 Construction Estimate

Work was predominantly estimated utilizing MII Estimating Software with specified input factors. The alternative analysis included unit costs of all project features and contrasted the options in order to scale relative differences. The next phase is having further design definition that is used to refine the project features.

Major Construction Features for the recommended plan were estimated as follows.

3.3.1 Mobilization & Demobilization

Equipment and Labor is assumed to be available within the Guam regional area and estimated at 10% of the direct construction costs.

3.3.2 Existing Wall Demolition

The existing wall is made up of block, concrete and rock rubble and will be demolished and the backfilled prior to construction. The demolition will be hauled offsite and disposed at a local waste facility.

3.3.3 Excavation and Grading

Initial excavation will be for the toe of the revetment in the existing limestone. Excavation is assumed to be at low tide with the use of excavators and hydraulic hammers and the waste hauled offsite. A splash apron will be excavated at the top of the revetment along with fine grading the beach. No additional compaction is assumed.

3.3.4 Stone Placement

Geotextile fabric will be applied followed by dozer installation of the underlayer stone. Toe stone (~450#) will be placed with a small 17 ton crane to provide stability to the base of the revetment. 300# armor stone is then placed using the combination of the crane and interlocked with an excavator.

3.3.5 Concrete Stairs

A single concrete stair is assumed for access to the beach. Construction is assumed to be cast in place concrete building the footings, walls, landing, and risers. Stairs include a 2-line pipe stainless steel handrail.

3.3.6 Tree Removal

The estimate assumes no trees would need to be removed for the existing wall demolition or revetment installation.

3.3.7 Cultural Resource Monitor

The estimate assumes a cultural resource monitor is onsite during active excavation for the splash apron.

3.3.8 General Conditions, Overhead, and Profit

The estimate assumes that the prime contractor will self-perform most of the work. Subcontractors have been added for the seeding work. Prime and Subcontractor markups are shown below.

Prime Contractor

Markup	Own Work	Sub Work
Mobilization [Running %]	10.00%	10.00%
JOOH [Running %]	25.00%	25.00%
HOOH [Running %]	15.00%	15.00%
Profit [Running %]	10.00%	10.00%
Bond [Running %]	1.00%	1.00%

Subcontractor

Markup	Own Work	Sub Work
Mobilization [Running %]	10.00%	10.00%
JOOH [Running %]	10.00%	10.00%
HOOH [Running %]	15.00%	15.00%
Profit [Running %]	10.00%	10.00%

Tribar Fabrication Sub

Markup	Own Work	Sub Work
HOOH [Running %]	10.00%	10.00%
Profit [Running %]	10.00%	10.00%

3.3.9 *Miscellaneous Markups, Assumptions, & General Notes*

- Escalation (~11%) was taken into account for the alternative analysis.
- HTRW and UXO clearance were not included as part of the scope of work.
- Costs for the 30 & 31 accounts (PED and CM respectively) were assumed at 25% and 15% respectively of the contract total.
- There are no work windows or restriction. No overtime rate was applied in MII and assumes a single shift working a typical 40 hour work.
- MII Equipment rates per EP 1110-1-8, Volume 12, 2020.
- 2022 Davis Bacon Wage Rates for Guam were assumed in the estimate. Labor shortages have been reported in Guam and an additional $5/hr was added to the Davis Bacon Wage rates plus a $10/hr per diem rate and $2/hr travel costs.

4. Construction Schedule

The anticipated base year for construction is 2026. The current estimated duration for the project is 12 months of construction with a single construction contract.

5. Acquisition Plan

The current acquisition strategy is assumed fully open and competitive though an actual contracting plan has yet to be established.

6. Risk Assessment

An abbreviated risk analysis (ARA) was performed to develop a weighted contingency for the construction cost estimate. The current weighted construction contingency for the TSP Alternative 2 is approximately 31%. The contingency accounts for contract acquisition, contractor competition, scope changes, labor availability and cost uncertainties. The concerns outlined in the ARA could have an overall impact on the project. Project costs have the potential to increase due to economic conditions and the level of apparent competition during the solicitation process. Due to the level of technical information available, current plan set provided by the PDT, and Moderate Risk level overall the estimate is considered Class 4 (per ER 1110-2-1302).

7. References

U.S. Army Corps of Engineers, 1993, *Engineering and Design Cost Engineering Policy and General Requirements, Engineering Regulation 1110-1-1300,* Department of the Army, Washington D.C., 26 March 1993.

U.S. Army Corps of Engineers, 1999, *Engineering and Design for Civil Works Projects, Engineering Regulation 1110-2-1150,* Department of the Army, Washington D.C., 31 August 1999.

U.S. Army Corps of Engineers, 2016, *Civil Works Cost Engineering, Engineering Regulation 1110-2-1302,* Department of the Army, Washington D.C., 30 June 2016.

U.S. Army Corps of Engineers, 2019, *Civil Works Construction Cost Index System (CWCCIS), Engineering Manual 1110-2-1304,* Department of the Army, Washington D.C., 31 March 2020.

Unified Facilities Criteria, 2011, *Handbook: Construction Cost Estimating,* Unified Facilities Criteria (UFC) 3-740-05, Department of Defense, 1 June 2011.

8. Attachments

a. MCACES Estimates

b. Abbreviated Risk Analysis

Estimated by	CENWW-ECE
Designed by	CENWW-POH
Prepared by	Phillip Ohnstad, CPC, CCC
Preparation Date	6/10/2022
Effective Date of Pricing	6/10/2022
Estimated Construction Time	Days

Description	Quantity	UOM	ProjectCost
Project Cost Summary Report			**21,924,912**
1 Revetment (Limestone)	**2,100.00**	**LF**	**4,626,846**
1.1 CRM Wall Demo	**933.00**	**CY**	**708,801**
1.2 Backfill Wall	**311.00**	**CY**	**11,812**
1.3 Geotextile	**5,833.00**	**SY**	**57,268**
1.4 Revetment	**2,100.00**	**LF**	**3,601,324**
1.5 Associated Cost	**1.00**	**EA**	**68,656**
1.6 Reseeding	**2,800.00**	**SY**	**80,206**
1.7 Backfill behind Revetment	**233.00**	**CY**	**8,864**
1.8 Concrete Stairs	**1.00**	**EA**	**31,533**
1.9 Cultural Resource Monitor	**1.00**	**EA**	**58,382**
4 Precast Concrete Seawall	**2,100.00**	**LF**	**6,380,591**
4.1 CRM Wall Demo	**933.00**	**CY**	**708,801**
4.2 Construct Precast Wall	**2,100.00**	**LF**	**5,039,460**
4.3 Reseeding	**4,667.00**	**SY**	**133,686**
4.4 Associated Cost	**1.00**	**EA**	**68,656**
4.5 Tree Removal	**20.00**	**EA**	**43,042**
4.6 Culverts	**3.00**	**EA**	**17,664**
4.7 Concrete Stairs	**1.00**	**EA**	**31,533**
4.8 Cultural Resource Monitor	**1.00**	**EA**	**337,748**
5 CRM Wall with Cast in Place Base	**2,100.00**	**LF**	**10,917,475**
5.1 CRM Wall Demo	**933.00**	**CY**	**708,801**
5.2 Construct CRM Wall	**2,100.00**	**LF**	**9,061,255**
5.3 Reseeding	**3,733.00**	**SY**	**106,931**
5.4 Associated Cost	**1.00**	**EA**	**68,656**
5.5 Tree Removal	**20.00**	**EA**	**43,042**
5.6 Culverts	**3.00**	**EA**	**17,664**
5.7 Concrete Stairs	**1.00**	**EA**	**31,533**
5.8 Cultural Resource Monitor	**1.00**	**EA**	**879,592**

Currency in US dollars

Abbreviated Risk Analysis

East Hagatna Shore Protection

Alternative Formulation

Meeting Date: 3-Jun-22

PDT Members

Note: PDT involvement is commensurate with project size and involvement.

Represents	Name
Project Management:	Jeff Herzog CEPOH-PPC
Planner:	Nick Emilio CEPOH-PPC
Technical Lead:	Dillon Sally Catherine (Catie) CEPOH-ECT
Geotech:	Justin Miller CEPOA-ECG-M
H&H	Jessica Podoski CEPOH-ECT
Structural:	Brendon Hayashi CEPOH-ECE-G
Cost Engineering:	Phillip Ohnstad CENWW-ECE
Environmental:	Marian Dean CEPOH-PPC-C

Abbreviated Risk Analysis

Project (less than $40M): **East Hagatna Shore Protection** — **Alternative:** **Alt 2,3,4**

Project Development Stage/Alternative: **Alternative Formulation**

Risk Category: **Moderate Risk: Typical Project Construction Type** — **Meeting Date:** **6/3/2022**

Total Estimated Construction Contract Cost = $ -

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	10 BREAKWATERS AND SEAWALLS	Revetment	$ 4,600,000		31%	$ 1,443,699	$ 6,043,699
2	10 BREAKWATERS AND SEAWALLS	Precast Concrete Seawall	$ 6,400,000		35%	$ 2,266,211	$ 8,666,211
3	10 BREAKWATERS AND SEAWALLS	Concrete Rubble Masonry Wall	$ 10,900,000		46%	$ 5,012,535	$ 15,912,535
4			$ -		0%	$ -	$ -
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)					$ -	

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

East Hagatna Shore Protection Alt 2,3,4

Alternative Formulation

Abbreviated Risk Analysis

Meeting Date: 3-Jun-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**		**75%**
PS-1	Revetment	There has not been any detailed study of the wave climate and need for wave attenuation on the shoreline, which could change design/quantity.	USACE is very experienced with design and construction of revetments. Additional protection measures or modification to proposed measures may need to be modified due to wave climate but should be reflected in current assumptions. Quantity risk is considered low and is more likely to have greater impact. Risk of losing beach and habitat value and could rquire additional survey costs.	Marginal	Possible	1
PS-2	Precast Concrete Seawall	There has not been any detailed study of the wave climate and need for wave attenuation on the lakefront structures, which could change design/quantity.	USACE is very experienced with design and construction of concrete structures. Additional protection measures or modification to proposed measures may need to be modified due to wave climate but should be reflected in current assumptions. Quantity risk is considered low and is more likely to have greater impact. Tree scope of work is assumed and likely to change based on final wall layout.	Marginal	Possible	1
PS-3	Concrete Rubble Masonry Wall	There has not been any detailed study of the wave climate and need for wave attenuation on the shoreline, which could change design/quantity.	USACE is very experienced with design and construction of concrete and rubble structures. Additional protection measures or modification to proposed measures may need to be modified due to wave climate but should be reflected in current assumptions. Quantity risk is considered low and is more likely to have greater impact. Tree scope of work is assumed and likely to change based on final wall layout.	Marginal	Possible	1
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Revetment	Contracting plan is not established at this stage of development. Various technical challenges and related design and construction complexities can result in differing contract strategies that result in less or greater Government risks and resulting project costs.	Type of contracting strategy will likely be based on project size, district experience, completion of plans and specs, and schedule for construction implementation. Project size and contract strategies can effect ability to bond contractors, bidding competition and Gov't risks verses contractor risks. It is likely to impact overall project costs, larger projects even more so. Contract strategy can greatly influence a final project cost from least risk to greatest: funding availability, contract value, competitive bids, firm-fixed lowest price, best value, design/build, cost plus incentive fee.	Marginal	Possible	1

AS-2	Precast Concrete Seawall	Contracting plan is not established at this stage of development. Various technical challenges and related design and construction complexities can result in differing contract strategies that result in less or greater Government risks and resulting project costs.	Type of contracting strategy will likely be based on project size, district experience, completion of plans and specs, and schedule for construction implementation. Project size and contract strategies can effect ability to bond contractors, bidding competition and Gov't risks verses contractor risks. It is likely to impact overall project costs, larger projects even more so. Contract strategy can greatly influence a final project cost from least risk to greatest: funding availability, contract value, competitive bids, firm-fixed lowest price, best value, design/build, cost plus incentive fee.	Marginal	Possible	1
AS-3	Concrete Rubble Masonry Wall	Contracting plan is not established at this stage of development. Various technical challenges and related design and construction complexities can result in differing contract strategies that result in less or greater Government risks and resulting project costs.	Type of contracting strategy will likely be based on project size, district experience, completion of plans and specs, and schedule for construction implementation. Project size and contract strategies can effect ability to bond contractors, bidding competition and Gov't risks verses contractor risks. It is likely to impact overall project costs, larger projects even more so. Contract strategy can greatly influence a final project cost from least risk to greatest: funding availability, contract value, competitive bids, firm-fixed lowest price, best value, design/build, cost plus incentive fee.	Marginal	Possible	1
Construction Elements				Maximum Project Growth		25%
CON-1	Revetment	Water in Excavation for toe. Potential labor shortages. Congestion, weather impacts, construction near heavily used recreational area.	Construction practices can manage these concerns.	Moderate	Unlikely	1
CE-2	Precast Concrete Seawall	Water in Excavation. Potential labor shortages. Congestion, weather impacts, construction near heavily used recreational area.	Working in excavation below MSL a concern keeping trench dewatered. Construction practices can manage these concerns. UXO and Cultural resouces could be discovered and cause a schedule delay.	Moderate	Possible	2
CE-3	Concrete Rubble Masonry Wall	Water in Excavation for cast in place concrete. Potential labor shortages. Congestion, weather impacts, construction near heavily used recreational area.	Working in excavation below MSL a concern keeping trench dewatered. Construction practices can manage these concerns but likely to increase costs. UXO and Cultural resouces could be discovered and cause a schedule delay.	Moderate	Likely	3
Specialty Construction or Fabrication				Maximum Project Growth		65%
SC-1	Revetment	Numerous assumptions are made w/ a conceptual design, but no special equipment or fabrications are anticipated.	Major construction is a rock revetment and unknowns are unlikely and pose a negligible cost risk.	Negligible	Unlikely	0
SC-2	Precast Concrete Seawall	Numerous assumptions are made w/ a conceptual design, but no special equipment or fabrications are anticipated.	Major construction is precast concrete and reinforcement. Additional cost impacts are possible due to unknown subsurface conditions.	Marginal	Possible	1
SC-3	Concrete Rubble Masonry Wall	Numerous assumptions are made w/ a conceptual design, but no special equipment or fabrications are anticipated.	Major construction is cast in place concrete, reinforcement, and rubble wall. Additional cost impacts are possible due to unknown subsurface conditions.	Moderate	Possible	2
Technical Design & Quantities				Maximum Project Growth		30%
T-1	Revetment	Designs are not yet established. Quantities for this feature have not been developed to any level of detail.	Design and quantities have not been developed in any detail at this point making it possible the quantities change to a degree as design progresses. Most risk is considered in establishing the initial scope.	Moderate	Possible	2
T-2	Precast Concrete Seawall	Designs are not yet established. Quantities for this feature have not been developed to any level of detail.	Design and quantities have not been developed in any detail at this point making it possible the quantities change to a degree as design progresses. Most risk is considered in establishing the initial scope.	Moderate	Possible	2

T-3	Concrete Rubble Masonry Wall	Designs are not yet established. Quantities for this feature have not been developed to any level of detail.	Design and quantities have not been developed in any detail at this point making it possible the quantities change to a degree as design progresses. Most risk is considered in establishing the initial scope.	Moderate	Possible	2
Cost Estimate Assumptions					**Maximum Project Growth**	**35%**
EST-1	Revetment	Most cost changes will be based on design scope and quantity changes, which are addressed elsewhere.	Much of the production are based on local historic production. Hauling of material adds complexity and risk to cost estimate. Labor rates based on DB rates from Guam. Labor shortages have been reported and may cost more than estimated.	Moderate	Possible	2
EST-2	Precast Concrete Seawall	Most cost changes will be based on design scope and quantity changes, which are addressed elsewhere.	Many unknowns with excavation, quantity changes, and subsurface conditions. Estimate assumes minimal dewatering and assumes precast can be set into place on leveling rock. Hauling of material adds complexity and risk to cost estimate. Labor rates based on DB rates from Guam. Labor shortages have been reported and may cost more than estimated.	Moderate	Possible	2
EST-3	Concrete Rubble Masonry Wall	Most cost changes will be based on design scope and quantity changes, which are addressed elsewhere.	Much of the production are based on local historic production. Rubble Masonry wall construction production in trench may be slower than estimated. Hauling of material adds complexity and risk to cost estimate. Labor rates based on DB rates from Guam. Labor shortages have been reported and may cost more than estimated.	Moderate	Likely	3
External Project Risks					**Maximum Project Growth**	**40%**
EX-1	Revetment	External risk included in the risk register (and contingency) are extreme escalation and delays/impacts by others (outside organizations, municipalities, public interest groups, etc.)	Project delays increase likelihood of scope growth and cost increases. Similarly, multiple interest and political groups can result in unexpected changes and delays. Recent history indicates an annual national construction escalation rate of 3.5%. The support for the project is high so hypbrid seawall delay risks are unlikely.	Marginal	Possible	1
EX-2	Precast Concrete Seawall	External risk included in the risk register (and contingency) are extreme escalation and delays/impacts by others (outside organizations, municipalities, public interest groups, etc.)	Project delays increase likelihood of scope growth and cost increases. Similarly, multiple interest and political groups can result in unexpected changes and delays. Recent history indicates an annual national construction escalation rate of 3.5%. The support for the project is high so hypbrid seawall delay risks are unlikely.	Marginal	Possible	1
EX-3	Concrete Rubble Masonry Wall	External risk included in the risk register (and contingency) are extreme escalation and delays/impacts by others (outside organizations, municipalities, public interest groups, etc.)	Project delays increase likelihood of scope growth and cost increases. Similarly, multiple interest and political groups can result in unexpected changes and delays. Recent history indicates an annual national construction escalation rate of 3.5%. The support for the project is high so hypbrid seawall delay risks are unlikely.	Marginal	Possible	1

East Hagatna Shore Protection Alt 2,3,4

Alternative Formulation

Abbreviated Risk Analysis

Risk Evaluation

WBS	Potential Risk Areas	Project Management & Scope Growth	Acquisition Strategy	Construction Elements	Specialty Construction or Fabrication	Technical Design & Quantities	Cost Estimate Assumptions	External Project Risks	Cost in Thousands
10 BREAKWATERS AND SEAWALLS	**Revetment**	1	1	1	0	2	2	1	$4,600
10 BREAKWATERS AND SEAWALLS	Precast Concrete Seawall	1	1	2	1	2	2	1	$6,400
10 BREAKWATERS AND SEAWALLS	Concrete Rubble Masonry Wall	1	1	3	2	2	3	1	$10,900

US Army Corps of Engineers®
Honolulu District

Appendix A-3: Environmental Resources

East Hagatna, Guam

CAP Section 14 Emergency Shoreline Protection

Draft Integrated Feasibility Report and Environmental Assessment

July 2023

Appendix A-3

TABLE OF CONTENTS

***to be inserted when received*

1 INTRODUCTION

This Appendix to the Integrated Feasibility Report and Environmental Assessment (IFR/EA) provides a more detailed administrative record of coordination on environmental compliance conducted to date as part of the East Hagatna - Continuing Authorities Program (CAP), Section 14 Emergency Stream Bank and Shoreline Protection (Project). It further discusses compliance specific to the Territory of Guam (Territory).

2 LIST OF STATEMENT AGENCIES

A list of the agencies, organizations, and persons to whom USACE will provide copies of the draft report for review is as follows:

- U.S. Fish and Wildlife Service (USFWS), Pacific Islands Fish and Wildlife Office (PIFWO)
- NOAA National Marine Fisheries Service (NMFS), Pacific Islands Regional Office (PIRO), Protected Resources Division (PRD)
- NMFS, PIRO, Habitat Conservation Division (HCD)
- U.S. Environmental Protection Agency (USEPA)
- Guam Environmental Protection Agency (GEPA)
- Guam Division of Aquatic and Wildlife Resources (DAWR)
- Guam State Historic Preservation Office (GSHPO)
- Guam Preservation Trust (GPT)
- Guam Department of Chamorro Affairs (GDCA)

3 ENVIRONMENTAL COMPLIANCE

3.1 National Environmental Policy Act (NEPA)

NEPA (*42 USC § 4321 et seq.*) requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their Proposed Actions and reasonable alternatives to those actions. NEPA also established the Council on Environmental Quality (CEQ). As part of the Executive Office of the President, CEQ coordinates federal environmental efforts and is responsible for advising the president on environmental policy matters. CEQ has also promulgated regulations implementing NEPA, which are binding on all federal agencies. These regulations address the procedural provisions of NEPA and the administration of the NEPA process, including preparation of EISs.

The NEPA is applicable to all “major” federal actions affecting the quality of the human environment. A major federal action is an action with effects that may be major, and which are potentially subject to federal control and responsibility. These actions may include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals.

3.1.1 NEPA Coordination for the Proposed Project

An IFR/EA) has been drafted for this project and will be provided to all resource agencies and other stakeholders for review and comment during a 30-day public comment period.

Communications with Statement Agencies (Section 2) will continue as part of the agency review of the Draft IFR/EA.

Coordination on public outreach and information sharing continues with the non-federal sponsor, the DPA. The project will comply with this Act.

3.2 Clean Air Act of 1972 (42 U.S.C. §7401 et seq.)

Hagatna and Tamuning are not designated as nonattainment or maintenance areas for any criteria pollutant; therefore, U.S. Environmental Protection Agency's (USEPA) General Conformity Rule to implement Section 176(c) of the CAA [42 U.S.C. §7506(c)] does not apply. No air quality permits, nor a conformity determination are required for this project. The project complies with the Act.

3.3 Clean Water Act (CWA) of 1972

CWA establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and regulating quality standards for surface waters. The CWA defines waters of the U.S. to include all interstate waters, lakes, rivers, streams, territorial seas, tributaries to navigable waters, interstate wetlands, wetlands that could affect interstate or foreign commerce, and wetlands adjacent to other waters of the U.S (WOTUS). The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, without a permit.

- Section 401 of the CWA (33 U.S.C. §1341) ensures that discharge into WOTUS do not violate state, territorial, or tribal water quality standards. States, territories, and authorized tribes where the discharge originates are generally responsible for issuing Water Quality Certifications (WQCs)

- Section 402 of the CWA (33 U.S.C. § 1342) requires that a discharge of any pollutant or combination of pollutants to surface waters that are deemed WOTUS, such as storm water from point or nonpoint sources, be regulated through the National Pollutant Discharge Elimination System (NPDES) permitting program. Section 402(a) provides that the permit-issuing authority may issue an NPDES permit that authorizes the discharge of any pollutant into navigable waters of the United States, upon the condition that such discharge meets all applicable requirements of the CWA and such other conditions as the permitting authority determines necessary to carry out the provisions of the CWA. As part of this program, general NPDES permits are required to regulate storm water discharges associated with deployment or construction activities that disturb one (1) or more acres of land.

- Section 404 of the CWA (33 U.S.C. §1344) establishes a program to regulate the discharge of dredged and fill material into WOTUS, including wetlands. The program is administered by the US Army Corps of Engineers (USACE).

  Although the USACE does not process and issue permits for its own activities, it conducts an internal assessment to ensure that all requirements of Section 404 are met by applying all applicable substantive legal requirements, including application of the Section 404(b)(1) Guidelines, 33 CFR 336.1(a). Under the Section 404(b)(1) Guidelines, an analysis of practicable alternatives is the primary tool used to determine whether a proposed discharge is prohibited. The Section 404(b)(1) Guidelines prohibit discharges of dredged or fill material into waters of the U.S. if a practicable alternative to the proposed discharge exists that would have less adverse impacts on the aquatic ecosystem (including wetlands) if the alternative does not have other significant adverse environmental impacts (40 C.F.R. 230.10(a)). An alternative is considered practicable if it is available and capable of being implemented after considering cost, existing technology, and logistics in light of overall project purpose (40 C.F.R. 230.10(a)(2)).

The Section 404(b)(1) guidelines follow a sequential approach to project planning that considers mitigation measures only after the project proponent shows no practicable alternatives are available to achieve the overall project purpose with less environmental impacts. Once it is determined that no practicable alternatives are available, the guidelines then require that appropriate and practicable steps be taken to minimize potential adverse effects on the aquatic ecosystem (40 C.F.R. 230.10(d)). Such steps may include actions controlling discharge location, material to be discharged, the fate of material after discharge or method of dispersion, and actions related to technology, plant and animal populations, or human use (40 C.F.R. 230.70-230.77). Beyond the requirement for demonstrating that no practicable alternatives to the proposed discharge exist, the Section 404(b)(1) Guidelines also require USACE to compile findings related to the environmental impacts of discharge of dredged or fill material. The USACE must make findings concerning the anticipated changes caused by the discharge to the physical and chemical substrate and to the biological and human use characteristics of the discharge site. These guidelines also indicate that the level of effort associated with the preparation of the alternatives analysis be commensurate with the significance of the impact and/or discharge activity (40 C.F.R. 230.6(b)). The Section 404(b)(1) analysis is in Attachment 6.

- Sections 305(b) and 303(d)) of the CWA, respectively, requires States, Territories, and authorized Tribes to assess waterbodies, as well as identify and make a list of those surface water bodies that are polluted. A review of all “existing and readily available” state or territorial surface water quality data must be reviewed and compared compare their water quality standards. Section 303(d) of the CWA authorizes the USEPA to list impaired waters and develop water pollution reduction plans, or Total Maximum Daily Loads (TMDLs), for those waterbodies that are classified as lower quality. The TMDL defines the upper threshold of a given pollutant that a waterbody can contain and still meet water quality standards.

3.3.1 Specific Territorial Regulations for CWA

CWA Section 401: In accordance with CWA Section 401, the Guam Environmental Protection (GEPA) Agency administers the Territory’s 401 Water Quality Certification Program. The objective of the program is to ensure that any Federally permitted activity will not adversely impact the existing uses, designated uses, and applicable water quality criteria of the receiving Territorial waters. Issuance of a Water Quality Certification demonstrates compliance with Section 401 of the CWA.

CWA Section 402: In accordance with CWA Section 402, the US Environmental Protection (USEPA) administers the Territory’s 402 Water Quality Certification and NPDES Program. The USEPA has not authorized the territory of Guam to issue its own NPDES permits; therefore, USEPA Region 9 is the permit-issuing agency for Guam. The objective of the program is to ensure that any Federally permitted activity will not adversely impact the existing uses, designated uses, and applicable water quality criteria of the receiving Territorial waters.

CWA Section 404: There are no territorial regulations specific to CWA Section 404 in Guam.

CWA Section 305(b) and Section 303(d): The Territory's water quality standards designate the waters of Hagatna Bay as M- 2, which requires preserving a balanced, indigenous population of marine organisms, especially shellfish and corals, and intended uses including water sports, aesthetic enjoyment, and mariculture. East Hagatna Bay water quality is reported as good for 2020 (USEPA 2023). Previous USACE studies identified 30 storm drain outfalls throughout the Bay which discharge solids, nitrate-nitrogen, and coliform bacteria exceeding water quality standards (USACE 1993). The Agana River, west of the study area (Figure 6), is impaired for aquatic life, fish and shellfish consumption, and swimming and boating due to bacteria and other microbes, low oxygen, and PCBs. A storm drain east of the study area is impaired for aquatic life, swimming and boating due to bacteria and other Microbes, low oxygen, murky water, nitrogen and/or phosphorus, and salts (USEPA 2023).TMDLs have not yet been developed for any of these impaired waters.

3.3.2 CWA Coordination for the Proposed Project

Regulations and policies that protect water quality and are being considered as part of the proposed Project include CWA Sections 401, 402, and 404.

CWA 401 and 402

The USEPA and GEPA were informed about the preferred plan during Cooperating Agency Workshops on 8 and 14 June 2022 (HST). Section 401 Water Quality Certification will be requested from the GEPA prior to construction of the project.

With respect to the Section 401 permit, USACE would be responsible for compliance during construction while the Guam Department of Public Works (GDPW) would need to comply separately with Section 401 for O&M.

Coordination with the USEPA and GEPA will continue during the draft IFR/EA public review period and through the remainder of the feasibility phase for this project. If required, Section 401 and 402 Water Quality Certification will be requested from the USEPA and ASEPA prior to construction of the project.

CWA 404

A Draft 404(b)(1) evaluation is included as Attachment 4 of this Appendix. The 404(b)(1) analysis demonstrates that both construction and O&M comply with Section 404. So long as the non-federal sponsor (Guam Department of Public Works) conducts O&M operations within the scope of activities characterized in the environmental assessment, it would comply with Section 404. The project will comply with this Act.

3.4 Rivers and Harbors Act of 1899, Section 10 (33 USC §403 *et seq*.)

The proposed work would not affect navigable waters of the U.S. The proposed action will be subjected to the public notice and other evaluations normally conducted for activities subject to the Act. The proposed work will not obstruct navigable waters of the U.S. The Project complies with the Act.

3.5 Marine Protection, Research, and Sanctuaries Act (33 U.S.C. §1401 ET SEQ.).

Ocean disposal is not a component of this Project; therefore, this Act is not applicable.

3.6 Migratory Bird Treaty Act (16 U.S.C. §§703-712) and Migratory Bird Conservation Act (16 U.S.C. §§715-715D, 715E, 715F-715R)

The Migratory Bird Treaty Act (*16 USC § 703-712*) was enacted to ensure protection of migratory bird resources that are shared among the U.S., Canada, Mexico, Japan, and Russia. The MBTA makes it unlawful to “pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or egg of any such bird, or any product”.

The responsibilities of federal agencies to protect migratory birds are set forth in EO 13186. USFWS is the lead agency for migratory birds. The USFWS issues permits for takes of migratory birds for activities such as scientific research, education, and depredation control, but does not issue permits for incidental take of migratory birds. The MBTA does not apply to non-native species introduced to the U.S. or its territories by mean of intentional or unintentional human assistance.

USACE will include standard migratory bird protection measures in the project plans and specifications and will require the Contractor to abide by those requirements. The Project is being coordinated with USFWS and will comply with these Acts.

3.7 Marine Mammal Protection Act (MMPA)

All marine mammals are protected under MMPA (*16 USC § 1361 et seq*.), which prohibits takes of all marine mammals in the U.S. (including territorial seas) with few exceptions. Permits for scientific research on marine mammals and permits to enhance the survival or recovery of a species, issued under Section 104 of the MMPA are two such exceptions. For T&E marine mammals, any activities that could affect ESA-listed species must be consistent with the ESA as well.

3.7.1 MMPA Coordination for the Proposed Project

16 USC 1362 defines “take” as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.” No take or harassment of marine mammals are anticipated through the proposed project. Hagatna Bay is not a known haul out, breeding, or foraging location for marine mammals and no interactions are anticipated. The project will comply with this Act.

3.8 Anadromous Fish Conservation Act (16 U.S.C. §§757A-757G)

This Project will have no effect on anadromous fish species. The Act does not apply.

3.9 Fish and Wildlife Coordination Act (FWCA) of 1934

The FWCA (16 USC 661 et seq.) requires federal agencies to coordinate with the USFWS and local state/territorial agencies when any stream or body of water is proposed to be impounded, diverted, or otherwise modified. The intent is to give fish and wildlife conservation equal consideration with other purposes of water resources development projects.

3.9.1 FWCA Coordination for the Proposed Project

Pursuant to the Fish and Wildlife Coordination Act (FWCA) of 1934, as amended (16 U.S.C. §§ 661–667e), USACE consulted USFWS and NMFS on the effect of the recommended alternative (Alternative 2) on fish and wildlife resources as documented in Appendix 3, Attachment 1. A Planning Aid Letter was received from NMFS and USFWS on 14 July 2023. The project complies with the Act.

As documented in the Planning Aid Letter, the Services recommended the following measures to conserve fish and wildlife resources:

1. The length of the proposed revetment appears fairly long, so it may be best to consider a staged approach to the dredging and filling (D&F) operations. D&F in the intertidal habitat should be timed to avoid operations in areas that are submerged.
2. Limits on the placement and use of people and equipment in submerged areas are recommended, and direct interactions with vegetative habitats and corals should be avoided.
3. Low impact design (LID) principles should be considered in the revetment design and along the edge of the adjacent road, with a focus on storm water management, sediment impoundment and the control and filtering of urban runoff.
4. Fisher access to the seasonal rabbitfish fishery should be considered and should not be meaningfully inhibited by the project.
5. The area is designated as Essential Fish Habitat, so an EFH MSA consultation will be required. Full consideration should be given to the conservation recommendations that result from that consultation.
6. Appropriate precautions and work stoppages should be implemented if mobile ESA listed species approach or enter the work area. Specific ESA conditions and conservation recommendations may be obtained in consultation with our NMFS Protected Resources Division.
7. Monitoring of adjacent and regional beach profiles and the distribution and densities of regional seagrasses should be implemented to assess the short and long-term effects of the proposed project. Such data will be very useful in informing future Guam revetment proposals and predictions, which we foresee increasing in number and need. Pre- and post-construction measures should be made in the adjacent habitat and appropriate reference areas. Additional measures should be made 3 to 5 years following the project's completion to provide for long-term inference on revetment beach and submerged resources effects.

In addition, the Services recommended the following standard BMPs to be implemented when working in the aquatic environment:

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.
2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.
3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.asp) can help to prevent attraction and introduction of non-native species.
5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, et

The Corps will adopt these recommendations, to the extent that the measure is applicable, commensurate and practical, as enforceable conditions i.e., specifications, of any construction contract.

3.10 Endangered Species Act (ESA) of 1973

Section 7 of the ESA requires each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of critical habitat for such species. Federal agencies are further required to consult with the appropriate federal agency, either the USFWS or NOAA-NMFS, for federal actions that “may affect” a listed species or adversely modify critical habitat. Federal agencies must use the best available scientific and commercial data when making an effect determination relating to the impact of their actions.

3.10.1 Specific Territorial Regulations for ESA

The USFWS PIFWO and the NMFS PIRO are the federal regulatory agencies that oversee consultations for compliance with the ESA in Guam. The NMFS and USFWS share jurisdiction for recovery and conservation of sea turtles listed under the ESA. NMFS leads the conservation and recovery of sea turtles in the marine environment and USFWS leads the conservation and recovery of sea turtles on nesting beaches (*NOAA 2015*). A Memorandum of Understanding outlines the specific roles of each agency.

The Guam Division of Aquatic and Wildlife Resources (DAWR) is the territorial agency responsible for managing and preserving the marine and wildlife resources in Guam. DAWR also distributes hunting regulations that control the taking of various wildlife species, including fruit bats and native birds.

Currently, there is no federally designated critical habitat in Guam for any species.

3.10.2 ESA Coordination for the Proposed Project

USACE requested technical assistance from USFWS and NMFS on March 15, 2022 and received a list of species listed or proposed for listing under both NMFS and USFWS jurisdiction that may be present on or in the vicinity of the proposed project location, as well as confirmation that there is no designated or proposed federally designated critical habitat occurring within the immediate vicinity of the proposed study area (Attachment 2).

Pursuant to Section 7 of the Endangered Species Act, USACE evaluated the potential effects to T&E species that may be affected by implementation of the Recommended Plan. USACE determined the federal action may affect but is not likely to adversely affect corals, turtles; and the Mariana fruit bat. Detailed discussion on the USACE determination is included in the Biological Evaluation in Appendix 3 Attachment 2a.

The USACE will continue to coordinate with the USFWS, NMFS, and the DAWR as part of the public review of this Draft IFR/EA document and throughout the feasibility phase. The project will comply with the Act.

3.11 Magnuson-Stevens Fishery Conservation and Management Act (MSA)

MSA (*16 USC § 1801 et seq.*) is the primary law governing fisheries management in U.S. federal waters. MSA is intended to foster long-term biological and economic sustainability of U.S. marine fisheries through the prevention of overfishing, the rebuilding of overfished stocks, and increasing long-term economic and social benefits to ensure a safe and sustainable supply of seafood. MSA extended U.S. jurisdiction from 12 nautical miles to 200 nautical miles and established eight regional fisheries management councils to develop Fishery Management Plans, which must comply with conservation and management standards to promote sustainable fisheries management. The Fishery Management Plans also define Essential Fish Habitat (EFH), which is the aquatic habitat where fish spawn, breed, feed, and grow through various life stages; this habitat includes marine waters, wetlands, coral reefs, seagrasses, and rivers. The Fishery Management Plans further define Habitat Areas of Particular Concern (HAPC), which are high-priority areas that are rare, particularly sensitive, or critical to overall ecosystem functions.

The Western Pacific Regional Fishery Management Council (WPRFMC) is one of eight regional fishery management councils established by Congress in 1976. Under the MSA, it has authority over fisheries seaward of state/territorial waters of Hawaii and the US Pacific Islands and creates and amends management plans for fisheries seaward of state/territorial waters in the US Pacific Islands. Both the Guam Bottomfish and Pelagic Fishery Ecosystem Plans were approved in 2009 and codified in 2010 (WPRFMC 2009). These Fishery Ecosystem Plans outline ecosystem approaches to management of fisheries and are amended as necessary.

3.11.1 Specific Territorial Regulations for MSA

The U.S. has exclusive fishery management authority over all fishery resources within the U.S. Exclusive Economic Zone, which extends from the seaward boundary of Guam to 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. Management plans to protect trophic structure and biodiversity and increase key coral reef fish species are priorities within and outside of existing protected areas (*WPRFMC 2009*).

The NMFS PIRO is the federal regulatory agency responsible for implementing the MSA, including the EFH provision (Section 305(b)(2) as described by 50 CFR 600.920). The marine water column from the surface to a depth of 1,000 m from shoreline to the outer boundary of the Exclusive Economic Zone (5,150 kilometers/200 nautical miles/230 miles), and the seafloor from the shoreline out to a depth of 400 m around Guam were designated as EFH. As such, all surrounding waters and submerged lands around Guam are designated as EFH and support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council's Guam Bottomfish and Pacific Pelagic Fishery Ecosystem Plans. The management unit species and life stages found in these waters include eggs, larvae, juveniles, and adults of Bottom-fish and Pelagic MUS. Specific types of habitats considered as EFH include coral reef, patch reefs, hard substrate, artificial substrate, seagrass beds, soft substrate, mangrove, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean.

Compliance with the EFH provisions of the MSA can also be achieved through the pursuance of the Fish and Wildlife Coordination Act (FWCA, 16 U.S.C. 661-666c). See Section 3.3 of Appendix A-3.

3.11.2 MSA Coordination for the Proposed Project

USACE initiated consultation with NMFS during the 8 and 14 June 2022 cooperating agency workshops. Consultation is ongoing. Pertinent correspondence is found in the Environmental Appendix 3 Attachment 3. The Project complies with the Act.

3.12 Coastal Zone Management Act of 1972

Congress enacted the Coastal Zone Management Act (CZMA) (*16 USC § 1451 et seq.*) to protect the coastal environment from growing demands associated with residential, recreational, commercial, and industrial uses (such as state and federal offshore oil and gas development). Coastal states with an approved Coastal Zone Management Plan, which defines permissible land and water use within a state or territory's coastal zone, can review federal actions (such as deployment/construction and operation of a proposed project action) for federal consistency. Federal consistency is the requirement that a proposed action likely to affect any land/water use or natural resources of the coastal zone be consistent with the enforceable policies of a state or territory's program. The CZMA requires NOAA to conduct periodic evaluations of the performance of states and territories with federally approved coastal management programs.

3.12.1 Specific Territorial Regulations for CZMA

In Guam, federal consistency determinations under the Coastal Zone Management Act (CZMA) are administered by the Guam Bureau of Statistics and Plans (GBSP) through the Guam Coastal Management Program (GCMP).

The GCMP was approved in 1979 and is the federally approved coastal management program for the Territory of Guam. The GCMP has extensive responsibilities under the CZMA, which provides the primary authority for program and has been developed under a unique approach that incorporates both western and traditional systems of management.

3.12.1.1 CZMA Coordination for the Proposed Project

A Federal Consistency Determination (FCD) evaluation is included as Attachment 5 in this Appendix. Pursuant to the CZMA, an FCD was drafted and will be submitted to Guam BSP for review and concurrence. USACE determined that the Recommended Plan is consistent with the state's Coastal Zone Management Program and anticipates receiving concurrence. The project will comply with this Act.

3.13 Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. §4601 ET SEQ.).

The purpose of Public Law 91-646 is to ensure that owners of real property to be acquired for Federal and federally assisted projects are treated fairly and consistently and that persons displaced as a direct result of such acquisition will not suffer disproportionate injuries because of projects designed for the benefit of the public as a whole. This Project does not involve real property acquisition and/or displacement of property owners or tenants. Therefore, this Act is not applicable.

3.14 Farmland Protection Policy Act of 1981 (7 U.S.C. §4201 *et seq*.)

No prime or unique farmland will be affected by implementation of this project. This Act is not applicable.

3.15 National Historic Preservation Act (NHPA) of 1966

The goal of the NHPA (54 USC 306101) is to empower federal agencies to act as responsible stewards of cultural resources when agency actions affect historic properties. The NHPA established the Advisory Council on Historic Preservation, an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy. The NHPA also authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places composed of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture.

Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. In carrying out their responsibilities under Section 106, the NHPA requires that federal agencies consult with federally recognized tribes and Native

Hawaiian Organizations that attach traditional religious and cultural significance to eligible or listed historic properties that could potentially be affected by the agency's actions. The intent of the consultation is to identify historic properties potentially affected by the undertaking and to seek ways to avoid, minimize, or mitigate any adverse effects on those properties.

The NHPA details a four-step process for Section 106 consultation that requires each federal agency to: 1) initiate a review process to evaluate the potential of a proposed federal undertaking to cause an effect; 2) identify historic properties with the federal undertaking's Area of Potential Effect; 3) assess whether the undertaking will have an adverse effect on historic properties that are within the Area of Potential Effect, and 4) if avoidance or minimization of an adverse effect is not possible, work with consulting parties to identify mitigation that will resolve the adverse effect.

3.15.1 NHPA Coordination for the Proposed Project

Pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. § 306108), as amended, USACE notified the Guam State Historic Preservation Officer (SHPO), the Guam Preservation Trust, and the Guam Department of Chamorro Affairs of this undertaking on February 25, 2022. In consultation with these consulting parties, USACE has determined the proposed undertaking's Area of Potential Effect (APE), reviewed existing information on cultural resources and historic properties within and in the general vicinity of the APE, and found that a phased identification and evaluation of potential historic properties within the APE is warranted. On March 15, 2023, in accordance with 36 CFR § 800.4(b)(2), USACE found that the recommended plan (Alternative 2) has the potential to result in an adverse effect on historic properties. USACE proposed to develop a Memorandum of Agreement (MOA) in accordance with 36 CFR § 800.6 to identify actions to resolve this adverse effect. The SHPO concurred with this determination and agreed to the development of an MOA on May 15, 2023. The project will comply with this Act.

3.16 Federal Water Project Recreation Act (16 U.S.C. §460(L)(12)-460(L)(21) *et seq.*)

The principles of the Federal Water Project Recreation Act (16 U.S.C. §460l-12 et. seq.) require USACE to give full consideration to any opportunity for the Project to add or improve outdoor recreation and/or fish and wildlife enhancement. The Preferred Alternative does not have any anticipated long-term impacts to recreation. The project complies with this Act.

3.17 Wild and Scenic River Act of 1968 (16 U.S.C. §1271 *et seq.*)

There are no streams with special designations and no designated wild and scenic rivers in Guam (*National Wild and Scenic Rivers System 2015*). This Act is not applicable.

3.18 Estuary Protection Act of 1968 (16 U.S.C. §§1221-26)

No designated Estuary of National Significance exists within American Samoa, CNMI, Guam, or Hawaii. This Act is not applicable to POH.

3.19 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990 (16 U.S.C. §3501 *et seq*.)

There are no designated coastal barrier resource system units that will be affected by this project. These Acts are not applicable.

3.20 Executive Order (EO) 14008 Tackling the Climate Crisis at Home and Abroad

EO 14008 (Tackling the Climate Crisis at Home and Abroad; Section 2223 established the Justice40 Initiative requiring that 40% of the overall benefits of certain Federal investments be directed to disadvantaged communities. The 15 March 2022 Memorandum for Commanding General, U.S. Army Corps of Engineers, Implementation of Environmental Justice and the Justice40 Initiative defined the process for USACE to address Justice40. While CEQ's CEJST does not designate the census tracts immediately adjacent to the study area as disadvantaged, Guam is designated as an economically disadvantaged community in accordance with Section 160 of the Water Resources Development Act of 2022 and USACE (2023a). Protecting the East Hagatna shoreline furthers Objective 6: Increase the proportion of project benefits to economically disadvantaged and historically underserved communities, of Honolulu District's Environmental Justice Strategic Plan (USACE 2023b).

3.21 EO 13690 Flood Plain Management

EO 11988 (Floodplain Management; May 24, 1977) requires a Federal agency, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and the modification of a floodplain. EO 11988 requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In addition, the agency must minimize potential harm to or in the floodplain and explain why the action is proposed. Additional floodplain management guidelines for Executive Order 11988 were provided in 1978 by the Water Resources Council and these have recently been revised as part of Executive Order 13690, signed on January 30, 2015, which amends Executive Order 11988. It should be noted, however, that determination of the proposed flood wall heights is selected based on economic optimization of the NED Plan, not the Federal FRM standard released in Executive Order 13690.

Federal agencies must either avoid funding or permitting critical facilities in the 500-year floodplain or must provide protection to mitigate the flood risk to those facilities. Critical facilities are those facilities for which even a small risk of flooding is too great and include public safety infrastructure (*FEMA 2016*). In accomplishing this objective, "each agency provides leadership and takes action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities" for the following actions:

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities

The National Flood Insurance Program (NFIP) is a federal program managed by the FEMA that allows property owners in participating communities to purchase flood insurance with rates established through the National Flood Insurance Rate Maps.

An eight-step process is used to ensure compliance with EO 13690; this process involves public review, consideration of practicable alternatives, identification of impacts and measures to minimize those impacts, and presentation of the findings. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives. Therefore, where possible, the eight-step decision-making process has been integrated into the analysis as presented in the IFR/EA, as listed below.

Step 1: Determine whether the proposed action is in the base floodplain. T*he proposed project is located on the southern coast of Hagatna Bay in East Hagatna, Guam.*

Step 2: Provide early public review of any plans or proposals for action in the base floodplain. *A 30 day review period of the draft IFR/EA documents will be provided to the public and consulting agencies.*

Step 3: If the action is in the base floodplain, determine whether there is a practicable alternative to the action. *The project is intended to provide shoreline protection and is not located within a base floodplain.*

Step 4: Identify beneficial and adverse impacts caused by the proposed action and any expected losses of natural and beneficial floodplain values.
The project is not located within a base floodplain nor do any waterways drain to the proposed project site. *Beneficial and adverse impacts associated with the recommended alternative are identified* and discussed *in the draft IFR/EA.*

Step 5: Determine viable methods to minimize any adverse impacts of the action and methods to restore and preserve the natural and beneficial values. *Potentially adverse impacts are expected to be avoided or minimized through implementation of appropriate mitigation measures, as described in the draft IFR/EA.*

Step 6: Reevaluate the proposed action based on the information generated in Steps 4 and 5. *An iterative plan formulation process was completed, as thoroughly described throughout the draft IFR/EA.*

Step 7: Prepare a Statement of Findings and advise the public if the proposed action will be in the floodplain. *Multiple opportunities have been and will continue to be provided for public and agency review of the proposed project. In addition, the draft IIFR/EA will be made available for public review.*

Step 8: Implement the action after completing the seven evaluation steps. *The project will be implemented after construction of the study if approved to move forward and all pre-construction permits are obtained.*

To comply with E.O. 11988, the policy of USACE is to formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. Based on the analysis in the IFR/EA, USACE concludes that the Recommended Plan will not result in harm to people, property, and floodplain values, in fact would protect the floodplain, will not induce development in the floodplain, and the Project is in the public interest. The project complies with the EO.

3.22 E.O. 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

This E.O. requires, among other things, a Memorandum of Understanding (MOU) between the USACE and USFWS concerning migratory birds. Neither the Department of Defense MOU nor the USACE Draft MOU clearly address migratory birds on lands not owned or controlled by USACE. For many USACE civil works projects, the real estate interests are provided by the non-Federal sponsor. Control and ownership of the Project lands remain with a non-Federal interest. Measures to avoid disturbing migratory birds are described in Section 6.9 of this EA and are incorporated by reference. The USACE will include standard migratory bird protection requirements in the Project plans and specifications and will require the contractor to abide by those requirements. The project complies with the Order.

3.23 E.O. 13571 Invasive Species

The Project's plans and specifications will include conditions to avoid the introduction and/or promotion of non-native species to the region. USACE will require the Contractor to abide by those requirements. The Project complies with the Order.

3.24 E.O. 13089 Coral Reef Protection

No corals or hardbottom habitats exist within the Study area. This E.O. is not applicable to the project.

3.25 E.O. 13045 Protection of Children from Environmental Health Risks and Safety Risks

On April 21, 1997, the President of the U.S. issued E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks. The E.O. mandates that each Federal agency make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. The proposed action does not affect children disproportionately from other members of the population and would not increase any environmental health or safety risks to children. The Project complies with the Order.

3.26 E.O. 12898 Environmental Justice

On February 11, 1994, the President of the U.S. issued E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This E.O. mandates that each Federal agency make environmental justice (EJ) part of the agency mission and to address, as appropriate, disproportionately high and adverse human health or environmental effects of the programs and policies on minority and low-income populations. Significance thresholds that may be used to evaluate the effects of a proposed action related to EJ are not specifically outlined. However, Council on Environmental Quality (CEQ) guidance requires an evaluation of a proposed action's effect on the human environment and USACE must comply with Executive Order 12898. USACE has determined that a proposed action or its alternatives would result in significant effects related to EJ if the proposed action or an alternative would disproportionately adversely affect an EJ community through its effects on:

•Environmental conditions such as quality of air, water, and other environmental media; degradation of aesthetics, loss of open space, and nuisance concerns such as odor, noise, and dust;

•Human health such as exposure of EJ populations to pathogens;

•Public welfare in terms of social conditions such as reduced access to certain amenities like hospitals, safe drinking water, public transportation, etc.; and

•Public welfare in terms of economic conditions such as changes in employment, income, and the cost of housing, etc.

USACE conducted an evaluation of EJ impacts using a two-step process: as a first step, the study area was evaluated to determine whether it contains a concentration of minority and/or low-income populations. Following that evaluation, in the second step, USACE determined whether the proposed action would result in the types of effects listed above in a disproportionately, high adverse manner on these populations.

As defined in Executive Order 12898 and the CEQ guidance, a minority population occurs where one or both of the following conditions are met within a given geographic area:

• The American Indian, Alaska Native, Asian, Pacific Islander, Black, or Hispanic population of the affected area exceeds 50 %; or

•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.

An affected geographic area is considered to consist of a low-income population (i.e. below the poverty level for purposes of this analysis) where the percentage of low-income persons:

•is at least 50 % of the total population; or

•is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis.

Guam is now included in CEQ's CEJST. While the entirety of Guam is considered a disadvantaged community, the purpose of this project tis the protection of the community and as such would not have an adverse effect on the community. No disproportionate and adverse effects to minority and/or low income populations are expected to result from the implementation of the Recommended Plan. The Project complies with the Order.

3.27 EO 11990 Protection of Wetlands

The purpose of EO 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, federal agencies are required, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The EO applies to the following:

- Acquisition, management, and disposition of federal lands and facilities construction and improvement projects that are undertaken, financed, or assisted by federal agencies
- Federal activities and programs affecting land use, including, but not limited to, water and related land resources planning, regulation, and licensing activities.

The procedures require the determination of whether the proposed project would be in, or would affect, wetlands. If so, a wetlands assessment must be prepared that describes the alternatives considered. The procedures include a requirement for public review of assessments. The evaluation process follows the same eight steps as for EO 11988, Floodplain Management. As with EO 11988, this eight-step process can be addressed as part of the NEPA compliance process if an EA or EIS is developed.

There are no wetlands within the proposed Study Area and no wetlands would be affected by and project activities. This EO is not applicable.

Attachment 1. FWCA Consultation

1a. 2 June 2022 Technical Assistance Letter to USFWS PIFWO
1b. 2 June 2022 Technical Assistance Letter to NMFS PIRO HCD
1c. 2 June 2022 Technical Assistance Letter to Guam DAWR
1d. 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS
1e. 21 July 2022 NMFS Technical Assistance Response
1f. 27 July 2022 USFWS Technical Assistance Response
1g. 17 March 2023 USFWS Technical Assistance Response
1h. 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

1a. 2 June 2022 Technical Assistance Letter to USFWS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil Works Branch
Programs and Project Management Division

Gregory Koob
Deputy Field Supervisor for Programmatic Operations
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Blvd Rm 3-122
Honolulu, HI 96850

Dear Mr. Koob:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to the Fish and Wildlife Coordination Act (FWCA) of 1934 (16 U.S.C. §661 et seq.), as amended and the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, USACE invites the U.S. Fish and Wildlife Service (USFWS) to participate in this study and requests any available information regarding fish and wildlife resources occurring within the study area. For the purposes of this request, the

1a (cont.). Technical Assistance Letter to USFWS

study area comprises the area within which USACE is considering direct and indirect impacts to protected resources. As more information is gathered, the impact areas relative to each protected resource will be further refined.

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a cooperating and participating agencies' workshop scheduled for June 8, 2022. We will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations.

A copy of this letter and its enclosures will be sent to the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, the U.S. Environmental Protection Agency, National Marine Fisheries Service (NMFS) Habitat Conservation Division, and NMFS Protected Resources Division pursuant to the FWCA, the Endangered Species Act and the National Environmental Policy Act (NEPA). This letter of request for information from your agency constitutes the USACE scoping request pursuant to NEPA. To reduce redundancy, a separate NEPA scoping letter will not be sent to your office. Any additional comments provided pursuant to NEPA will be fully considered and incorporated into the administrative record.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

1a (cont.). Technical Assistance Letter to USFWS

Enclosure 1

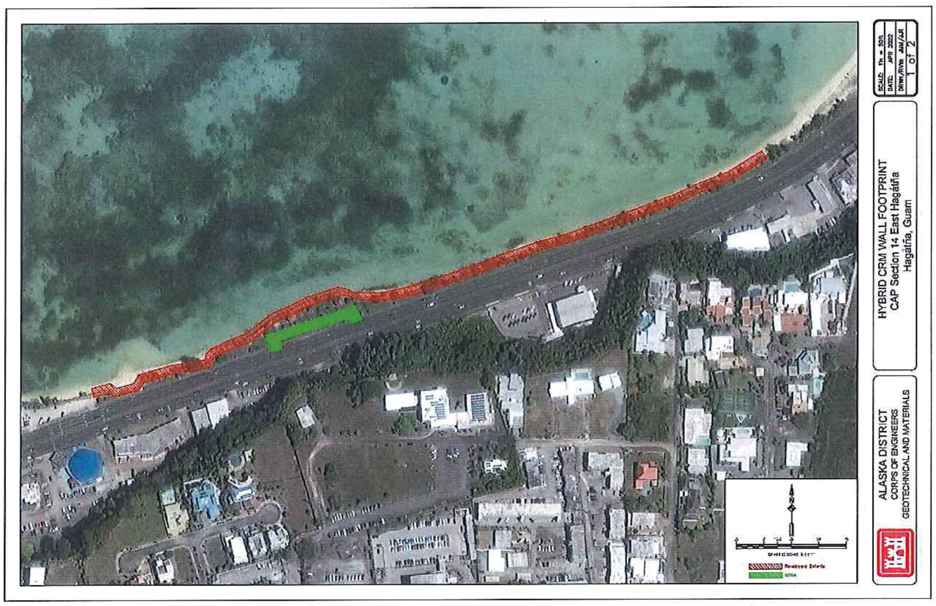


Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

1b. 2 June 2022 Technical Assistance Letter to NMFS PIRO Habitat Conservation Division

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Gerald Davis
Assistant Regional Administrator
Habitat Conservation Division
Pacific Islands Regional Office
National Marine Fisheries Service
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

Dear Mr. Davis:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 et seq.) of 1934, as amended, USACE invites the National Marine Fisheries Service (NMFS) to participate in this study and requests any available information regarding fish and wildlife resources occurring within the study area. Additionally, pursuant to the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855), USACE requests location-specific information on the status and any concerns for the conservation of federally managed fisheries and designated EFH within the study area. For the purposes of this request, the study area comprises the area within which USACE is considering direct and

1b (cont.). 2 June 2022 Technical Assistance Letter to NMFS PIRO HCD

indirect impacts to protected resources. As more information is gathered, the impact areas relative to each protected resource will be further refined.

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a cooperating agency and participating agency workshop scheduled for June 8, 2022. We will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations.

A copy of this letter and its enclosures will be sent to the U.S. Fish and Wildlife Service, the Guam Division of Aquatic and Wildlife Resources, the U.S. Environmental Protection Agency, and National Marine Fisheries Service Protected Resources Division pursuant to the FWCA, the Endangered Species Act and the NEPA. This letter of request for information from your agency constitutes the Corps' scoping request pursuant to NEPA. To reduce redundancy, a separate NEPA scoping letter will not be sent to your office. Any additional comments provided pursuant to NEPA will be fully considered and incorporated into the administrative record.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

1b (cont.). 2 June 2022 Technical Assistance Letter to NMFS PIRO HCD

Enclosure 1

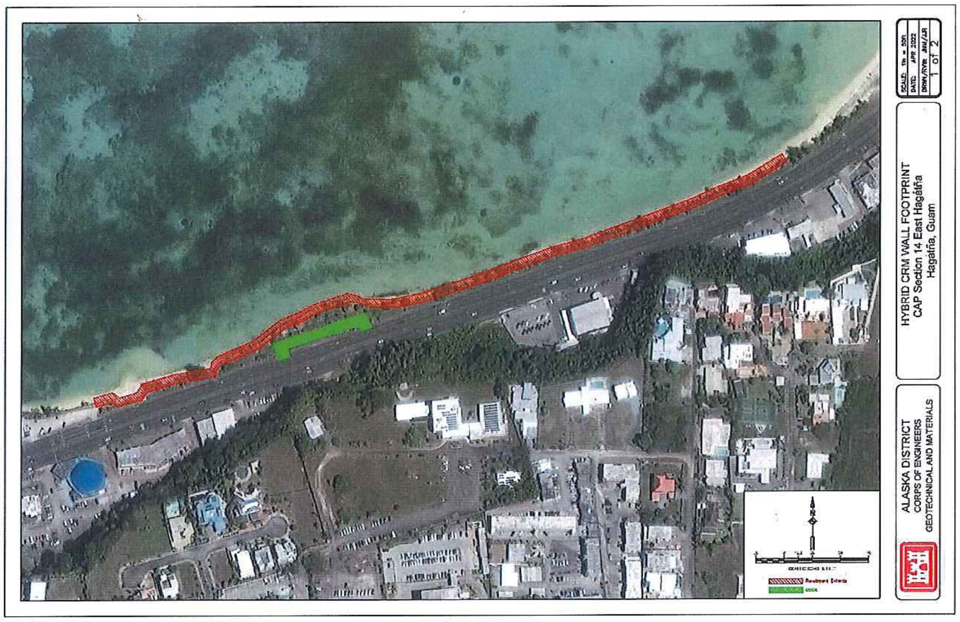


Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

1c. 2 June 2022 Technical Assistance Letter to Guam Division of Aquatic and Wildlife Resources

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Chelsa Muña-Brecht
Director
Division of Aquatic and Wildlife Resources
Government of Guam, Department of Agriculture
163 Dairy Road
Mangilao, Guam 96913

Dear Director Muña-Brecht:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to the Fish and Wildlife Coordination Act (FWCA) of 1934 (16 U.S.C. 661 et seq.), as amended, USACE invites the Guam Division of Aquatic and Wildlife Resources (DAWR) to participate in this study and requests any available information regarding fish and wildlife resources occurring within the study area. DAWR may have both expertise relevant to the study and to identifying environmental effects that could result from a recommended project, and jurisdiction by law. For the purposes of this request, the study area comprises the area within which USACE is considering direct and indirect impacts to protected resources. As more information is gathered, the impact areas relative to each protected resource will be further refined.

1c (cont.). 2 June 2022 Technical Assistance Letter to GDAWR

-3-

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a cooperating agency and participating agency workshop scheduled for June 9, 2022. We will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations.

A copy of this letter and its enclosures will be sent to the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service and National Marine Fisheries Service pursuant to the FWCA and the ESA. This letter of request for information from your agency constitutes the Corps' scoping request pursuant to NEPA. To reduce redundancy, a separate NEPA scoping letter will not be sent to your office. Any additional comments provided pursuant to NEPA will be fully considered and incorporated into the administrative record.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

1c (cont.). 2 June 2022 Technical Assistance Letter to GDAWR

-3-

Enclosure 1

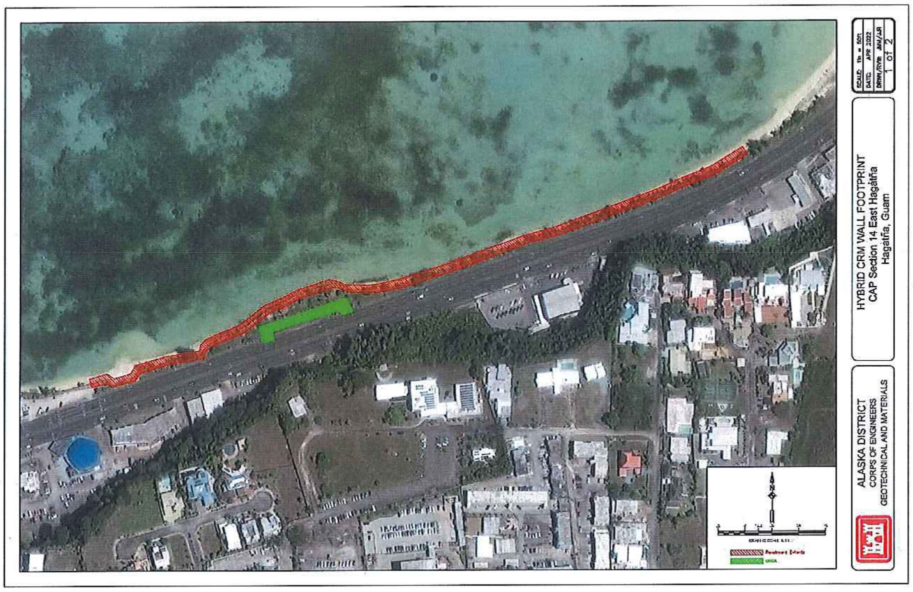


Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

1d. 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

JUN 28 2022

Civil Works Branch
Programs and Project Management Division

Dr. Dan A. Polhemus
Acting Supervisor, Ecological Services Field Office
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Blvd Rm 3-122
Honolulu, HI 96850

Dear Dr. Polhemus:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. In general, Section 14 of the 1946 Flood Control Act, as amended, provides authority for USACE to plan and construct emergency streambank and shoreline protection projects to protect vital public infrastructure. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321) and other environmental laws and regulations.

As described in the June 14, 2022, Resource Agency Workshop, the preferred alternative is the rock revetment (described in Figure 1 of the enclosure). Construction of the rock revetment involves demolition and removal of the existing wall and installation of a rock revetment along the coast (described in Figure 2 of the enclosure). The footprint provided for the revetment in Figure 2 shows the maximum extent that could be needed for construction. Construction activities include grubbing and demolition, excavating the toe trench, compacting fill, lining of the substrate with geotextile fabric, installing stone and armor rock underlayer, backfilling the toe with excavated sand, revegetation, and installing and removing all best management practices. The expected design life of this system (assuming proper installation and routine maintenance) is on the order of 50 years.

During initial background investigations into fish and wildlife resources present within and proximal to the study area, our team identified substantial available surveys, reports and information. To support your efforts, please reference the following resources concerning the study area:

1d (cont.). 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS

Individuals and organizations with data include:

- Dr. Dave Burdick, burdickd@triton.uog.edu, University of Guam, has coral survey data that includes Hagatna Bay surveys in 2022.
- Laura Duenas, Laura.Duenas@doag.guam.gov, has bird survey data that includes Migratory bird surveys and Micronesian starling surveys.
- Jesse Cruz, Jesse.Cruz@epa.guam.gov, Guam EPA, has water quality and related data, http://epa.guam.gov/
- Eyes of the Reef Marianas, https://eormarianas.org/, collects citizen scientist observations of coral presence and condition. It is partly funded by the Guam Bureau of Statistics and Plans http://bsp.guam.gov/coral-reef-initiatives/.
- Guam Subsistence Fishing https://www.facebook.com/Guam-Subsistence-Fishing-104979002102811/ collects fisher's catch data to monitor reef ecology.
- Guam Reef Restoration and Intervention Partnership (GRRIP) maintains a Facebook page of reef observations https://www.facebook.com/groups/619639241822965/#_=_
- USFS Guam has forest inventory data for 2002 and 2013 https://www.fs.usda.gov/pnw/tools/pnw-fia-pacific-islands-database

Recent publications on resources of Hagatna Bay include:

- Raymundo, L.J., M.D. Andersen, C. Moreland-Ochoa, A. Castro, C. Lock, N. Burns, F. Taijeron, D. Combosch, & D. Burdick. 2022. Conservation & Active Restoration of Guam's Staghorn Acropora Corals. https://www.uog.edu/_resources/files/ml/technical_reports/UOGML_TechRep168_Raymundo_2022.pdf. Includes a 2022 assessment of the Hagatna Bay coral population on p. 36.
- Fabian, V.P. & A.G. Fujimura. 2020. Survey of Guam Benthic Habitats and Coral Health. 39 pages. https://www.uog.edu/_resources/files/ml/technical_reports/UOGML_TechReport166_Fabian_Fujimura2020.pdf
- Kerr, A. M., A.K. Miller, C. Brunson, & A.M. Gawel. 2017. Commercially Valuable Sea Cucumbers of Guam. 55 pages. https://www.uog.edu/_resources/files/ml/technical_reports/UOGML_TechRep162_Kerr_etal_2017.pdf

Based on the substantial amount of available information, and the relatively minor in-water work area, we request that you provide us with a Planning Aid Letter in accordance with the Fish and Wildlife Coordination Act (FWCA) of 1934, as amended, for the evaluation of the preferred alternative. If you determine that an investigation and report under Section 2b of the FWCA is required, we request a scope of work and cost estimate.

A copy of this letter and its enclosures has been furnished to Stuart Goldberg, Acting EFH Coordinator, Pacific Islands Regional Office; Jeffrey S. Quitugua, Guam Division of Aquatic and Wildlife Resources; and Robin Truitt, U. S. Environmental Protection Agency, Pacific Islands Contact Office.

1d (cont.). 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

1d (cont.). 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS

-4-

Enclosure 1

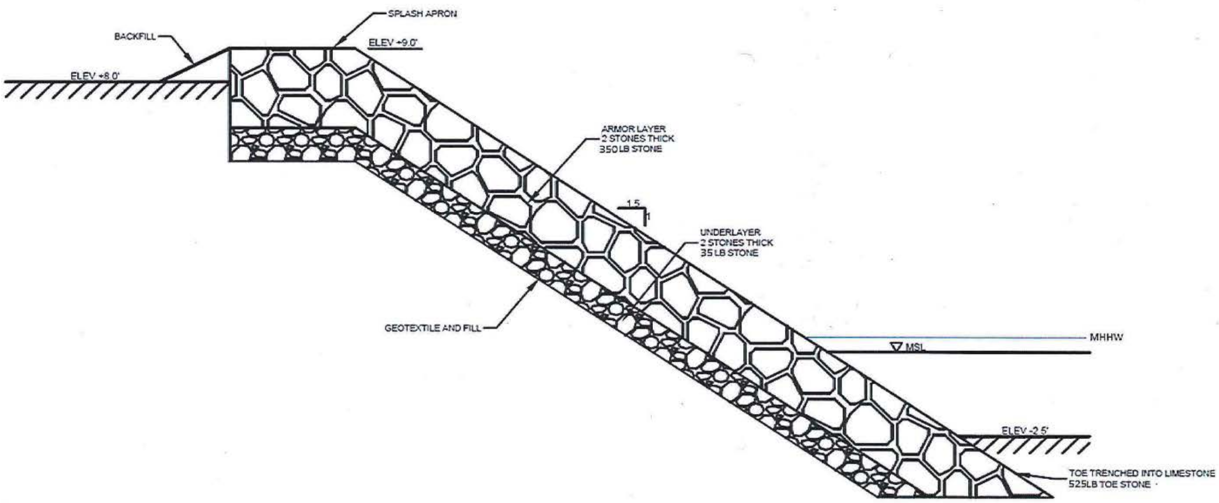


Figure 1: Rock revetment cross section, showing where Mean Sea Level (MSL) and Mean Higher High Water (MHHW) will potentially intersect with the structure. Figure by Catie Dillon, May 31, 2022.

The crest of the rock revetment is planned to be centered over the location of the existing vertical seawall, with the toe 17 ft out. A small trench will be excavated into the underlying limestone at -2.5 MSL to seat the toe of the revetment. The revetment extends up to +9ft. MSL at the crest elevation, approximately 1 foot above the current highest point of the existing seawall.

1d (cont.). 28 June 2022 USACE FWCA Planning Aid Letter Request to USFWS

-5-

Figure 2: Proposed Project Area: The proposed active construction and staging (labelled COSA) areas are indicated in black. The red line indicates mean lower low water (MLLW), the green line indicates mean sea level (MSL), and the blue line indicates mean higher high water (MHHW). Figure by Catie Dillon, May 31, 2022.

The proposed active construction and staging area is 1.45 acres. The project area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. Rock Revetment Footprint. The footprint of the revetment shown is about 40-50 ft. wide to accommodate any potentially needed area for construction. The revetment itself is currently designed to be only 17 ft. wide with a finished footprint of 0.82 acres (ac). The direct in-water footprint will vary along the project length with the existing shoreline. Excavation, grading, structure demolition, tree, and foliage removal, staging, and upland buffer areas are expected to increase the total project footprint to.

The present assumption is the revetment could be constructed from the land during low tide without in-water construction. However, the construction means and method will be further defined by the construction contractor prior to construction.

1e. 21 July 2022 NMFS Technical Assistance Response

From:	Jonathan Brown - NOAA Federal
To:	Dean, Marian E CIV USARMY CEPOH (USA)
Cc:	efhesaconsult@noaa.gov; Gerry Davis - NOAA Federal; Malia Chow - NOAA Federal; Stuart Goldberg - NOAA Federal
Subject:	[Non-DoD Source] NMFS Technical Assistance: East Hagatna Emergency Shoreline Protection Project in Guam
Date:	Thursday, July 21, 2022 6:32:31 PM

Håfa Adai, Marian:

On June 2, 2022, the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office (PIRO), Habitat Conservation Division (HCD), received the U.S. Army Corps of Engineers, Honolulu District, Civil Works Branch (USACE) request letter for comments and technical assistance for the East Hagatna Emergency Shoreline Protection Project, located in Hagatna, on the island of Guam. The June 2, 2022 letter also requests NMFS to participate in the early scoping activities of the project. The USACE proposes to study and construct an emergency shoreline protection project to protect the vital public infrastructure of South Marine Corps Drive adjacent to Trinchera Beach within Agana Bay, Guam. This proposed action is being conducted in partnership with the Government of Guam and the USACE is inquiring whether or not other Federal agencies, including NMFS PIRO HCD, would like to provide information to inform the scoping study. Staff from the HCD attended the June 9, 2022 interagency workshop, as well as a June 14, 2022 follow-up conference call.

Below we provide technical assistance intended to help you integrate EFH considerations as you start the scoping process for this study. This technical assistance does not fulfill any federal responsibilities, and does not constitute an EFH consultation. In addition to being the federal regulatory agency responsible for implementing the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including the EFH provisions described by Federal regulations (50 CFR 600.920), PIRO oversees consultations for compliance with the Endangered Species Act and other statutory mandates. Compliance with the EFH provisions of the MSA can also be achieved through pursuance to the Fish and Wildlife Coordination Act (FWCA, 16 U.S.C. 661-666c; see below). For all questions related to consultations with us in the future, please contact us through the email address EFHESAconsult@noaa.gov.

Essential Fish Habitat

The marine water column from the surface to a depth of 1,000 m from shoreline to the outer boundary of the Exclusive Economic Zone (200 nautical miles), and the seafloor from the shoreline out to a depth of 400 m around each of the Mariana Islands, have been designated as EFH. As such, the water column and bottom and all surrounding waters and submerged lands around Guam, including the Agana Bay, are designated as EFH and support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council's, Pelagic and Mariana Archipelago Fishery Ecosystem Plans (hereafter, Mariana FEP). The MUS and life stages found specifically within the Saipan lagoon include eggs, larvae, juveniles, and adults for Bottomfish and Pelagic MUS. Specific types of habitat considered as EFH within, or adjacent to, the proposed project area include coral reef, patch reefs, hard substrate, artificial substrate, seagrass beds, soft substrate, mangrove, lagoon, estuarine, surge zone, deep-slope terraces and pelagic/open ocean.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act mandates that wildlife, including fish, receive equal consideration and be coordinated with other aspects of water resource development. This is accomplished through consultation with NMFS, the U.S. Fish and Wildlife Service (USFWS), 1e. (cont.). 21 July 2022 NMFS Technical Assistance Response

and appropriate state agencies whenever any body of water is proposed to be modified in any way and a Federal permit or license is required. These agencies determine the possible harm to fish and wildlife resources, the measures needed to both prevent the damage to and loss of these resources, and the measures needed to develop and improve the resources, in connection with water resource development. NMFS, the USFWS, and state agencies submit comments to Federal licensing and permitting agencies on the potential harm to living marine resources caused by the proposed water development project, and recommendations to prevent harm In all, the FWCA compliance process includes the following four steps: consultation (notice of initiation); reporting (e.g., field surveys and summary reports) and recommendations to protect, mitigate, and restore natural resources; Action agency consideration of recommendations, and Action agency implementation of recommendations.

General Guidance
Shoreline protection strategies involving broad-scale hardening of coastlines through the use of seawalls, construction of revetments, or the installation of groins, typically impart adverse effects to EFH resulting in the need for avoidance, minimization and offset measures. The alteration of natural, stable shorelines should be avoided as much as is practicable. Where practicable, bioengineering approaches should be used to protect altered shorelines. NMFS recommends alternatives to hard engineering strategies through the use of soft engineering strategies (e.g., vegetation alternatives), a combination of hard and soft engineering strategies (i.e., nature-based solutions including living shorelines). Further, the repair of existing structures to the extent practicable, typically decreases the impacts of adverse effects to EFH and often results in greater environmental benefits. Please consider this when prioritizing projects from this study.

Habitat Resource Assessments and Modelling
The USACE has proposed several sources of marine assessments for the study area, but none are within the proposed project area (i.e., along Trinchera Beach within Agana Bay). NMFS first recommends qualitative assessments to determine the presence or absence of habitat forming EFH, including corals and seagrass, at and immediately adjacent to the proposed project footprint. If qualitative surveys reveal the presence of corals and/or seagrass, we recommend conducting quantitative marine assessments and modeling activities for any specific projects that emerge from the study. In addition to detailed surveys of hard-bottom habitat, corals, and seagrass, we recommend the USACE develop predictive modelling analyses for water transport, sedimentation, and changes in coastal processes in order for NMFS to adequately assess the resource condition baseline associated with any specific project activities. Climate change and sea level rise should be included in modelling analyses where applicable.

NMFS recommends that the USACE conduct modelling to predict how proposed projects will influence sediment transport, water motion, and other coastal processes before finalizing priorities from the study. Sediment transport and water current modelling would improve the accuracy of where potential survey transects are laid. Specifically, if there is high probability that sediment deposition will occur over sensitive and hard-to-replace hard-bottom habitat, corals, and seagrass, these should be priority survey areas. Completing these modelling efforts prior to finalizing the study would help reduce uncertainty and better inform potential EFH offset determinations.

NMFS also recommends that hard-bottom EFH, coral, and seagrass communities are sufficiently sampled during quantitative benthic marine surveys. Prioritize surveys at areas

1e. (cont.). 21 July 2022 NMFS Technical Assistance Response

where models predict deposition, and principle benthic organisms are present to reduce uncertainty and inform potential EFH minimization strategies and offset determinations. We are happy to continue coordinating during this process.

Water Quality Monitoring
Robust water quality monitoring (e.g., turbidity, sedimentation rates) may be needed to assess conditions before (i.e., baseline), during, and after certain project activities. These activities should be informed by the sediment modeling. Special attention may be needed to collect turbidity and sedimentation rate information at areas where there are habitat forming EFH resources, including corals and seagrass. For other criteria needed for projects that emerge from this study, NMFS would defer to the Guam 401 Water Quality Certification (WQC) authority. Completing the water quality monitoring planning effort and including it as part of project prioritization would help reduce uncertainty and better inform EFH conservation recommendations and any potential offset determinations.

Climate Change and Sea Level Rise
Predicted changes in precipitation patterns, ocean conditions and other factors associated with climate change should be integrated into each phase of the study and prioritization process. A description of how these are integrated into engineering and design plans is recommended.

Cumulative Effects
NMFS recommends that the USACE develop a cumulative effects analysis for potential adverse effects to EFH over time from any projects resulting from these scoping exercises. This includes the USACE-proposed flood damage reduction study for the Agana River within the Hagatna watershed (Agana River Flood Risk Management General Reevaluation Study). For example, sediment deposition may be enhanced by the flood control project, which intends to enhance discharge rates of water and sediment into the bay. If the seawall project is nearby, the impacts to water motion and sediment resuspension from its lifetime may result in additional unforeseen adverse effects to EFH, including corals, from smothering and burial leading to degradation in state and mortality.

NMFS appreciates the opportunity to provide technical assistance during the scoping phase of the current study. We are committed to providing continued cooperation and subject matter technical expertise that result in beneficial outcomes for NOAA trust resources and sufficiently comply with relevant mandates, while achieving the project goals effectively and expeditiously. Please contact Jonathan Brown at jonathan.brown@noaa.gov with any comments, questions, or to request further technical assistance.

Jonathan
--
Jonathan Brown
Guam Coral Reef Fisheries Liaison, Pacific Islands Regional Office
NOAA Fisheries | U.S. Department of Commerce
www.fisheries.noaa.gov

1f. 27 July 2022 USFWS Technical Assistance Response

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
Project Code 2022-0066853

July 27, 2022

Marian Dean
Environmental Planner
Civil & Public Works Branch
U.S. Army Corps of Engineers
Honolulu District
230 Otake St.
Ft. Shafter, HI 96858-5440

Subject: Response to request for Fish and Wildlife Coordination Act Planning Aid Letter for East Hagatna, Guam

The U.S. Fish and Wildlife Service (Service) is in receipt of your June 30, 2022, request for a Fish and Wildlife Coordination Act (FWCA) Planning Aid Letter for the East Hagatna Section 14 Emergency Shoreline Protection Project. The proposed project is sponsored by the U.S. Army Corps of Engineers (USACE) and the Government of Guam).

The FWCA provides the basic authority for the Secretary of the Interior, through the Service, to assist and cooperate with Federal, state, and public or private agencies and organizations in the conservation and rehabilitation of wildlife. Whenever the waters or channel of a body of water are modified by a federal agency, or by any other entity where a federal permit is required, adequate and equal consideration must be made for the conservation, maintenance, and management of trust wildlife resources and habitat. The National Oceanic and Atmospheric Administration's (NOAA), National Marine Fisheries Service (NMFS) provides similar assistance and cooperation for wildlife species under the management responsibilities of the Department of Commerce. Consultation under the FWCA is to be conducted with the Service, NMFS as appropriate, and the agency administering the wildlife resources of the State in which the project is located. In this case, the primary state wildlife resource agency is the Guam Division of Aquatic and Wildlife Resources DAWR). The resource agencies have the responsibility of ensuring that concerns and recommendations of the other resource agencies are considered fully in FWCA reviews. The FWCA compliance process has four general steps: consultation or request for technical assistance; reporting (a Planning Aid Letter or field surveys and summary reports) and recommendations to protect, mitigate, and avoid natural resources;

INTERIOR REGION 9
COLUMBIA–PACIFIC NORTHWEST
IDAHO, MONTANA*, OREGON*, WASHINGTON
*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS
AMERICAN SAMOA, GUAM, HAWAII, NORTHERN MARIANA ISLANDS

1f. (cont.). 27 July 2022 USFWS Technical Assistance Response

action agency consideration of recommendations; and action agency implementation of recommendations.

Purpose and Need

The purpose of the project is to plan and construct emergency shoreline protection along a section of Hagatna Bay, Guam. The construction is currently proposed for a 2,100 linear foot section along South Marine Corps Drive. Demolition and excavation may occur to remove the existing seawall structure and then install a new rock revetment along that same section. The stabilization structure is intended to slow erosion along the shoreline and to protect transportation infrastructure. In addition to the immediate project footprint, vegetation removal is expected along the adjacent shoreline to accommodate the activity, and there will be staging areas and an upland buffer area. The expected design life with routine maintenance is 50 years.

General comments and recommendations

Preliminary information from the USACE has identified that the project is still in the feasibility stage and that alternatives and construction designs are still being developed. The Service would like to provide some comments and recommendations intended to assist the USACE integrate FWCA considerations into the project development and implementation. This technical assistance does not fulfill any federal responsibilities and does not constitute an FWCA consultation. In addition, a draft National Environmental Policy Act (NEPA) document is not available for review currently.

Enclosure 1 in the USACE letter provided a rock revetment cross section as an example of a design that is preferred for the project. The footprint for the proposed action will differ based on the alternative proposed. A complete alternatives analysis cannot be performed without the range of proposed alternatives. In addition to the rock revetment, such alternatives might also include excavation, grading, structure demolition, tree and foliage removal, staging, and upland buffer areas. In projects where a preferred alternative has not been identified, the alternative with the maximum footprint and associated disturbance will be chosen for evaluation by the Service via the FWCA.

The USACE provided a list of publications related to Hagatna Bay for reference but did not identify if any of those occur within the proposed project footprint. The request letter stated that there is a "substantial amount of available information," but if the information is general and not specific to the direct project footprint and a buffer zone, it may not be relevant to an impact assessment for this project. The available information indicates that there could be valuable resources in Hagatna Bay in the vicinity of the project footprint, possibly including ESA species. Time is also relevant to the data conversation. In most cases, the data should be recent, with observations (or instrument data collection) and analysis completed within the last 5 years. Depending on the outcome of the natural resource evaluation, the resource agencies may recommend compensatory mitigation to the action agency.

1f. (cont.). 27 July 2022 USFWS Technical Assistance Response

The June 14, 2022, USACE presentation "East Hagåtña, Section 14 Emergency Shoreline Protection Feasibility Study" mentioned that there are known Endangered Species Act (ESA) listed corals in the area. There is no clarification on what species those are, where they occur in relation to the footprint, and when the observations were made. That type of information should be included in the NEPA document development. The USACE may be referencing a University of Guam study that was conducted near the project footprint in 1993. A study that is almost 30 years old would not be considered a recent observation, if there were ESA corals found at that time. If there is no recent information available for the project footprint, the resource agencies would require a field study to determine what resources and benthic habitats are present.

At this time, the Service is providing preliminary comments, listed below, for the development of the Draft Environmental Impact Statement/Environmental Assessment (DEIS or DEA). The Service appreciates being included in early planning for this project as it may make the coordination for the future consultations more efficient, because the resource agencies will have had a chance to contribute and address any concerns before the project reaches the Department of Army permitting stage.

Alternatives

Shoreline protection strategies involving broad-scale hardening of coastlines through the use of seawalls, construction of revetments, or the installation of groins often create adverse effects to proximal marine resources, necessitating measures for avoidance, minimization or mitigation. The alteration of natural, stable shorelines should be avoided as much as is practicable. Where practicable, bioengineering approaches should be used to protect altered shorelines. The Service recommends alternatives to hard engineering strategies through the use of soft engineering strategies (e.g., vegetation alternatives), or a combination of hard and soft engineering strategies (i.e., nature-based solutions including living shorelines). Further, the repair of existing structures, to the extent practicable, typically decreases resource impacts and often results in greater environmental benefits.

Habitat Resource Assessments and Modelling

The USACE has proposed several sources of marine assessments for the study area, but none are within the proposed project area (i.e., along Trinchera Beach within Agana Bay). The Service recommends qualitative assessments to determine the presence or absence of coral reefs and seagrass within and adjacent to the proposed project footprint. If qualitative surveys reveal the presence of corals, seagrass, or other trust resources, we recommend conducting quantitative marine assessments and modeling activities for any specific projects that emerge from the study. In addition to detailed surveys of hard-bottom habitat, corals, and seagrass, we recommend the USACE develop predictive modelling analyses for water transport, sedimentation, and changes in coastal processes in order for the Service to adequately assess the resource condition baseline associated with any specific project activities, and likely changes to such. Climate change and sea level rise should be included in modelling analyses where applicable.

1f. (cont.). 27 July 2022 USFWS Technical Assistance Response

The Service further recommends that the USACE conduct modelling to predict how proposed projects will influence sediment transport, water motion, and other coastal processes before finalizing priorities from the study. Sediment transport and water current modelling would help inform the most appropriate locations for survey transects. If there is high probability that sediment deposition will impact sensitive priority species such as corals and seagrass, then these areas should be prioritized for survey. Completing such modelling prior to finalizing the study will help reduce uncertainty and provide better clarity as to any potential need for mitigation due to unavoidable resource loss.

Water Quality Monitoring

Water quality monitoring regarding turbidity and sedimentation should be undertaken to assess conditions before during, and after project activities involving in-water work. Turbidity and sedimentation rate information should be gathered in those areas where corals and seagrass are shown to occur. The Corps should also work through the Guam 401 Water Quality Certification (WQC) authority regarding other criteria that may apply. Completing the water quality monitoring planning effort and including it as part of project prioritization will reduce uncertainty and again better inform discussions regarding avoidance, minimization, or mitigation.

Climate Change and Sea Level Rise

Predicted changes in sea level, meteorological conditions, and ocean heat content and chemistry other factors associated with climate change over the projected 50-year life of the project should be integrated into each phase of the study and prioritization process. A description of how these are integrated into engineering and design plans is recommended to assess project durability and potential longer term resource impacts.

Cumulative Effects

During the development of the NEPA document the project sponsor should document if there are additional shoreline stabilization, beach nourishment, and/or hardening projects that are currently proposed or recently completed for Hagatna Bay. This includes the USACE-proposed flood damage reduction study for the Agana River within the Hagatna watershed (Agana River Flood Risk Management General Reevaluation Study) which was recently evaluated by the Service in 2021. Sediment deposition may be increased by such a flood control project, which is intended to convey stream spate discharges more directly into the bay. If the seawall project is nearby, the impacts to water motion and sediment resuspension during its lifetime may result in additional unforeseen adverse effects to trust resources such as corals. Cumulative impacts must be considered in an impact assessment and in a FWCA evaluation. The sum of the individual projects may have greater impacts to the overall ecosystem and coastal processes and should be evaluated as such by the resource agencies.

The Service appreciates the opportunity to provide technical assistance during the scoping phase

1f. (cont.). 27 July 2022 USFWS Technical Assistance Response

of the current study. We are committed to providing continued cooperation and subject matter technical expertise that result in beneficial outcomes for trust resources while achieving the project goals in a reasonable and timely fashion. Please contact Nadiera McCarthy (nadiera_mccarthy@fws.gov) with any comments or questions, or to request further technical assistance in this matter.

Sincerely,

Digitally signed by GREGORY KOOB
Date: 2022.07.27 12:46:55 -10'00'

Gregory A. Koob
Assistant Field Supervisor for Programmatic Ops

1g. 17 March 2023 USFWS Technical Assistance Response

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer to:
FWS/R1/Project Code 2022-0066853

March 17, 2023

Marian Dean
Environmental Planner
Civil & Public Works Branch
U.S. Army Corps of Engineers
Honolulu District
230 Otake St.
Ft. Shafter, HI 96850-5440

Subject: Response to additional request for Fish and Wildlife Coordination Act Planning Aid Letter for East Hagatna, Guam

The U.S. Fish and Wildlife Service (Service) received a request for a Fish and Wildlife Coordination Act (FWCA) Planning Aid Letter for the East Hagatna Section 14 Emergency Shoreline Protection Project on June 30, 2022. The proposed project is sponsored by the U.S. Army Corps of Engineers (USACE) and the Government of Guam. The Service responded to that request with a letter dated July 27, 2022, that provided preliminary comments for the development of the Draft Environmental Impact Statement/Environmental Assessment (DEIS or DEA).

At that time, the purpose of the project was to construct emergency shoreline protection along a section of Hagatna Bay, Guam. The status of the project was then removed from the "emergency" category and conversations about a feasibility stage continued with the Federal natural resource agencies, including the National Oceanic and Atmospheric Administration's National Marine Fisheries Service Pacific Islands Regional Office (NMFS/PIRO). Through additional project coordination meetings with the USACE, the Service and NMFS/PIRO offered to collect information on natural resources and marine habitat in the project area and adjacent waters in the Bay if it was feasible, as there were no funds provided. NMFS/PIRO was able to document resources in those areas in November 2022, but a summary report has not been shared yet with the Service at the time of the writing of this letter. The Service has also not seen a draft for a DEIS or DEA that would provide updated project details. Without the additional

PACIFIC REGION 1

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1g. (cont.)**.** 17 March 2023 USFWS Technical Assistance Response

information from either of those, our agency cannot properly evaluate the potential impacts of the proposed action to trust resources.

The Service is still committed to providing continued cooperation and subject matter technical expertise that result in beneficial outcomes for trust resources while achieving the project goals in a reasonable and timely fashion. Please contact Nadiera Sukhraj (Nadiera_McCarthy@fws.gov) with any comments or questions.

Sincerely,

DREW CRANE Digitally signed by DREW CRANE Date: 2023.03.17 12:46:06 -08'00'

Drew Crane
Acting Deputy Field Supervisor

1h. 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 • Fax: (808) 725-5215

July 13, 2023

Ryan Pevey
Lieutenant Colonel
Commander and District Engineer
U.S. Army Corps of Engineers,
Honolulu District Fort Shafter,
Hawai'i 96858-5440

NMFS Planning Aid Letter for the East Hagatna Emergency Shoreline Protection Project

Lieutenant Colonel,

The National Marine Fisheries Service Pacific Islands Regional Office (NMFS) has prepared this Planning Aid Letter (PAL) to assist with the development of the East Hagatna Emergency Shoreline Protection Project in Agana Bay on the island of Guam. This PAL is provided in accordance with the Fish and Wildlife Coordination Act of 1958, as amended (FWCA; 48 Stat. 401; 16 U.S.C 661 *et seq.)*, but it does not constitute a report from the Secretary of Commerce under section 2(b) of the FWCA. Additionally, this PAL does not constitute a biological opinion under the Endangered Species Act (ESA; 87 Stat. 884; 16 U.S.C. 1531 *et seq.*), and it does not provide final conservation recommendations related to Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act (EFH MSA; 90 Stat. 331; 16 U.S.C. 1801 *et seq.*). The purpose of this PAL is to highlight to the U.S. Army Corps of Engineers (Corps) the natural marine resources that we believe may be exposed and affected by the proposed project, mitigation measures that may be implemented to avoid resource exposure and adverse effect, and to indicate our support to the Corps in their proceeding to the pre-construction engineering and design phase of the tentatively selected revetment plan.

The Corps is tentatively proposing to replace a preexisting but failing vertical seawall with a sloped revetment along a 0.64 kilometer portion of shoreline in Hagatna, Guam. This effort appears readily needed to protect the adjacent 7 lane road (South Marine Corps Drive) from shoreline erosion. A preliminary field reconnaissance survey adjacent to the existing seawall identified the surface substrate within the tentative project footprint to be mainly intertidal sand with pockets of exposed rubble and cobble. Sand was also a spatially dominant surface feature in the neighboring submerged region (out to approximately 50 meters distant). Biological resources in the submerged area included scattered patches of seagrass and algae in various aggregate densities, with a limited number of scattered corals (12 individuals that ranged in size from 2.5 to 300 centimeters greatest length). The seagrass, algae and coral resources were observed to be utilized by at least one octopus and 18 species of mainly juvenile-stage fishes,

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

indicating habitat and food-web resource value (NMFS, 2023). Guam-based management unit (MSA MUS) and ESA listed species were not observed, but regional use may occur by the various species and life-stages. In terms of fishing, Agana Bay is known to experience seasonal runs of rabbitfish fry (*Siganus argenteus* and *Siganus spinus*), which are heavily fished and culturally valued (Kyota, 2015). ESA critical habitat may eventually be designated in the Hagatna region for listed corals and or sea turtles.

Coastal hardening has the potential to interfere with natural shoreline dynamics in a manner that may affect adjacent beaches and submerged habitats and resources. As such, the National Marine Fisheries Service typically does not encourage shoreline hardening, particularly in sheltered coastal areas (NOAA, 2015). However, in this case, Hagatna is exposed, it is already "hardened" with an existing but failing vertical seawall, the eroding shoreline is directly adjacent to an extended 7 lane coastal road with no realistic options for rerouting or setback, and the long-term risks to the neighboring submerged habitats and resources appear limited (NMFS, 2023). Given the information that is available, we presently foresee a qualitatively similar state and baseline trajectory for the neighboring submerged habitat and resources with and without the proposed revetment. However, this prediction is based on an assumption that appropriate best management practices will be fully utilized to avoid and minimize the potential for impacts as the project is implemented.

A list of recommended standard best management practices has been developed by the United States Fish and Wildlife Service (USFWS) and is provided with this PAL (separate enclosure). The NMFS fully supports the use of these BMPs and provides the following additional project specific recommendations:

1. The length of the proposed revetment appears fairly long, so it may be best to consider a staged approach to the dredging and filling (D&F) operations. D&F in the intertidal habitat should be timed to avoid operations in areas that are submerged.

2. Limits on the placement and use of people and equipment in submerged areas are recommended, and direct interactions with vegetative habitats and corals should be avoided.

3. Low impact design (LID) principles should be considered in the revetment design and along the edge of the adjacent road, with a focus on storm water management, sediment impoundment and the control and filtering of urban runoff.

4. Fisher access to the seasonal rabbitfish fishery should be considered and should not be meaningfully inhibited by the project.

5. The area is designated as Essential Fish Habitat, so an EFH MSA consultation will be required. Full consideration should be given to the conservation recommendations that result from that consultation.

6. Appropriate precautions and work stoppages should be implemented if mobile ESA listed species approach or enter the work area. Specific ESA conditions and conservation

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

recommendations may be obtained in consultation with our NMFS Protected Resources Division.

7. Monitoring of adjacent and regional beach profiles and the distribution and densities of regional seagrasses should be implemented to assess the short and long-term effects of the proposed project. Such data will be very useful in informing future Guam revetment proposals and predictions, which we foresee increasing in number and need. Pre- and post-construction measures should be made in the adjacent habitat and appropriate reference areas. Additional measures should be made 3 to 5 years following the project's completion to provide for long-term inference on revetment beach and submerged resources effects.

We look forward to further participating and assisting, as needed, with this project and consider the FWCA consultation requirements, up to this point, to have been satisfied. We do highlight the eventual need for separate EFH MSA and ESA consultations, as warranted, which may be initiated at the email address EFHESAconsult@noaa.gov. We encourage the early onset of these consultations. This PAL has been shared with the USFWS and is sent with their support; a copy of their recent response to a Corps request for a PAL is provided (separate enclosure). Please reach out to me (Gerry.Davis@noaa.gov; 808-725-5080) or Dr. Steven Kolinski (Steve.Kolinski@noaa.gov; 808-725-5081) if you have any questions or would like to discuss.

Sincerely,

Gerry Davis

Gerry Davis
Assistant Regional Administrator
NMFS Pacific Islands Regional Office
Habitat Conservation Division

Cc: Sarah Malloy, Acting Regional Administrator, NMFS PIRO
Michelle Mansker, Acting Deputy Regional Administrator, NMFS PIRO

3

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

References

Kyota, C. 2015. University of Guam-4H rabbit fish (manahak) project 2014-2015. Western Pacific Regional Fishery Management Council report, Contract No. 13-SFFII-01, 19 p.

National Marine Fisheries Service (NMFS). 2023. A preliminary survey of marine species and habitats in the vicinity of a proposed shoreline revetment in East Hagatna, Guam. Final report prepared for the United States Army Corps of Engineers Honolulu District, 12 p.

National Oceanographic and Atmospheric Administration (NOAA). 2015. Guidance for considering the use of living shorelines, 35 p.

4

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.asp) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer to:
FWS/R1/Project Code 2022-0066853

July 7, 2023

Ms. Marian Dean
Environmental Planner
Civil & Public Works Branch
U.S. Army Corps of Engineers
Honolulu District
230 Otake St.
Ft. Shafter, Hawaii 96850-5440

Subject: Response to additional request for Fish and Wildlife Coordination Act Planning Aid Letter for East Hagatna, Guam, and comments on shoreline site visit

Dear Ms. Dean:

The U.S. Fish and Wildlife Service (Service) received the original June 30, 2022, request for a Fish and Wildlife Coordination Act (FWCA) Planning Aid Letter for the East Hagatna Section 14 Emergency Shoreline Protection Project. The proposed project is sponsored by the U.S. Army Corps of Engineers (USACE) and the Government of Guam with a purpose of reducing or dissipating wave energy along the shoreline to preserve terrestrial infrastructure needed for transportation. The Service responded to that request with a letter dated July 27, 2022, that provided preliminary comments for the development of the Draft Environmental Impact Statement/Environmental Assessment (DEIS or DEA).

At that time, the purpose of the project was to construct emergency shoreline protection along a section of Hagatna Bay, Guam. The status of the project was then removed from the "emergency" category and conversations about a feasibility stage continued with the Federal natural resource agencies, including the National Oceanic and Atmospheric Administration's National Marine Fisheries Service Pacific Islands Regional Office (NMFS/PIRO). Through additional project coordination meetings with the USACE, the Service and NMFS/PIRO offered to collect information on natural resources and marine habitat in the project area and adjacent waters in the Bay if it was feasible, as there were no funds provided. There was no formal agreement for a FWCA evaluation of resources and alternatives. NMFS/PIRO was able to

PACIFIC REGION 1

IDAHO, OREGON*, WASHINGTON,
AMERICAN SAMOA, GUAM, HAWAII, NORTHERN MARIANA ISLANDS
*PARTIAL

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qualitatively document resources and habitats in those areas in November 2022, and a summary report was sent to USFWS on June 22, 2023 (*A Preliminary Survey of Marine Species and Habitats in the Vicinity of a Proposed Shoreline Revetment in East Hagatna, Guam*).

The Draft Integrated Feasibility Report and National Environmental Policy Act Document for the East Hagatna Shoreline Protection (USACE, May 2023) identified Alterative 2: Revetment as the preferred alternative. The design meets the USACE climate change and sea level rise engineering requirements, and aligns with the funding available for the project, approximately $9 million. Alternative 2 involves the removal and replacement of 2,100 feet (ft)/640 meters (m) of existing seawall along South Marine Corps Drive with either a rock or tribar revetment. This alternative has the largest footprint of the alternatives included in the final array.

Service comments on NMFS/PIRO natural resource observations

The shoreline snorkel from November 2022 was divided into the three areas: 1) Intertidal Habitat Adjacent to the Seawall, 2) Submerged Habitat 82ft/25m distance from the seawall, and 3) Submerged Habitat 164ft/50m distance from the seawall. There were no ESA-listed corals observed in those three areas. The Intertidal Habitat Adjacent to the Seawall was the snorkel track that was within the footprint of proposed project. The observer reported the dominant substrate type as sand with a lack of live coral, invertebrates, seagrasses, and fishes. The next band that may be influenced by the change in seawall design was located 82ft/25m from the existing seawall. The dominant substrate type was sand again, but this time with patches of macroalgae and seagrass.

Summary

From the observations included in the NMFS/PIRO report, it does not appear that a larger quantitative FWCA study is needed to evaluate impacts to resources related to the current Alternative 2. If the project description changes, or a new Preferred Alternative is designated, the Service reserves the right to revisit this determination. The observed species list was short (Table 1 in report), with all those observations occurring along the tracks outside of the proposed project footprint. There were also no observations of ESA-listed species during the three days that the snorkel activity occurred. The proposed seawall design will extend over sand, not substrate with other natural resources present.

In addition, unless the project description changes, or new information reveals that the action may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to section 7 of the ESA is necessary.

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

The Service appreciates the opportunity to comment on the East Hagatna Section 14 Emergency Shoreline Protection Project. If there are questions regarding these comments, please contact biologist Nadiera Sukhraj (Nadiera_McCarthy@fws.gov) with any comments or questions.

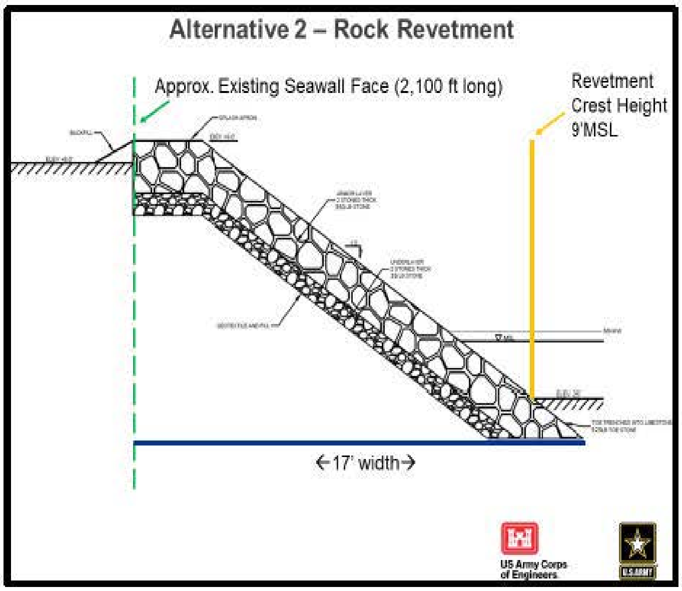
Sincerely,

AARON NADIG
Digitally signed by AARON NADIG
Date: 2023.07.07 15:07:31 -10'00'

Deputy Field Supervisor
Programmatic Operations

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

A Preliminary Survey of Marine Species and Habitats in the Vicinity of a Proposed Shoreline Revetment in East Hagatna, Guam



National Marine Fisheries Service
Pacific Islands Regional Office
1875 Wasp Blvd., Bldg. 176
Honolulu, HI. 96818

22 June 2023

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Abstract: A 2100 linear foot (640 meter [m]) vertical seawall that protects a portion of the coastal road in Hagatna, Guam is being considered for replacement with a rock revetment. The revetment will cover some existing intertidal substrate and has the potential to effect submerged habitats and resources in the area. A preliminary survey was conducted along the seawall and at 25 and 50 m distance from the exposed shoreline to assess the habitats and resources that may be at risk from the replacement activities. The intertidal and submerged substrates were observed to be spatially dominated by sand with scattered patches of seagrass and algae noted in the 25 and 50 m distant areas. Coral colonization was scattered and limited, with 12 individual colonies recorded in the 50 m distant area. Species that are listed as management units (Magnuson-Stevens Fishery Conservation and Management Act, MSA 16 U.S Code § 1801 et seq.) or as threatened or endangered (United States Endangered Species Act, ESA 16 U.S Code § 1531 et seq.) were not observed. The nearshore region in east Hagatna is designated as level 1 essential fish habitat (i.e. based simply on the "geographic range of a species [or life stage]"; 50 CFR Part 600 Subpart J; WPRFMC, 2009); it is not expected to be designated as critical habitat for corals.

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

Introduction

On June 2, 2022, the National Marine Fisheries Service (NMFS), Pacific Islands Regional Office (PIRO), Habitat Conservation Division (HCD) received a request from the US Army Corps of Engineers, Honolulu District, Civil Works Branch (USACE) to participate in the planning of the East Hagatna Shoreline Emergency Shoreline Protection Project located in Hagatna (also known as Agana) on the island of Guam (Figure 1). The USACE is proposing to study and provide emergency shoreline protection in the area due to an existing seawall failing to protect vital public infrastructure, namely South Marine Corps Drive.

Figure 1. The island of Guam with the location of the East Hagatna Shoreline Emergency Shoreline Protection Project highlighted.

The USACE is considering 8 replacement and repair alternatives, including:

- Alternative 1: No Action
- Alternative 2: Revetment
- Alternative 3: Precast Concrete Seawall
- Alternative 4: Concrete Rubble Masonry (CRM) Wall
- Alternative 5: Secant Pile Wall
- Alternative 6: Permeation Grouting
- Alternative 7: Beach Fill with Re-nourishment
- Alternative 8: Infrastructure Retreat

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

with "Alternative 2: Revetment" as preferred, since it is the only alternative to meet the climate change and sea level rise engineering requirements within the cost limitations ($9M USD). The footprint of the revetment is about 40-50 feet wide (ft.; 12 - 15 meters [m]) and the project will involve tree and foliage removal, staging, structure demolition, excavation, grading, construction and preparation of upland buffer areas. The revetment will replace 2,100 linear ft. of existing seawall (640 m) and may extend up to 20 ft. (6 m) from the existing seawall seaward, 30 ft. (9 m) upland and five ft. deep (1.5 m) into the limestone base (Figure 2). The action is being considered in partnership with the Government of Guam.

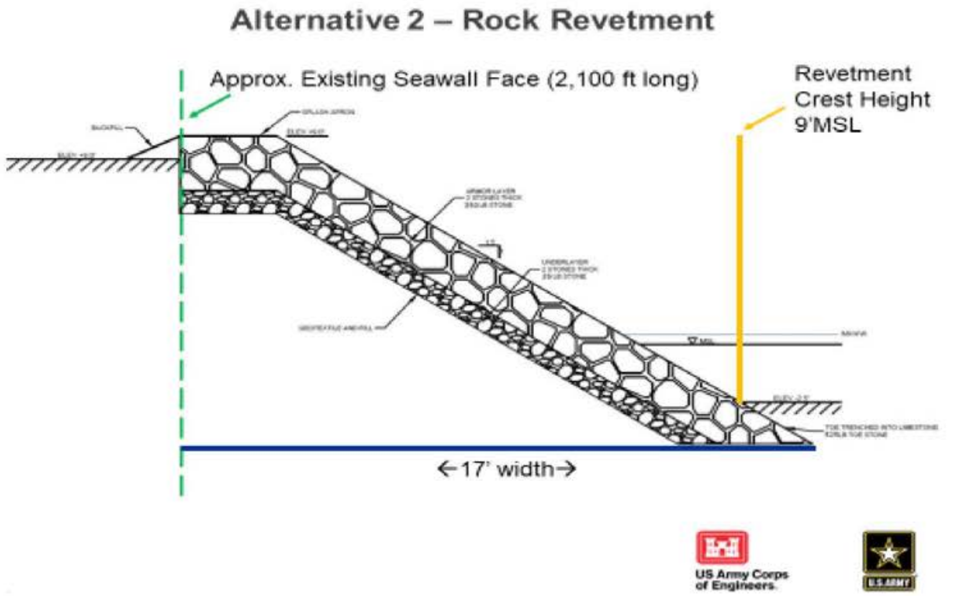

Figure 2. Preferred alternative of a rock revetment that may extend up to 20 ft. (6 m) seaward from the existing seawall into the water for the East Hagatna Shoreline Emergency Shoreline Protection Project on the island of Guam.

Pursuant to the Fish and Wildlife Coordination Act (16 U.S. Code § 661-666c; FWCA), the USACE requested NMFS to conduct a reconnaissance survey of the marine area adjacent to the proposed site to preliminarily inform on the fish and wildlife resources that may be exposed to project related effects. This included information on the status and potential concerns related to the conservation of federally managed fisheries and essential fish habitat (particularly that deemed necessary to the sustainability of such fisheries) under the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S Code § 1801 et seq.; MSA) and observations related to species listed as threatened or endangered under the U.S. Endangered Species Act (16 U.S Code § 1531 et seq.; ESA) and any overlay of designated critical habitat. The findings of the reconnaissance survey and preliminary NMFS concerns for consultation consideration are provided herein.

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

Methods

The reconnaissance survey was conducted on 1, 2 and 7 November 2022 along the length of the existing seawall (633 m; 2,077 ft.) and seaward roughly 56 m (184 ft.), which represents an area of approximately 3.5 hectares (8.8 acres). Snorkeling was conducted at high tide 25 m (82 ft.) and 50 m (164 ft.) from the shoreline adjacent to the existing seawall, and a shoreline walk occurred at low tide along the entirety of the existing seawall. At 25 m (82 ft.) distant, a transect line was consecutively laid and the resources were surveyed 12 m (39 ft.) to either side. At 50 m (164 ft.) distant, the resources were surveyed without the use of a transect line by a roving snorkeler. The survey endpoints (west end 13.47848°N, 144.76285°E; east end 13.48033°N, 144.76845°E) were marked with orange cones on the shoreline for reference. A Garmin GPSMAP 78SC was used to track the surveyor's location (Figure 3). The notable habitat types and species encountered were photographed and recorded in writing.

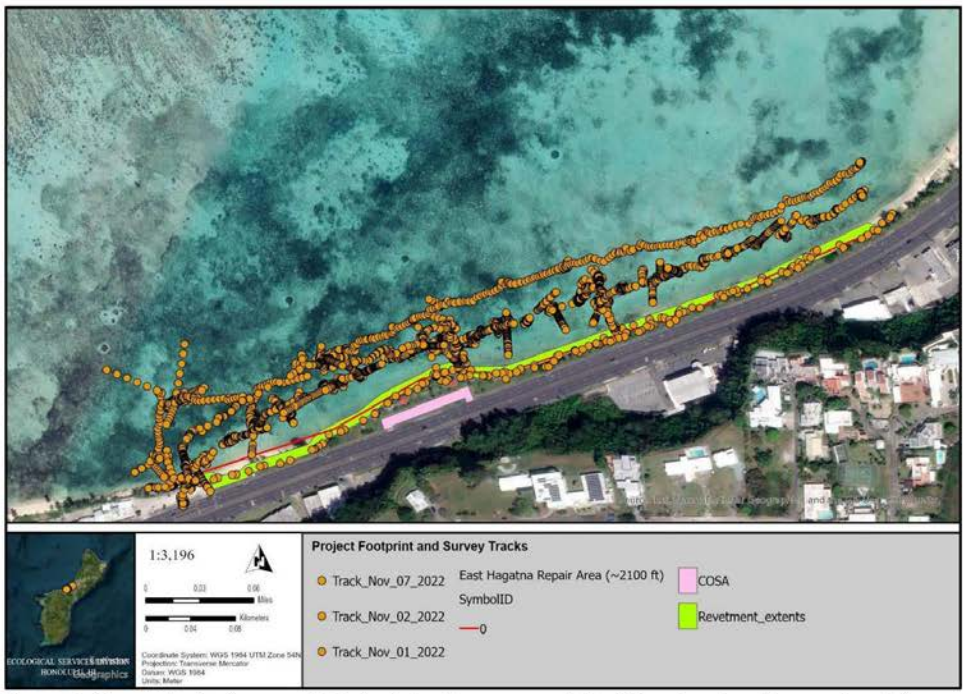

Figure 3. Survey tracks (orange circles) relative to a proposed East Hagatna shoreline revetment (green line) on the island of Guam. The three tracks represent a shoreline walk and two snorkel routes 25 and 50 m (82 and 164 ft.) distant from the exposed intertidal shoreline. A proposed equipment staging area (COSA) is denoted in pink.

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

Results

Intertidal Habitat Directly Adjacent to the Seawall

An undercutting of the existing seawall and other direct shoreline erosion was very evident within the proposed project area (Figure 4). The intertidal substrate was predominantly sand (roughly 70 % of the combined area) with pockets of aggregated rubble and cobble present. The intertidal region, at the tides evaluated, extended approximately 6 m (20 ft.) distant from the existing seawall/shoreline in most places, so the primary marine area for the proposed revetment appears intertidal. Live corals, other macroinvertebrates, seagrasses and fishes were not observed in this aerially exposed region. Bird utilization was not evaluated.

Figure 4. Images of the existing seawall/shoreline from west (A) to east (F) at Hagatna, Guam. The neighboring intertidal substrate consisted primarily of accumulated calcareous sand (A, C, E) with noted regions of aggregated rubble (B) and cobble sized coral skeletons (D and F).

Submerged Habitat 25 m distant

This area averaged approximately 1 m (3 ft.) in depth and was primarily covered by sand (approximately 50 % in total) with limited hard bottom evident. Sparse and moderately dense areas of macroalgae and seagrasses were observed as scattered patches and appeared as the primary habitat for a variety of observed fishes (Figure 5). Corals were not observed in the transected area; 3 seagrass, 9-plus macroalgae and 13 fish species (mainly juveniles) were recorded (Table 1, Appendix). The seagrass and macroalgae distributions appeared more prominent along the western end of the surveyed track. Species listed under the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Management and Conservation Act (MSA) management unit species were not observed. This nearshore region does not appear as a likely candidate for critical habitat designation for ESA listed corals (Smith, L., NMFS, pers. comm.).

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

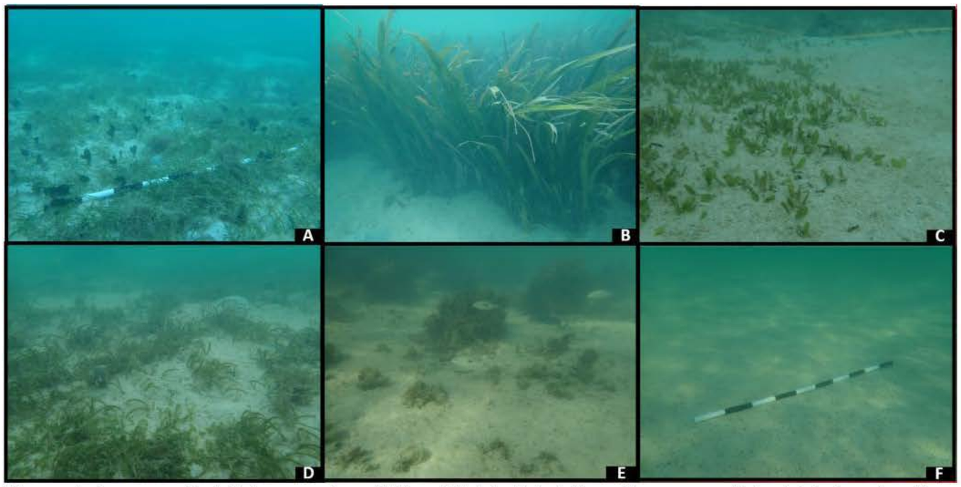

Figure 5. Images of habitat encountered 25 m (82 ft.) distant from the exposed intertidal shoreline from west (A) to east (F) along the existing seawall in Hagatna Guam. The substrate cover was primarily calcareous sand (F) with patch areas of macroalgae (seagrass mix with *Avrainvillea spp.* [A]; mixed *Sargassum vulgare* and *Padina spp.* [E]) and seagrasses (*Enhalus acoroides* [B], *Halophila gaudichaudii* [C] and *Halodule uninervis* [D]) observed.

Submerged Habitat 50 m distant

This area also averaged approximately 1 m (3 ft.) in depth and was primarily covered with sand, but qualitatively it appeared that less aggregates of seagrass and macroalgae were encountered than observed 25 m closer to shore. Twelve scattered colonies of 3 coral species were observed, including a single *Porites australiensis* (approximately 300 centimeters [cm] greatest length), a *Porites cylindrica* (approximately 60 cm greatest length) and 10 *Pocillopora damicornis* colonies (ranging from 2.5 to 10 cm in greatest length). Two seagrass, one macroalgae, 11 fish and an octopus species were also observed (Table 1, Appendix). The benthic distributions appeared more prominent along the western end of the surveyed track. ESA listed and MSA management unit species were not observed. This specific area does not appear as a likely candidate for critical habitat designation for ESA listed corals (Smith, L., NMFS, pers. comm.).

Discussion

The existing vertical seawall in the proposed project area appears to be insufficient for protecting against erosion related risk to the durability and safety of the neighboring coastal road. Replacement with a rock revetment is being proposed as a long term solution that will meet USACE cost and climate related engineering requirements. The structure may extend up to 6 m (20 ft.) into mainly sand covered intertidal habitat with digging, demolition and land-based staging expected. The exact revetment length has not been determined but it appears that the entirety of the existing seawall will be replaced (640 m; 2100 ft.) and that additional work will be limited by a $9M project cap.

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

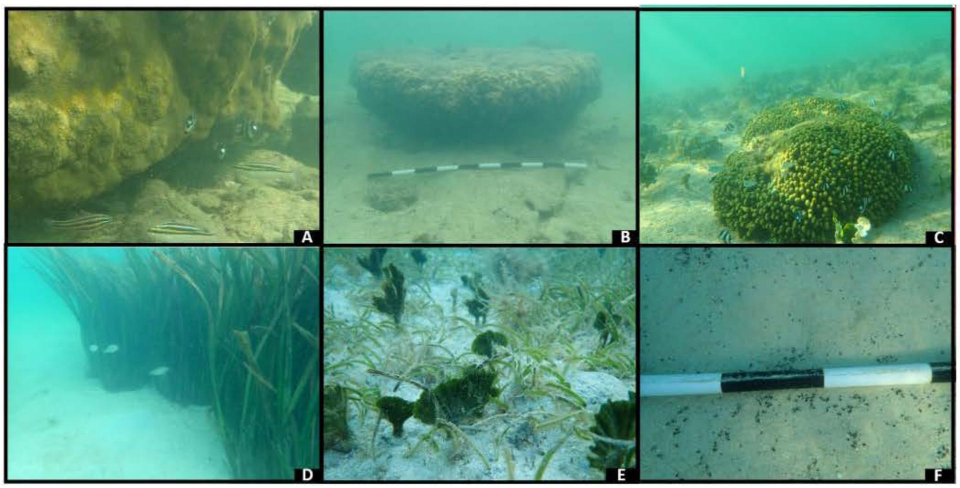

Figure 5. Images of habitat encountered 50 m (164 ft.) from the exposed intertidal shoreline along the existing Hagatna Guam seawall from west (A) to east (F). The benthic habitats consisted of individual corals (*Porites australiensis* [A, B] and *Porites cylindrica* [C] shown), seagrasses (*Enhalus acoroides* [D] and *Halodule uninervis* [E]) and macroalgae (*Avrainvillae spp.* [E]). The area was spatially dominated by calcareous sand (F).

The proposed rock revetment may be expected to enhance wave energy absorption (Allsop and Hettiarachchi, 1988; Griggs and Fulton-Bennett, 1988) and the impounding of shoreline sediment when compared to the existing vertical seawall structure in the immediate area. Scouring at the toe may still occur (Nielsen, 2023; Salauddin and Pearson, 2019; Sutherland et al., 2006); however, such may be partially attenuated by porosity in the riprap structure (USACE, 2006). Intertidal beach-type habitat will be lost with the area hardened and elevated, but the long-term risk to the presence of submerged aquatic vegetation (i.e. seagrasses and algae), scattered corals and biodiversity in the adjacent seaward region appears limited (Gittman et al., 2016; Nielsen et al., 2000; but see also Patrick et al., 2014). Agana Bay is prized for its seasonal runs of rabbitfish fry (*Siganus argenteus* and *Siganus spinus*), which are heavily fished and culturally valued (Kyota, 2015). The revetment may affect access to these fish runs in the immediate area, but recruitment of these species is likely to continue and to be dependent on other factors (Wolanski et al., 2021). It is possible that neighboring reef fishes may utilize tidally inundated portions of the revetment structure, if conducive, for temporary feeding and shelter (Ng et al. 2021). Additionally, the recruitment and use by benthic species may be enhanced as sea-levels rise (Kikuzawa et al., 2020). In general, shoreline hardening tends to be disruptive to adjacent beach and natural shoreline dynamics (Fletcher et al., 1997; Coyle and Dethier, 2010), and such is often an inequitable surrogate for the natural habitat it effects and that is lost (Schoonees et al., 2019). Hardening is typically not encouraged by the National Marine Fisheries Service, particularly in sheltered coastal areas (NOAA, 2015). However, in this case, Hagatna is exposed, it possesses an existing but failing seawall, the eroding shoreline is directly adjacent to an extended 7 lane coastal road with no realistic options for rerouting or setback, and the long-term risks to the neighboring submerged habitats and resources appear limited.

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1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

Adverse effects to the submerged marine habitats and associated species may be expected if project mitigation practices are not put in place. The release of oils or fuel-based products from project related equipment may be detrimental to exposed seagrasses, corals and fishes (Lewis and Deveroux, 2009; Turner and Renegar, 2017; Johansen et al., 2017; Baum et al., 2016). Excessive construction related sedimentation may also be detrimental (Tuttle and Donahue, 2022; Zabarte-Maeztu et al., 2021; Erftemeijer and Lewis, 2006; Wenger et al., 2015). In-water use of equipment and or personnel may lead to direct physical impacts to nearby seagrasses and corals (Hawkins and Roberts, 1993; Rogers and Cox, 2003; Eckrich and Holmquist, 2000). An activity related introduction or transfer of invasive species may occur (BOR, 2021). Additionally, a mechanism for limiting storm runoff of sediments and any contaminants from the nearby road and other impervious surfaces may be considered. These types of impacts should be fairly easy to avoid/mitigate when implementing the project and may be further explored through agency and mandate specific consultations related to essential fish habitat (level 1 designation beginning at the shoreline in Hagatna, Guam; WPRFMC, 2009; 50 CFR Part 600 Subpart J; MSA 16 U.S Code § 1801 et seq.), the Fish and Wildlife Coordination Act (16 U.S. Code § 661-666c) and the Endangered Species Act (16 U.S Code § 1531 et seq.).

Acknowledgements

The fieldwork was conducted by Jonathan Brown (NMFS PIRO HCD). Dr. Nadiera Sukhraj (United States Fish and Wildlife Service) provided the map of the tracking data (Figure 3). Dr. Steven Kolinski (NMFS PIRO HCD) assisted Jonathan with the organizing and consideration of the field data and with the development of this report.

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APPENDIX

1h. (cont.). 13 July 2023 NMFS and USFWS FWCA Planning Aid Letter

Table 1. Species observed 25 and 50 meters (82 and 164 ft.) from the exposed intertidal shoreline along the existing seawall in the proposed project area at Hagatna, Guam.

Genus species	Survey Location		Genus species	Survey Location	
	25 m	50 m		25 m	50 m
Seagrasses			**Fishes**		
Enhalus acoroides	X	X	*Canthigaster bennetti*	X	X
Halophila gaudichaudii	X		*Caranx spp.*	X	
Halodule uninervis	X	X	*Chaenopsidae spp.*	X	X
Macroalgae			*Chlorurus sordidus*		X
Acanthropora spicifera	X		*Chromis viridis*	X	X
Avrainvillae spp.	X	X	*Corythoichthys intestinalis*	X	
Caulerpa filicoides	X		*Dascyllus aruanus*	X	X
Caulerpa macrophysa	X		*Echidna nebulosa*	X	
Caulerpa sertularioides	X		*Gerres oyena*	X	
Dictyota spp.	X		*Labroides dimidiatus*		X
Halimeda opuntia	X		*Lethrinus harak*	X	
Padina spp.	X		*Mulloidichthys flavolineatus*	X	X
Sargassum vulgare	X		*Myripristis adusta*		X
Corals			*Myripristis kuntee*		X
Porites australiensis		X	*Rhinecanthus aculeatus*	X	
Porites cylindrica		X	*Sargocentron spiniferum*		X
Pocillopora damnicornis		X	*Scolopsis lineata*	X	X
Invertebrates			*Siganus spinus*	X	
Pinna spp.	X				
Octopus spp.		X			

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Attachment 2. ESA Consultation

2a. ESA species list from the USFWS PIFWO
2b. ESA species list received from the NMFS PIRO
2c. Technical Assistance Request to NMFS
**Technical Assistance Request to USFWS is Attachment 1a.*
2d. Draft ESA Biological Evaluation
2e. NMFS Concurrence Letter
2f. USFWS Concurrence Letter

2a. ESA species list from the USFWS Pacific Islands Fish and Wildlife Office

From: Flores, Jacqueline B
To: Floyd, Christopher B CIV USARMY CEPOA (USA); Paahana, Jessie A CIV USARMY CEPOH (USA); Dean, Marian POH
Cc: Polhemus, Dan
Subject: [Non-DoD Source] Re: [EXTERNAL] RE: Guam East Hagatna - ESA species request letter to USFWS
Date: Tuesday, March 15, 2022 9:57:22 PM

Hafa Adai Chris,
What is highlighted below would be the species that we would recommend on a species list. There are no known turtle nesting sites at that area, but they may be foraging in that area. We have had documented sightings of fruit bat along that area as well.

Thanks
Jackie

From: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Sent: Wednesday, March 16, 2022 7:13 AM
To: Flores, Jacqueline B <jacqueline_flores@fws.gov>; Paahana, Jessie A CIV USARMY CEPOH (USA) <Jessie.K.Paahana@usace.army.mil>; Dean, Marian POH <Marian.Dean@usace.army.mil>
Cc: PIFWO_Admin, FW1 <pifwo_admin@fws.gov>; Polhemus, Dan <dan_polhemus@fws.gov>
Subject: RE: [EXTERNAL] RE: Guam East Hagatna - ESA species request letter to USFWS

Hi Jackie –
Below is the content of the letter I prepared for Honolulu District; USFWS PIFWO should be receiving an official signed copy from Honolulu District soon.
It may have been more appropriate for the USACE handle this sort of initial correspondence with USFWS via email. Please let us know if your office has a preference.

Thanks,
Chris Floyd
==

The purpose of this letter is to request an official list of endangered and threatened species that may be present at a proposed U.S. Army Corps of Engineers (USACE) project site, and to initiate informal consultation, under Section 7 of the Endangered Species Act (ESA).

The USACE Honolulu District is studying alternatives to provide emergency shoreline protection from coastal erosion at East Hagatna, U.S. Territory of Guam (Figure 1). The study area includes approximately 1,200 feet of low-lying shoreline closely paralleling a stretch of South Marine Corps Drive, an important island throughfare. An existing seawall in the study area is showing signs of being damaged and undercut by wave action (Figure 2).

Terrestrial wildlife habitat in the project area is limited to a strip of urban park, varying from 10 to 60 feet wide, between the seawall and the roadway. On the ocean side of the seawall is a narrow, discontinuous sandy beach (Figure 2). The park strip vegetation consists of a closely cropped lawn planted with indigenous trees such as coconut palm and ironwood, as well as introduced ornamentals such as plumeria. Clumps of indigenous beach morning glory grow along the base of the seawall.

2a. (cont.). ESA species list received from the USFWS Pacific Islands Fish and Wildlife Office.

Figure 1. Location of USACE study area in East Hagatna, Guam.


Figure 2. Views of the Hagatna Bay seawall, and the adjacent park strip and beach (9 January 2022).

A project area-based search on the U.S. Fish and Wildlife Service (USFWS) IPaC website suggests that the following ESA-listed species may be potentially affected by construction activities in the study area:

- Mariana fruit bat (*Pteropus mariannus mariannus*)
- Green sea turtle (*Chelonia mydas*)
- Slevin's skink (*Emoia slevini*)
- Fragile tree snail (*Samoana fragilis*)

2a. (cont.). ESA species list received from the USFWS Pacific Islands Fish and Wildlife Office.

Guam tree snail (*Partula radiolata*)
- Humped tree snail (*Partula gibba*)
- Mariana eight-spot butterfly (*Hypolimnas octocula marianensis*)
- Mariana wandering butterfly (*Vagrans egistina*)
- *Solanum guamense* (flowering plant)
- *Maesa walkeri* (flowering plant)
- *Tabernaemontana rotensis* (flowering plant)
- *Tinospora homosepala* (flowering plant)

Most of these species are threatened or endangered because of the loss of unique forest habitats endemic to Guam and the Northern Mariana Islands; it seems very unlikely that they would be present in the sparse, urbanized habitat available within and near the project study area. Green sea turtles are present in Hagatna Bay, but the USACE has not found information that they nest on Hagatna Bay beaches.

We look forward to assistance from the USFWS in confirming or refining this list of species. USACE points-of-contacts for this project are environmental coordinator Chris Floyd (Christopher.B.Floyd@usace.army.mil, 907-753-2700) and project manager Troy Phan (Troy.T.Phan@usace.army.mil, 808-835-4434)

From: Flores, Jacqueline B <jacqueline_flores@fws.gov>
Sent: Tuesday, March 15, 2022 12:47 PM
To: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>; Paahana, Jessie A CIV USARMY CEPOH (USA) <Jessie.K.Paahana@usace.army.mil>; Dean, Marian POH <Marian.Dean@usace.army.mil>
Cc: PIFWO_Admin, FW1 <pifwo_admin@fws.gov>; Polhemus, Dan <dan_polhemus@fws.gov>
Subject: [Non-DoD Source] Re: [EXTERNAL] RE: Guam East Hagatna - ESA species request letter to USFWS

Hafa Adai Christopher,
Thank you for your response. If you could forward me the species list and the consultation letter, it would greatly be appreciated. I did not receive any attachments.

Thanks again
Jackie

From: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Sent: Wednesday, March 16, 2022 4:01 AM
To: Flores, Jacqueline B <jacqueline_flores@fws.gov>; Paahana, Jessie A CIV USARMY CEPOH (USA) <Jessie.K.Paahana@usace.army.mil>; Dean, Marian POH <Marian.Dean@usace.army.mil>
Cc: PIFWO_Admin, FW1 <pifwo_admin@fws.gov>; Polhemus, Dan <dan_polhemus@fws.gov>
Subject: [EXTERNAL] RE: Guam East Hagatna - ESA species request letter to USFWS

This email has been received from outside of DOI - Use caution before clicking on links,

2a. (cont.). ESA species list received from the USFWS Pacific Islands Fish and Wildlife Office.

opening attachments, or responding.

Hi Jackie,

The USACE generated a provisional ESA species list for the East Hagatna project area from the USFWS iPac website; we are asking USFWS to either confirm or help us modify that species list.
Given the highly modified urban habitat in the project area, the USACE is leaning towards making a determination of "no effect" for these species, as none would likely be present in this setting.
However, we request to initiate ESA informal consultation with USFWS, and welcome any input and local knowledge that USFWS could provide.
(This was explained in a letter that USFWS may or may not have received yet...)

Thanks much,
Chris Floyd, Biologist
Environmental Resources Section
Civil Works Project Management Branch
Alaska District (assisting Honolulu District)
US Army Corps of Engineers
Cell: 907-744-0788

From: Flores, Jacqueline B <jacqueline_flores@fws.gov>
Sent: Monday, March 14, 2022 5:39 PM
To: Paahana, Jessie A CIV USARMY CEPOH (USA) <Jessie.K.Paahana@usace.army.mil>; Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Cc: PIFWO_Admin, FW1 <pifwo_admin@fws.gov>; Polhemus, Dan <dan_polhemus@fws.gov>
Subject: [Non-DoD Source] Guam East Hagatna - ESA species request letter to USFWS

Hafa Adai,

I am emailing you to clarify what the Corps is specifically asking from the Service for the East Hagatna project. It looks like a species list was already provided. Clarification is greatly appreciated.

Thanks
Jackie

Jacqueline Flores

Island Team Manager - Mariana Islands

2a. (cont.). ESA species list received from the USFWS Pacific Islands Fish and Wildlife Office.

U.S. Fish and Wildlife Service – Ecological Services

Pacific Islands Fish and Wildlife Office

108 Hernan Cortez Avenue, Sirena Building Suite 131

Hagatna, Guam 96910

ph: (671) 989-6744/43

cell: (671) 787-6094

fax: (671) 989-6748

web page: http://www.fws.gov/pacificislands/

2b. ESA species list received from the NMFS PIRO

From: Floyd, Christopher B CIV USARMY CEPOA (USA)
To: Ashley Schrader - NOAA Affiliate
Cc: Dean, Marian POH; Paahana, Jessie A CIV USARMY CEPOH (USA)
Subject: RE Re: re re Request for Species List for Proposed USACE Project Site in Hagatna Bay, Guam
Date: Tuesday, April 12, 2022 12:26:17 PM

Thanks, Ashley

From: Ashley Schrader - NOAA Affiliate <ashley.schrader@noaa.gov>
Sent: Tuesday, April 12, 2022 9:40 AM
To: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Subject: Re: [URL Verdict: Neutral][Non-DoD Source] Re: re re Request for Species List for Proposed USACE Project Site in Hagatna Bay, Guam

Hi Chris,

Given the location of the activity, the maximum water depth, and that there will be no vessel use, we recommend the following species to be included in your biological evaluation:

- Central West Pacific Green Turtle (*Chelonia mydas*)
- Hawksbill Turtle (*Eretmochelys imbricata*)
- Coral (*Acropora globiceps*)

Scalloped hammerhead sharks and giant manta ray are typically not included for activities occurring in ~3 feet of water and recent surveys (yet to be published at this time) indicate that the coral species, *A. retusa* and *S. aculeata* are not likely to be in your proposed project area. Should the proposed activities include a vessel after all, I recommend reaching out to us again to reconfirm the species list.

Please let me know if you have any questions and thank you for requesting guidance from us.

Ashley

On Tue, Apr 12, 2022 at 9:20 AM Ashley Schrader - NOAA Affiliate <ashley.schrader@noaa.gov> wrote:

> Hi Chris,
>
> Okay great, thank you for confirming. I'll finish putting the species list together and get it to you as soon as possible.
>
> Have a great day,
>
> Ashley
>
> On Tue, Apr 12, 2022 at 6:43 AM Floyd, Christopher B CIV USARMY CEPOA (USA)

2b. (cont.). ESA species list received from the NMFS PIRO.

<Christopher.B.Floyd@usace.army.mil> wrote:

Hi Ashley –
The project design and construction details are still being studied, but the project is leaning towards a narrow-footprint replacement seawall that could be constructed entirely from shore. I'm going to say, no, there will be no vessel used for the project.

Chris Floyd

From: Ashley Schrader - NOAA Affiliate <ashley.schrader@noaa.gov>
Sent: Monday, April 11, 2022 12:59 PM
To: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Subject: [URL Verdict: Neutral][Non-DoD Source] Re: re re Request for Species List for Proposed USACE Project Site in Hagatna Bay, Guam

Hi Chris,

I apologize for not circling back on this sooner. Were you able to confirm whether a vessel is going to be used as part of project activities?

Thank you,

Ashley

On Wed, Mar 16, 2022 at 4:37 PM Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil> wrote:

Hi Ashley –
We have a USACE internal project meeting tomorrow; I'll see what answers we can shake loose.

Chris Floyd

From: Ashley Schrader - NOAA Affiliate <ashley.schrader@noaa.gov>
Sent: Wednesday, March 16, 2022 3:29 PM
To: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>
Cc: Dean, Marian POH <Marian.Dean@usace.army.mil>; Phan, Troy T CIV USARMY CEPOH (USA) <Troy.T.Phan@usace.army.mil>
Subject: Re: [URL Verdict: Neutral][Non-DoD Source] Request for Species List for Proposed USACE Project Site in Hagatna Bay, Guam

Hi Chris,

Thanks for providing that additional information. If the maximum depth is approximately 3 ft., that is helpful to know as some larger species aren't typically included in consultations involving very shallow water. As for the construction equipment, I think that question might

2b. (cont.). ESA species list received from the NMFS PIRO.

now be moot, given that shallow maximum depth.

At this point, the size of the vessel is not as important as the presence/absence of vessel use. Knowing whether a vessel would be involved, and particularly what its transit path might look like, is helpful for determining whether any offshore species should be considered for consultation.

Do you know when the presence/absence of vessel use may be determined?

Thank you,

Ashley

On Wed, Mar 16, 2022 at 4:18 PM Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil> wrote:

Hi Ashley –
The USACE is just now designing several possible construction alternatives, and we do not have answers to your questions at this point.

As a purely practical matter, the waters offshore of the Hagatna Bay seawall are very shallow (marked "Submerged reef, Depths 1 to 3 ft" on NOAA chart 81048); I doubt a work vessel of any size could approach the project site. At most, a skiff or other very small craft carrying survey instruments might be involved.

Thanks,
Chris Floyd, Biologist
Environmental Resources Section
Civil Works Project Management Branch
Alaska District (assisting Honolulu District)
US Army Corps of Engineers
Cell: 907-744-0788

From: Ashley Schrader - NOAA Affiliate <ashley.schrader@noaa.gov>
Sent: Wednesday, March 16, 2022 2:26 PM
To: Floyd, Christopher B CIV USARMY CEPOA (USA) <Christopher.B.Floyd@usace.army.mil>; Dean, Marian POH <Marian.Dean@usace.army.mil>; Phan, Troy T CIV USARMY CEPOH (USA) <Troy.T.Phan@usace.army.mil>
Subject: [URL Verdict: Neutral][Non-DoD Source] Request for Species List for Proposed USACE Project Site in Hagatna Bay, Guam

Hello Christopher, Marian, and Troy,

I'm Ashley Schrader, I am coordinating the response to your request for a species list. The information you provided, including the potential species that may be affected by

2b. (cont.). ESA species list received from the NMFS PIRO.

construction activities, in your request has been informative. To better direct my efforts, could you please provide responses to the following,

1. Will a vessel be used at any time during the proposed action? If so, where will the vessel hail from?
2. Where will any construction operate from (e.g., primarily or exclusively from land, from a vessel, in the water next to the wall, a combination)?
3. What are the minimum and maximum depths in the proposed project area (to the best of your knowledge)?

In the meantime, please feel free to reach out to me with any questions you may have.

Thank you,

Ashley

--

Ashley Schrader
Endangered Species Biologist, Contractor with Lynker in support of
NOAA Fisheries Southeast Regional Office | U.S. Department of Commerce
(815) 326-5441
www.fisheries.noaa.gov

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Ashley Schrader
Endangered Species Biologist, Contractor with Lynker in support of
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Ashley Schrader
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(815) 326-5441
www.fisheries.noaa.gov

2c. Technical Assistance Request to NMFS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Ron Dean
Intergovernmental Consultation and Conservation Branch Chief
Protected Resources Division
Pacific Islands Regional Office
National Marine Fisheries Service
1845 Wasp Boulevard, Building 176
Honolulu, HI 96818

Dear Mr. Dean:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), USACE requests technical assistance from the National Marine Fisheries Service (NMFS) and identification of designated or proposed critical habitat occurring within the study area. NMFS may have both expertise relevant to the study and to identifying environmental effects that could result from a recommended project, and jurisdiction by law. For the purposes of this request, the study area comprises the area within which USACE is considering direct and indirect impacts to protected resources and coincides with the ESA action area based on the level of detail available to this study at this time. As more information is gathered, the impact areas relative to each protected resource, including the ESA action area, will be further refined. Although the

2c (cont.). Technical Assistance Request to NMFS

need for comprehensive biological field surveys is not anticipated and impacts to federally listed species are not anticipated as a result of the study or any recommended project that could result from the study, compliance with the ESA will be ensured and completed during the feasibility phase.

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a cooperating agency and participating agency workshop scheduled for June 8, 2022. We will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations.

A copy of this letter and its enclosures will be sent to the U.S. Fish and Wildlife Service, the Guam Division of Aquatic and Wildlife Resources, the U.S. Environmental Protection Agency and National Marine Fisheries Service Habitat Conservation Division pursuant to the ESA, the Fish and Wildlife Coordination Act, the NEPA and the Magnuson-Stevens Fishery Conservation and Management Act. This letter of request for information from your agency constitutes USACE's scoping request pursuant to NEPA. To reduce redundancy, a separate NEPA scoping letter will not be sent to your office. Any additional comments provided pursuant to NEPA will be fully considered and incorporated into the administrative record.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

2d. Draft ESA Biological Evaluation

ENDANGERED SPECIES ACT BIOLOGICAL EVALUATION

CAP Section 14 Emergency Shoreline Protection Project

East Hagatna, Guam

Action Agency:	Honolulu District, U.S. Army Corps of Engineers
Federal Action:	Construction of shoreline protection at East Hagatna, Guam
Consulting Agencies:	National Marine Fisheries Service Pacific Islands Regional Office Protected Resources Division United States Fish and Wildlife Service Pacific Islands Fish and Wildlife Office

Honolulu District
U.S. Army Corps of Engineers

2d.(cont.) Draft ESA Biological Evaluation

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2d.(cont.) Draft ESA Biological Evaluation

2d.(cont.) Draft ESA Biological Evaluation

1. Background

The Emergency Shoreline Protection Project at East Hagatna is being developed as a cost-shared effort between the Honolulu District, U.S. Army Corps of Engineers (USACE) and the Government of Guam, represented by the Guam Department of Public Works (DPW). This emergency shoreline protection feasibility study is authorized under Section 14 of the Flood Control Act of 1946 (Public Law 79-525), as amended. The project will provide emergency shoreline protection from coastal erosion to South Marine Corps Drive and public utilities in the area. The project area includes the west central coast of Guam in Hagatna Bay, east of the capital of Hagatna along South Marine Corps Drive and Trinchera Beach Park.

Note that while the project will take place on Guam, due to the location of USACE staff in Alaska and Hawaii, dates throughout this document, the Integrated Feasibility Report and NEPA Document, and appendices, are given for Hawaii standard time, not Guam time.

Approximately 2,100 feet (ft) of South Marine Corps Drive is at imminent risk of failure due to storm surge and wave attack. An existing seawall constructed between the shoreline and the main thoroughfare in the study area is threatened by shoreline erosion and is experiencing severe undercutting, leaving South Marine Corps Drive vulnerable to increased future damage. The proposed project consists of replacing approximately 2,100 linear ft of existing, compromised seawall with a rock revetment. The top crest elevation needed for the design to meet the USACE 50-year design requirement for sea level change (SLC) and be adaptable to 100-year SLC under the intermediate scenario is 9ft above Mean Sea Level (MSL), approximately 1 ft higher than the existing seawall. The revetment will be approximately 17 ft wide, constructed parallel to the shoreline and extending seaward.

To that end, USACE has prepared a Draft Integrated Feasibility Report and NEPA Document (IFR/NEPA) for the East Hagatna, Guam - Continuing Authorities Program (CAP), Section 14 Emergency Shoreline Protection project (Proposed Action/Federal Action) pursuant to Engineering Regulation 1105-2-100 and the National Environmental Policy Act (NEPA). The IFR/NEPA identifies, evaluates, and discloses all impacts that would result from the implementation of either of several potential alternatives, including the "No Action" alternative (i.e., Future Without Project Condition, modelled under 50 years of different climate change projections), designed to provide emergency shoreline protection within the study area.

The purpose of this Biological Evaluation (BE) is to address the effects of the Proposed Project on species listed or proposed for listing as endangered or threatened and their designated critical habitat pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended.

Early coordination and pre-consultation with National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and Guam Division of Aquatic and Wildlife

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Resources (GDAWR) on threatened and endangered species was conducted during a series of email conversations on 16 March 2022 (HST) and 12 April 2022 (HST). Coordination workshops were held with Guam Coastal Management Program and the NMFS Pacific Islands Regional Office (PIRO), Intergovernmental Coordination and Conservation Branch of the Protected Resources Division (PRD) on 8 June 2022 (HST) and with NMFS, USFWS, United States Environmental Protection Agency (USEPA); and GDAWR on 14 June 2022 (HST).

1.1 Project Purpose and Need

The purpose of the Proposed Project is to replace the existing, compromised seawall with a rock revetment along approximately 2,100 linear ft of shoreline along South Marine Corps Drive in East Hagatna, Guam.

Guam is in an area of the Pacific Ocean that has a high risk for tropical storms and typhoons, and the low-lying coastline of East Hagatna is subject to frequent storm wave attack. Large storm events and associated high waves and storm surge has caused significant erosion, undermining the existing seawall. The existing seawall is not anchored into the limestone foundation and instead, sits atop the ground surface, leaving it vulnerable to wave attack. Continual undermining of the seawall has put South Marine Corps Drive and public utilities in the immediate vicinity of the study area at imminent risk of damage. In some places, less than 20 ft of shoreline separates the road from the beach. Future sea level rise will continue to exacerbate this condition and accelerate the rate of erosion and damage.

South Marine Corps Drive is a major arterial roadway that extends approximately 22 miles from Andersen Air Force Base in Yigo on the northeastern corner of the island down to Naval Base Guam in Santa Rita in the central western area of the island. Both military bases play a vital role in regional and national security. Closure of South Marine Corps Drive or significant traffic delays would result in impacts to the U.S. Military's ability to prepare for and respond to a crisis in the region.

Additionally, South Marine Corps Drive connects numerous island villages on the west side of the island including the capital city of Hagatna. Guam Department of Public Works traffic counts indicate an average of 51,000 vehicles pass through the section of road at risk daily. Damage to the road and public utilities beneath it would delay the southern villages' access to essential services such as hospitals and emergency responders, thereby resulting in health and safety risks, as well as a significant disruption to Guam's economy.

The most critical problem in the study area is the imminent failure of an existing seawall that would leave South Marine Corps Drive subject to heavy damage from storm surge and wave attack. Figures 1 to 3, captured by USACE Project Delivery Team (PDT) members on a site visit in January 2022, show the existing condition of the wall along Trinchera Beach and Veteran's Sunset Beach Park in the study area. The greatest damage to the existing seawall is along Veteran's Sunset Beach Park, where some sections of wall are undercut by up to 2 ft of seawater. This undercutting is already

2d.(cont.) Draft ESA Biological Evaluation

causing the seawall to crack and undermine the structural integrity of the seawall. Figure 3 shows the rocks and concrete skirt eroding out of the seawall on the eastern edge of Veteran's Sunset Beach Park. The western access staircase is in danger of collapsing into the ocean. Erosion has also dislodged some of the larger rocks from the seawall, especially on the eastern end of Veteran's Sunset Beach Park (USACE 2022a).

Figure 1: Existing seawall on eastern edge of Veteran's Sunset Beach Park, facing southwest (USACE 2022a). The beach has eroded below the rocks and concrete skirt, causing the seawall to crack, and undermining its structural integrity.

Figure 2: Existing seawall at Trinchera Beach Park, facing northeast (USACE 2022a)

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Figure 3: Close up view facing south of the undercut Hagatna Bay seawall (USACE 2022a)

If the existing seawall fails, South Marine Corps Drive and associated public utilities will be subject to more frequent and severe storm damage as the shoreline in the study area continues to erode. This will be exacerbated by long-term sea level rise. Heavy damage to the South Marine Corps Drive may necessitate road closure or relocation. This would result in economic loss and the potential for decreased public and emergency service provision for people who depend on the road. Without federal intervention, it is assumed that the Government of Guam will bear the full burden of protecting South Marine Corps Drive. They will be fiscally impacted by this responsibility and will likely need to repair or replace failing sections of wall in a piecemeal approach.

USACE has developed potential alternative plans for shoreline stabilization over a 50-year period of analysis (2026-2076) by identifying coastal hazards and potential structural shoreline stabilization management measures within the study area affected by coastal erosion and future changes to sea level.

USACE and the Guam DPW evaluated the results of the feasibility study and recommend Alternative 2: Rock Revetment: replacing approximately 2,100 linear ft of existing, compromised seawall with a 17 ft wide rock revetment. The revetment crest elevation of 9 ft above mean sea level (MSL) meets the USACE 50-year design requirement for sea level change (SLC) and is adaptable to 100-year SLC under the intermediate scenario at 9 ft above MSL. This alternative is considered most practicable with respect to real estate considerations, costs, and logistics as the Tentatively Selected Plan (TSP) and has been tentatively identified as the Least Environmentally Damaging Practicable Alternative and is carried forward for analysis to either confirm the TSP as the recommended plan or select a different alternative. While maximizing net benefits, it has anticipated positive impacts on nearshore water quality (e.g., by

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minimizing future coastal erosion) and is supported by the Guam Government. The Guam Government supports Alternative 2 as the TSP.

The proposed Action and Action Area for this project will include an area of permanent impact required for placement of the rock revetment and an area of temporary impact for access, construction, and staging areas (COSA). These are described in detail in Section 2. Section 3 describes the listed species and habitats that could be potentially affected by the proposed Project activities, as well as an analysis of effects of the proposed Action on these species and habitats. Section 4 provides a description of the environmental baseline conditions. Section 5 provides a summary of overall effects of the proposed Action and Section 6 includes a discussion of potential cumulative effects. Section 2.2 summarizes the measures and best management practices (BMPs) that would be used to avoid and minimize impacts to the natural resources. Preparation and implementation of these BMPs would reduce the potential construction-related water quality impacts to a less-than-significant level. With implementation of these best management practices, the extent of impacts from the proposed Action are expected to be less than significant.

2. Description of the Proposed Action and Action Area

2.1 Description of the Proposed Action

This Proposed Action is the construction of a 2100 ft long by 17 ft wide (approximately 35,700 ft^2 or 0.82 acres) rock revetment (Figure 4) along the coast at East Hagatna.

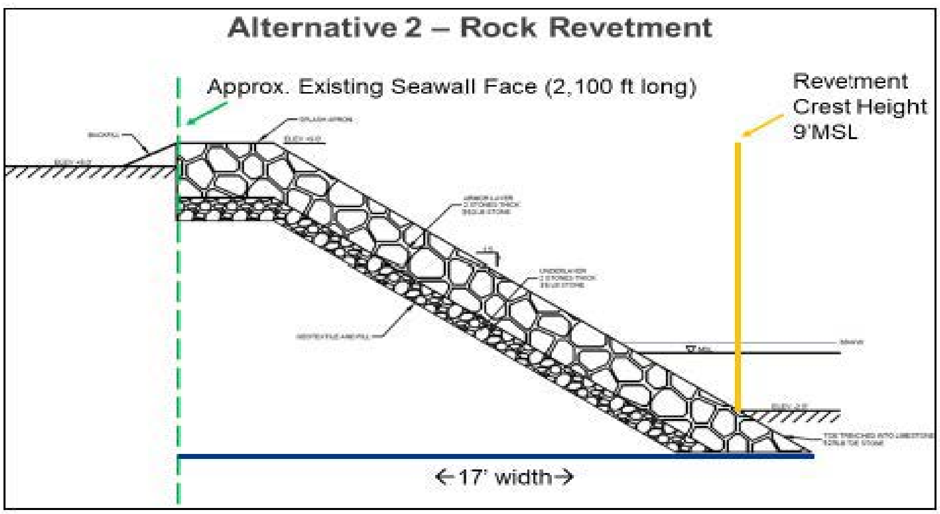

Figure 4: Alternative 2 - Rock Revetment

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The base of the revetment would extend 17 feet toward the ocean from the crest of the existing seawall. The toe of the revetment would be anchored in the limestone. The revetment installation would begin with construction at the toe (-2.5 ft. MSL) and up to the crest elevation (+9ft. MSL), just 1 foot above the current highest point of 8 feet (Figure 4). The present assumption is the revetment could be constructed from the land during low tide without in-water construction. To seat the toe a small trench will need to be dug into the underlying limestone. Excavation, grading, structure demolition, tree and foliage removal, staging, and upland buffer areas are expected to increase the total project footprint to 1.45 ac.

Revetments are a type of "hard" sloping coastal engineering structure that runs parallel to the shoreline to protect landward areas and infrastructure from waves, tides, currents, and storm surge (water build up above the average tide level). They can be used in areas exposed to both high and low wave energy.

The major components of the proposed revetment are the rock armor layer, filter, and toe (Figure 4). The rock armor layer is an erosion resistant material that dissipates the energy of storm waves, prevents further recession of the backshore, and provides basic protection against wave action. The filter layer supports the rock, provides for the passage of water through the structure, and prevents the underlying soil from being washed through the armor. The buried toe prevents displacement of the seaward edge of the revetment. Revetments can be constructed as carefully designed engineered structures protecting long lengths of shoreline with some permeability allowing for increased wave dissipation in the interstices of the revetment in comparison to non-permeable structures such as concrete seawalls that reflect and can accelerate wave energy radially.

2.1.1 Alternative Analysis

Relocation of the road was considered but

Soft engineering strategies (i.e., natural, and nature-based measures) such as vegetation barriers and use of beach fill were considered as potential solutions early in the planning phase of this project. However, these solutions would not be effective in reducing the effects of coastal storm damages in the proposed Action Area. Due to the high wave energy environment in the Action Area, vegetation alone

Revetments are generally considered to cause less damage to the environment than other types of structures, like vertical seawalls, because they are less prone to wave flanking and limit interference with natural sediment processes, thereby maintaining coastal stability while still allowing some natural coastal processes to occur. Natural shoreline erosion supplies adjacent stretches of coastline with sediment, through longshore sediment transport. Burial of the toe of the revetment maintains an area of shoreline sediment to participate in natural sediment transport processes.

Sloping revetments are more effective at dissipating wave energy and less subject to significant loadings because of wave impact. Smooth, vertical seawalls are the least effective at dissipating wave energy; instead, the structures reflect wave energy seawards. Reflection creates turbulence, capable of suspending sediments (Bush et al. 2004), thus making them more susceptible to erosion. The problems of wave reflection and scour can be reduced to some degree by incorporating slopes and irregular surfaces such as tribar into the structure design. Slopes encourage wave breaking and therefore energy dissipation while irregular surfaces scatter the direction of wave reflection (French 2001). Pilarczyk (1990) recommends the use of maximum seawall slopes of 1:3 to minimize scour due to wave reflection. The proposed slope of the tribar revetment is 1:1.5. Scour at the foot of a sloped revetment is less of concern than at the base of a vertical seawall.

Revetments are less susceptible to erosive forces that occur in front of the structure. Seawalls, while effective at preventing erosion of the land area behind the wall, often do not stop erosion in front of the structure which affects localized sediment availability (French 2001). As a result, seawall maintenance costs can be high (Pilarczyk 1990).

The revetment is comprised of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of underlayer stone, a double layer of armor stone, and anchoring by an oversized toe stone. At the specified 1.5H/1V slope, the revetment is expected to be 17 feet wide, extending towards the ocean, with a crest elevation of +9 ft MSL. Depending on the cost and local availability of material, this revetment could be capped with either a two-stone layer of 200 lb. armor stones or pre-cast concrete armor units. This design will meet USACE coastal engineering criteria for expected design life and adaptability to RSLC. The expected design life of this system, assuming proper installation and routine maintenance, is on the order of 50 years.

2.2 Best Management Practices

The USACE considers Best Management Practices (BMPs) to be an integral component of the federal action. All BMPs would become specifications of any construction contract and are legally binding on the selected construction contractor. The following BMPs are intended to avoid and/or minimize impacts to ESA-listed species and habitat:

2.2.1 ESA General BMPs

- To minimize impacts to endangered species, the permittee shall avoid in-water work during mass-coral spawning times or peak coral spawning seasons June 1 to September 30 or land based work during Mariana fruit bat foraging during breadfruit season (February to October) if practicable.
- Constant vigilance shall be kept for the presence of ESA-listed sea turtles during all aspects of the proposed action.
- A responsible party (i.e., site manager/project supervisor) shall designate an appropriate number of competent trained observers to survey the areas adjacent to the authorized work area (i.e., proposed action) for ESA-listed marine species.

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The competent observer will not be simultaneously engaged in any other activity (e.g., captaining, operating equipment, etc.) while surveying for listed species.

- Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour.
- All work shall be postponed or halted when ESA-listed marine species are within 50 meters (54.7 yards, 164 feet) of the proposed work, and will only begin/resume after the animals have voluntarily departed the area.
- If ESA-listed marine species are noticed within 50 meters (54.7 yards, 164 feet) after work has already begun, that work may continue only if, in the best judgement of a biologist, the activity will not adversely affect (i.e., disturb or harm) the animal(s). For example: divers performing underwater work (excluding the use of toxic chemicals) such as surveys would likely be permissible, whereas operation of heavy equipment is not.
- Project-related personnel shall NOT conduct activities resulting in a take of an ESA-listed species, a species proposed for listing, or listed or proposed critical habitat. "Take" as defined under the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct". Activities that would qualify as take include attempting to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.
- Sensitive resource areas, such as corals, coral reefs and seagrass beds known to occur within a project area must be identified on project figures. Project staff must be instructed to avoid the sensitive resource areas to the greatest extent practicable, including avoiding anchoring in these areas, flagging the areas if appropriate, and securing all in-water equipment in a manner that will prevent the equipment from being dragged across the substrate.
- Project construction must cease under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.
- If an ESA-listed species is adversely affected because of the project, all work must stop until coordination with USACE and NMFS has been completed.

2.2.2 BMPs for waste and discharge

- A stormwater management plan, commensurate to the size of the project, must be prepared and carried out for any project that will produce any new impervious surface or a land cover conversion that will slow the entry of water into the soil to ensure that effects to water quality and hydrology are minimized.
- An erosion control plan for the project site and adjacent areas must be prepared and carried out. Erosion controls must be properly installed before any alteration of the project area may take place.

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- A pollution control plan for the project site and adjacent areas must be prepared and implemented. At a minimum, this plan shall include:
- Proper installation and maintenance of equipment diapers, or drip pans.
- A contingency plan to control and clean spilled petroleum products, hydraulic leaks, and other toxic materials.
- Appropriate materials to contain and clean potential spills will be stored at the work site and be readily available.
- All project-related materials and equipment placed in the water will be free of pollutants.
- Daily pre-work inspections of heavy equipment and vessels for cleanliness and leaks, with all heavy equipment operations and vessel use postponed or halted until leaks are repaired and equipment is cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 50 feet (15 meters) away from the water, preferably over an impervious surface.
- All construction discharge water (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) must be treated before discharge.
- Debris and other wastes will be prevented from entering or remaining in the marine environment during the project.
- Temporary access roads and drilling pads must avoid steep slopes, where grade, soil types, or other features suggest a likelihood of excessive erosion or failure; existing access routes must be utilized or improved whenever possible, in lieu of construction of new access routes.
- Temporary fills must be removed in their entirety. All areas impacted by construction must be returned to pre-construction elevations. The affected areas must be stabilized and revegetated with native species as appropriate.
- All disturbed areas must be immediately stabilized following cessation of activities for any break in work longer than 4 days.

2.2.3 BMPs for Activities that may result in Direct Physical Impact

- Before any equipment, anchor(s), or material enters the water or begins operating on the beach, a responsible party, i.e., permittee/site manager/project supervisor, shall verify that no ESA-listed marine animals are in the area where the equipment, anchor(s), or materials are expected to contact the substrate.

2.2.4 BMPs for activities that may result in Exposure to Elevated Noise Levels

- In-water excavation and movement of large armor stones shall not be undertaken if any ESA-listed marine animals are within 50 meters (54.7 yards, 164 feet) of the authorized work, and those operations will immediately shut-down if an ESA-listed marine animal enters within 50 meters (54.7 yards, 164 feet) of the authorized work.

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2.2.5 Reporting for Stranded, Injured, Sick or Dead Marine Mammal or Turtle

- If observers become aware of any injured, sick, or dead marine mammal or turtle (whether it may be related to the proposed action), they will immediately call the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources (DAWR) at (671) 735-0281 or (671) 735-0294 during regular business hours. Outside of regular business hours, they will contact the NOAA Office of Law Enforcement, Agana, GU, at (671) 472-7200 and/or the DAWR Conservation Office Hotline at (671) 688-DAWR (671-688-3297). The observer will be prepared to provide information to the hotline operator about the animal's condition, location, and other information specific to the situation to help the operator determine the most appropriate response.
- The observers will submit photos and data as soon as possible regarding stranded, injured, sick, or dead marine animals that DAWR may use to inform DAWR-directed field responses and/or further analysis to determine whether a taking resulted. Photos and data submitted to DAWR regarding stranded, injured, sick, or dead marine animals will include date, time, location, species, and number of animals, as well as a description of the animal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine animals. The observers will email this documentation to: respectwildlife@noaa.gov, with the subject line indicated as: "Hagatna Bay, Guam, Stranded Animal Report"
- If DAWR determines that implementation of the federal action resulted in the taking, re-initiation of ESA consultation is warranted. USACE will collect the following information and include it in the re-initiation request:
    - Number of individuals and species of listed animals affected.
    - The date, time, and location of each event (provide geographic coordinates).
    - Description of the event.
    - The time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal.
    - Mitigation measures implemented prior to and after the take; and
    - If a vessel struck a marine mammal, the contact information for the observer on duty, or the contact information for the individual piloting the vessel if there was no observer on duty.
    - Photographs or video footage of the animal(s) (if available).

2.2.5 Habitat Restoration

- As required by Guam Law (5 GCA Government Operations Guam Code Annotated CH. 63 Fish, Game, Forestry & Conservation § 63302) all tree felling or limbing will be conducted under the supervision of a licensed arborist or forester.

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- All removed trees will be replaced with appropriate species for the particular location. Large trees, greater than 2-inch diameter at breast height, will be used as much as possible based on nursery availability. All areas impacted by construction must be stabilized and revegetated with native species as appropriate. Clearing will be confined to the minimal area necessary to facilitate construction activities, while all bare areas will be reseeded and maintained until grass/vegetative cover is established. All areas will be cleaned of any trash and debris and returned, as close as possible, to the condition prior to initiation of project activities.

2.3 Description of the Study Area and Proposed Action Area

Guam is located in the North Pacific Ocean between the Commonwealth of the Northern Mariana Islands (to the north) and the Federated States of Micronesia (to the south), as shown in the inset map of Figure 5.

Figure 5: Guam location map with study area

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The East Hagatna Emergency Shoreline Protection study area encompasses a 2,100 ft long stretch of Trinchera Beach along Hagatna Bay, which runs parallel to South Marine Corps Drive (also referred to as Highway 1), a main transportation corridor of the island. In some places, less than 20 ft of shoreline separates the road from the beach. The project extent is bounded on the western end by a strip mall parking lot that has an access ramp through the seawall down to the beach, and centers on the Veteran's Sunset Beach Park. Upland of the eastern extent of the project area is the Antonio B. Won Pat International Airport.

The study area includes 2,100 linear ft of existing seawall situated parallel to and between the Hagatna Bay shoreline and South Marine Corps Drive (Figure 5). The project footprint may extend as far as 20 ft seaward from the existing seawall, 30 ft inland of the existing seawall, and 5 ft down into the limestone subgrade. The existing seawall height ranges from approximately 7.5 to 8.9 ft above MSL and is composed of large volcanic rocks cemented together, likely built after a 1993 USACE feasibility study for the project area. The study area encompasses the ESA Action Area within which USACE is evaluating the effects of the proposed action on ESA listed species and designated critical habitat.

Figure 6: Approximate extent of the project area along Hagatna Bay.

Hagatna Bay is surrounded by dense residential, commercial, and military development. The low-lying shoreline is bounded to the south by a high cliff inland of South Marine Corps Drive. A strip of small commercial establishments is located between South Marine Corps Drive and the cliff (USACE 1993).

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The ESA Action Area is 30 feet inland from the existing seawall to 20 feet seaward of the existing seawall, as depicted in Figure 7 and includes on staging area on an existing parking lot. The habitat within the Action Area is a narrow, highly variable intertidal strand of sand, coral rubble, gravel, and rock, supporting no obvious aquatic communities. NMFS surveys in November 2022 confirmed previous observations (USFWS 1992, NOAA 2005) that the intertidal region within 20 ft of the wall is predominantly sand and does not contain live coral, other macroinvertebrates, seagrasses or fish. Sparse seagrass, macroalgae and fish occur beyond 20 ft. from the existing seawall where the depth reaches 1 ft. The depth is shallow, approximately 1 foot, for several hundred ft from the existing seawall (NMFS 2023).

Figure 7: Proposed Project Action Area: The proposed active construction and staging area are indicated in black. The project area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. Rock Revetment Footprint. Redline indicates mean lower low water (MLLW), green line indicates mean sea level (MSL), blue line indicates mean higher high water (MHHW). Figure by Catie Dillon, May 31, 2022.

Because work will occur in the water, it has the potential to impact the following ESA-listed species that occur in the area: Central West Pacific Green Turtle (*Chelonia mydas*), Hawksbill Turtle (*Eretmochelys imbricata*), the coral *Acropora globiceps,* and their habitat. The endangered Mariana Fruit Bat *(Pteropus mariannus mariannus)* has been observed passing through the upland area where work will also occur.

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Table 1: Proposed Action Area Dimensions

Impact	Area	Height	Width	Length	Surface Area
Permanent	Beach/Intertidal Construction Area	10 ft	17 ft	2100 ft	0.82 ac
Temporary	Intertidal Toe Trenching	-2.5 ft	3 ft	2100 ft	0.14 ac
Temporary	Upland Backfill and Staging Area	10 ft	30 -50 ft	2100 ft	1.45 ac

3. Listed species & Critical habitat in the action area

The Study Area includes 30-50 ft of sparse, urbanized habitat of Veteran's Sunset Beach Park and Trinchera Beach Park on the upland side of the existing seawall, the existing seawall, and 20 ft of sandy intertidal zone in front of the existing seawall. Park vegetation is an actively maintained lawn planted with indigenous coconut palm (*Cocos nucifera*) and ironwood (*Casuaria equisetifolia*) trees and the introduced ornamentals plumeria (*Plumeria* sp.) and fish poison tree (*Barringtonia asiatica*).

There are varying amounts of sandy beach present between the existing seawall and the ocean. In some locations toward the eastern end of the project extent, there is approximately 15 feet of beach (PDT 2022). In other areas, such as Veteran's Sunset Beach Park, there is no beach at all. The 1993 Environmental Assessment (USACE 1993) describes Trinchera Beach as extending along approximately 3,400 feet of the East Hagatna shoreline. The beach material is fine calcareous sand with extensive coral, gravel, and rubble. Portions of the shoreline are covered almost exclusively with gravel, rocks, rubble, and small limestone boulders. Small sand and alluvial deltas had formed in the vicinities of storm drains and the inner reef flat has a covering of fine sand and silt (USACE 1993, PDT 2022, NMFS 2023).

Pursuant to Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), USACE requested technical assistance from USFWS and NMFS. The initial list of threatened and endangered species for Hagatna Bay and its shoreline included Central West Pacific Green Turtle (*Chelonia mydas*), Hawksbill sea turtle (*Eretmochelys imbricata*), Indo-West Pacific scalloped hammerhead shark (*Sphyrna lewini*), giant manta ray (*Manta birostris*), proposed coral critical habitat and the corals *Acropora globiceps, A. retusa*, and *Seriatopora aculeata*, and Mariana fruit bat (*Pteropus mariannus mariannus*). On 12 April 2022 NMFS Contractor Ashley Schrader concluded that based on the location of the activity, a mean water depth of less than 3 feet in the project area and that there would be no vessel use, scalloped hammerhead sharks and giant manta ray need not be included in the biological evaluation. Ms. Schrader also reported that recent yet to be published surveys indicate that the coral species *A. retusa*

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and *S. aculeata* are not likely to be in the proposed project area. Therefore this USACE biological evaluation will consider effects of the project on the following federally listed species which are potentially affected by project activities along South Marine Corps Drive and are considered in detail in this BE:

Table 2: ESA Listed Species potentially present on or in the vicinity of the study area. Noe were observed during the NMFS surveys in 2022.

Common Name	Scientific Name	Status	Critical Habitat	Jurisdiction	Observed in Action Area
Sea Turtles					
Green sea turtle, Central South Pacific Distinct Population Segment (DPS)	*Chelonia mydas*	Endangered	No	NMFS in ocean. USFWS on land	No
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	No	NMFS in ocean. USFWS on land	No
Terrestrial Species+					
Mariana Fruit Bat	*Pteropus mariannus mariannus*	Endangered	No	USFWS	No
Coral Species					
small-polyp stony coral	*Acropora globiceps***	Threatened	Pending	NMFS	No

No threatened or endangered species were seen during the NMFS 2022 surveys at or near the proposed project site although sea turtles are known to use the waters immediately offshore.

3.1 Central West Pacific Green Sea Turtle (*Chelonia mydas*)

The green sea turtle is the largest hard-shelled sea turtle. They are unique among sea turtles in that they are herbivores, eating mostly seagrasses and algae. This diet is what gives their fat a greenish color (not their shells), which is the source of their name. Green sea turtles are found throughout the world. They nest in over 80 countries and live in the coastal areas of more than 140 countries. Historically, green turtles were exploited for their fat, meat and eggs, causing global population declines (NMFS & USFWS 1998a).

3.1.2 Listing Status

NMFS has jurisdiction over sea turtles while they are in the water and the USFWS has jurisdiction over sea turtles on land, including sea turtle eggs, nesting females, and hatchlings on the beach. The green sea turtle was listed as threatened on July 28, 1978 (43 FR 32800), except for breeding populations found in Florida and the Pacific coast of Mexico, which were listed as endangered. On March 23, 2015 the services (NMFS and USFWS) released a proposed rule concluding that the green sea turtle population is comprised of 11 DPSs that qualify as ‘‘species’’ for listing under the ESA, and identified eight DPSs as threatened and three as endangered (80 FR 15271), including the

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Central West Pacific DPS which includes Guam. The final rule was published on April 06, 2016 (81 FR 20057). For the purposes of this analysis, the Central West Pacific DPS of green sea turtle was evaluated for effects resulting from project implementation.

3.1.3 Critical Habitat

There is no designated critical habitat for green sea turtles on or nearby Guam. Critical habitat for the North Atlantic distinct population segment of the green sea turtle in September 1998, which includes the waters of Culebra Island, Puerto Rico, and its outlying keys, is the only designation at this time.

3.1.4 Distribution and Habitat

Green sea turtles are globally distributed, typically along continental coasts and islands in tropical and subtropical waters between 30° N and 30° S. They are highly migratory and use a wide range of broadly separated habitats throughout their lives. Post-hatchling and juvenile green sea turtles are believed to drift along major current systems for several years, where they are assumed to forage at, or near, the surface where currents converge. As pelagic juveniles, their diet appears to be primarily carnivorous, and includes invertebrates and fish eggs. Upon reaching a carapace length of about 35 cm, juveniles recruit to nearshore habitats. Neritic juveniles, subadults and adult green turtles appear to have a primarily herbivorous diet, consisting largely of marine algae and seagrasses. Every few years after reaching sexual maturity, green sea turtles make breeding migrations that may span thousands of km between resident foraging grounds and their natal nesting areas.

Green turtles are found worldwide primarily in subtropical and temperate regions of the Atlantic, Pacific, and Indian Oceans, and in the Mediterranean Sea. In the eastern North Pacific, green turtles have been sighted as far north as southern Alaska, but most commonly occur from southern California to northwestern Mexico. Elsewhere in the U.S. Pacific, green turtles occur in Guam, the Commonwealth of the Northern Mariana Islands, Hawaii, and American Samoa. Detailed information about the biology, habitat, and conservation status of this species is described in the U.S. green turtle recovery plan (NMFS and USFWS 1998a), the 5-year green sea turtle status review (NMFS and USFWS 2007a), and the green sea turtle status review (NMFS and USFWS 2015). Globally, most of the important green sea turtle nesting populations declined substantially during the 20th century. Harvest of green sea turtles for their meat, shells, and eggs has been a major factor in past declines of green turtles, and continues to be a major threat globally (Humber et al. 2014). Although threats and impacts persist, conservation efforts over the past 25 years or more appear to have had some positive results, especially in Hawaii (Seminoff et al. 2015).

In the Central West Pacific DPS, green sea turtle nesting occurs at low levels throughout the geographic distribution of the population, with isolated locations having high nesting activity. Historical baseline nesting information in general is not widely available in this region, but exploitation and trade of green sea turtles throughout the region is well-known (Groombridge and Luxmoore, 1989).

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Green turtles occupy three habitat types: high-energy oceanic beaches, convergence zones in the pelagic habitat, and benthic feeding grounds in relatively shallow, protected waters.

After leaving the nesting beach, young sea turtles are believed to occupy open ocean pelagic habitat, perhaps associated with sargassum rafts. It is generally assumed that at this life stage they are omnivorous with a strong tendency toward carnivory. An ontogenetic shift from a pelagic life form to benthic foraging occurs after reaching a carapace size of 20-25 cm in the Western Atlantic or 35 cm carapace length in Hawaii and Australia. A change to a herbivorous diet also occurs during this time, primarily seagrasses and algae, although they also consume jellyfish, salps and sponges (Lutz and Musick 1997).

In contrast to their protected status, it appears that green sea turtle colonies are increasing and are nesting on beaches that had no recent nesting activities, such as Rancho Nuevo (Tamaulipas, Mexico) and along the mid-Atlantic coast of Florida. Patrolling nesting beaches in other areas of the world has also had a positive effect on nesting populations. It is believed by some that the green sea turtle is not faced with imminent extinction (Lutz and Musick 1997).

3.1.5 Potential for Occurrence in Project Area

On Guam, nesting habitat tends to be in areas isolated from human activity and nesting has not been observed in the proposed project/action area. Sea turtles may use the lagoon for foraging habitat. Although green sea turtles nest on Guam beaches, this normally occurs at relatively isolated locations far away from the Action Area (USFWS 1992). Within the Marianas, green turtles are reasonably common and present year-round in the waters, and approximately 22 green sea turtles nest in Guam (Seminoff et al. 2015).

Green sea turtle (*Chelonia mydas*) have previously been observed in the water and on the beach in Hagatna Bay, but they have not been observed to nest on Hagatna Bay beaches (Flores 2022). A NMFS sea turtle tagging project from 2014 through 2019 did not tag or observe any hawksbill or green sea turtles in Hagatna Bay (Gaos et al. 2021). No turtles were observed during the NMFS 2022 surveys (NMFS 2023).

Given the above, it is unlikely that the green sea turtle will enter the project area. The green sea turtle enter Hagatna Bay and they have previously been reported using the shoreline for foraging habitat. However, the turtles have not been recently documented to use nearshore habitat in the project area.

3.2 Hawksbill sea turtle

Hawksbill sea turtle have a similar appearance to other marine turtles but with a sharp, curving beak. Adult hawksbill sea turtles typically grow to 1 m (3 ft) in length, weighing around 80 kg (180 lb) on average. Adult hawksbill sea turtles are primarily found in tropical coral reefs. Little is known about the habitat preferences of young sea turtles;

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they are assumed to be completely pelagic, remaining at sea until they mature (Houghton et al. 2003). Aside from sponges, their principle food source, hawksbills feed on algae, marine plants, cnidarians, comb jellies and other jellyfish, sea anemones, mollusks, fish, and crustaceans.

3.2.1 Listing Status

The hawksbill sea turtle was listed as endangered throughout their range on June 2, 1970 (35 FR 8490). NMFS has jurisdiction over sea turtles while they are in the water and the USFWS has jurisdiction over sea turtles on land, including sea turtle eggs, nesting females, and hatchlings on the beach.

3.2.2 Critical Habitat

Population declines resulted in the hawksbill turtle being listed as endangered on 2 June 1970 (35 FR 8495). Hawksbill Sea Turtle critical habitat is only designated for areas of Puerto Rico (50 CFR § 17.95(a). There is no critical habitat designated for hawkbill sea turtles in the Pacific.

3.2.3 Distribution and Habitat

Although certain authors (Carr 1952) separate the species into two sub specific populations (Indo-Pacific and Atlantic subspecies), the USFWS is treating the recovery of this species as a single taxonomic entity.

Hawksbill turtles have a circum-tropical distribution, occurring from 300N to 300S latitude within the Atlantic, Pacific, and Indian oceans. Along the eastern Pacific Rim, hawksbills were apparently common to abundant as recently as 50 years ago in near shore waters from Mexico to Ecuador, particular the east coast of Baja California Sur in the vicinity of Concepcion Bay and Paz Bay, Mexico. Presently, the hawksbill is considered rare in most localities as there are no known nesting beaches remaining on the Pacific coast of Mexico (Clifton, et al 1982, as cited in USFWS 1998).

What appears to be a better situation occurs in the Central Pacific; nesting is widely distributed and in very low numbers. Foraging hawksbills are observed from virtually all the island groups in Oceania, from the Galapagos Islands in the eastern Pacific to the Republic of Palau in the Western Pacific. Hawksbills nest on the islands and mainland of southeast Asia, from China and Japan, throughout the Philippines, Malaysia, and Indonesia, to Papau New Guinea, the Solomon Islands and Australia (USFWS 1998).

As with other sea turtle species, after leaving the nest the turtle is pelagic. The ontogenetic change to benthic foraging occurs in the Caribbean at a carapace length between 20 to 25 cm (straight) and in Australia at a carapace length of 35 cm (curved).

Data indicates that Hawksbills forage most often over coral reef areas and rock outcroppings although they also feed in seagrass meadows in mangrove-fringed bays. Although generally accepted that hawksbill sea turtles are primarily spongivores, other

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items consumed include: seagrasses, tunicates, bryozoans, coelenterates, molluscs and soft corals. Hawksbills are believed to undergo a period of omnivorous feeding in benthic habitats prior to adopting the specialized spongivory known from larger juveniles and adults (Lutz and Musick 1997).

Hawksbill turtles are circumtropical in distribution, generally occurring from 30 degrees North to 30 degrees South latitude within the Atlantic, Pacific, and Indian Oceans and associated bodies of water. Along the eastern Pacific rim, hawksbills were apparently common to abundant as recently as 50 years ago in nearshore waters from Mexico to Ecuador, particularly the east coast of Baja California Sur in the vicinity of Concepción Bay and Paz Bay, Mexico. Today, the hawksbill is rare to nonexistent in most localities; there are no known nesting beaches remaining on the Pacific coast of Mexico. Hawksbills may still represent a rare nesting species along Pacific Central America, but there has been no documented nesting in recent years (NMFS & USFWS, 1998b).

Hawksbill turtles use a variety of habitats during different stages of their life cycle, but largely inhabit nearshore foraging grounds, especially healthy coral reef habitats. In the Eastern Pacific, large hawksbill populations have been found in mangrove estuaries. Upon leaving their nesting beaches, most hawksbill hatchlings enter pelagic (open sea) habitat, where they take shelter in floating algal mats and drift lines of flotsam and jetsam for approximately 1 to 5 years.

Eventually, juveniles migrate to shallower coastal feeding grounds, including their preferred coral reef habitats, where they mature to adulthood and spend the remainder of their lives. The ledges and caves of coral reefs provide shelter for resting hawksbills during the day and at night. Hawksbills are also found around rock formations, high energy shoals (sand bars in shallow water), and estuaries that provide good habitat for sponge growth (NMFS & USFWS 1998b).

These turtles are distributed globally in tropical and subtropical waters between 30° N and 30° S. They are highly migratory, use different habitats at different stages of their life cycle, and are most commonly associated with healthy coral reefs. Post-hatchlings and oceanic stage juveniles are believed to occupy the pelagic environment for several years where they probably drift along major current systems and feed primarily at the surface. At about 35 cm carapace length, juveniles recruit to nearshore foraging areas where they begin feeding on benthic sponges, other invertebrates, and algae. Every few years, adult hawksbill sea turtles make breeding migrations that may span thousands of km between their foraging and nesting areas. Detailed information about the biology, habitat, and conservation status of this species is described in the recovery plan (NMFS and USFWS 1998b) and the 5-year status reviews (NMFS and USFWS 2007b; NMFS and USFWS 2013). Globally, hawksbill nesting populations declined substantially during the 20th century, and population declines appear to continue (NMFS and USFWS 2007b; NMFS and USFWS 2013).

In the Mariana Archipelago of Guam and the Commonwealth of the Northern Mariana Islands, less than 10 females nest annually, which likely represents a significant decrease from historic levels. The populations in Micronesia, Melanesia and Polynesia

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(with exception of Hawaii) are exploited for shell, meat and eggs for local consumption, and are considered overall depleted and declining.

Hawksbills are uncommon, occurring in much lower numbers than green sea turtles, but foraging hawksbill sea turtles occur in the waters around the main Hawaiian Islands, Guam, and Tutuila in American Samoa (NMFS and USFWS 2013). Capture-mark-recapture studies of sea turtles in the Pacific islands under U.S. jurisdiction occur in the Commonwealth of the Northern Mariana Islands, Palmyra Atoll, and Hawaii which have also captured hawksbills opportunistically during capture activities; however, the duration of these in-water monitoring programs have not been sufficient for trend analysis.

3.2.4 Potential for Occurrence in Project Area

NMFS sea turtle tagging project from 2014 through 2019 did not tag or observe any hawksbill or green sea turtles in Hagatna Bay (Gaos et al. 2021). No turtles were observed during the NMFS 2022 surveys (NMFS 2023).

Given the above, it is unlikely that the Hawksbill sea turtle will enter the project area. Hawksbill sea turtles have not been reported in the Bay.

3.3 Coral (*Acropora globiceps*)

A. globiceps is a “stony” coral. Stony corals are sessile, colonial, marine invertebrates that secrete skeletons of calcium carbonate (aragonite). *A. globiceps* colonies occur in the intertidal zone, upper reef slopes, and reef flats in water shallower than 26 feet (8 meters) (DON 2015). *A. globiceps* coral have finger-like branches that are closely compacted. Their size and color vary by location. Colonies are brown or fluorescent green in American Samoa, yellow-brown in the Northern Marianas (at least on Tinian and Rota), and range from brown to yellow-brown and green-brown to light tan to gray-green in Guam (Fenner and Burdick 2016

3.3.1 Listing Status

In the Commonwealth of the Northern Mariana Islands (CNMI) and Guam *A. globiceps* was listed as threatened under ESA on October 10, 2014 (79 FR 53851), under the jurisdiction of NMFS. According to the Final Rule, *A. globiceps* occurs on upper reef slopes, reef flats, and adjacent habitats in depths ranging from 0 to 8 m.

3.3.2 Critical Habitat

There is no designated critical habitat for the coral species. However, NMFS proposed designated critical habitat on November 27, 2020; critical habitat would include Hagatna Bay. NMFS proposed to designate critical habitat for seven threatened corals in U.S. waters in the Indo-Pacific (1/26/21; 85 FR 76262), including waters in Guam. The public comment period for the proposed critical habitat closed on May 26, 2021, and is awaiting finalization. Major threats to habitat include ocean warming, ocean acidification, trophic effects of reef fishing, nutrient enrichment, contaminants, and sedimentation. The proposed coral critical habitat consists of substrate and water column habitat characteristics essential for the reproduction, recruitment, growth, and maturation of the listed corals. Sites that support the normal function of all life stages of the corals are natural, consolidated hard substrate or dead coral skeleton free of algae and sediment at the appropriate scale at the point of larval settlement or fragment reattachment, and the associated water column.

Several attributes of these sites determine the quality of the area and influence the value of the associated feature to the conservation of the species:

1. Substrate with presence of crevices and holes that provide cryptic habitat, the presence of microbial biofilms, or presence of crustose coralline algae;

2. Reefscape (all the visible features of an area of reef) with no more than a thin veneer of sediment and low occupancy by fleshy and turf macroalgae;

3. Marine water with levels of temperature, aragonite saturation, nutrients, and water clarity that have been observed to support any demographic function; and

4. Marine water with levels of anthropogenically-introduced (from humans) chemical contaminants that do not preclude or inhibit any demographic function.

While *A. globiceps* Proposed Coral Critical Habitat includes the entirety of Hagatna Bay at a depth of 0 – 131 ft (0 – 40 m), it does not include managed areas (e.g., harbors, navigation channels, anchorages, etc.) or artificial substrates (e.g., aids-to-navigation, seawalls, wharves, boat ramps, fishpond walls, pipes, submarine cables, wrecks, mooring balls, docks, aquaculture cages, etc.) (NMFS 2019).

3.3.3 Distribution and Habitat

A. globiceps morphology was described as digitate and usually small and it is distributed from the oceanic west Pacific to the central Pacific as far east as the Pitcairn Islands. The species occurs on upper reef slopes, reef flats, and adjacent habitats in depths ranging from 0 to 8 m. *A. globiceps* is a hermaphroditic spawner with lecithotrophic (yolk-sac) larvae. *A. globiceps'* vulnerabilities to threats as follows: High vulnerability to ocean warming, moderate vulnerabilities to disease, ocean acidification, trophic effects of fishing, nutrients, and predation, and low vulnerabilities to sedimentation, sea-level rise, and collection and trade.

A. globiceps is found in the oceanic central and western Pacific Ocean and central Indo-Pacific from the oceanic west Pacific to the central Pacific as far east as the Pitcairn Islands. Within the United States, it is known to occur in Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, and the Pacific Remote Island Areas. *A. globiceps* occurs on upper reef slopes, reef fats, and adjacent habitats in depths ranging from 0 to 8 meters.

3.3.4 Potential for Occurrence in Project Area

During surveys in 1992 USFWS recorded nine species of·coral on the inner reef flat at the proposed project site (Table 4). *A. globiceps* was not one of them (USFWS 1992). Corals were virtually absent on the sandcovered inner reef flat within 200 m (656 ft) of the beach (USFWS 1992). The nearest documented observance of *A. globiceps* was in northern part of lagoon (Maynard et al. 2015; Horsley Whitten Group 2017) more than 4 miles from the project area. No *A. globiceps* were observed during the NMFS 2022 surveys (NMFS 2023).

3.4 Mariana fruit bat (*Pteropus mariannus mariannus*)

The Mariana fruit bat is a medium-sized fruit bat in the family Pteropididae that weighs 0.66 to 1.15 pounds (330 to 577 grams) and has a forearm length ranging from 5.3 to 6.1 in (13.4 to 15.6 cm); males are slightly larger than females. The underside (abdomen) is colored black to brown, with gray hair interspersed, creating a grizzled appearance. The shoulders (mantle) and sides of the neck are usually bright golden brown, but may be paler in some individuals. The head varies from brown to dark brown. The well-formed and rounded ears and large eyes give the face a canine appearance; members of the family Pteropodidae often are referred to as flying foxes (USFWS 2022).

3.4.1 Listing Status

Mariana Bat was listed as endangered on August 27, 1984 (49 FR 33881-33885). It is managed by USFWS.

3.4.2 Critical Habitat

Although critical habitat has been designated on Guam by the USFWS for Mariana Fruit Bat (*Pteropus mariannus mariannus*) (50 CFR § 17.95(a)), the project site (East Hagatna Bay Shoreline) is not included within any designated or proposed critical habitat areas.

3.4.3 Distribution and Habitat

In 2020 DAWR counted 82 bats on Guam (USFWS 2020). Recent surveys and population estimates (DAWR 2020; DFW 2017; DFW 2020; Mildenstein 2013) suggest the *P. m. mariannus* population is stable overall. However there is insufficient survey frequency and only Rota has sufficient population numbers to meet recovery criteria. Many of the islands have not been surveyed during the last five year period due to difficult access to the islands and a lack of funding. Although the species is stable overall, its range is contracting due to development, and if the subspecies is considered to be a new species the range will naturally change from that as well to only encompass the Mariana islands. In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2). Thus *P. m. mariannus* still meets the definition of threatened.

2d.(cont.) Draft ESA Biological Evaluation

3.4.4 Potential for Occurrence in Project Area

The primary constituent elements required by the Mariana fruit bat for the biological needs of foraging, sheltering, roosting, and rearing of young are found in areas supporting limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native or introduced plant species. Plant species used for foraging include *Artocarpus* sp. (breadfruit), *Carica papaya* (papaya), *Cycas circinalis* (fadang), *Ficus* spp. (fig), *Pandanus tectorius* (kafu), *Cocos nucifera* (coconut palm), and *Terminalia catappa* (talisai). Remote locations, often within 328 ft (100 m) of clifflines that are 260 to 590 ft (80 to 100 m) tall, with limited exposure to human disturbance; land that contains mature fig, *Mammea odorata* (chopak), *Casuarina equisetifolia* (gago), *Macaranga thompsonii* (pengua), *Guettarda speciosa* (panao), *Neisosperma oppositifolia* (fagot), and other tree species are used for roosting and breeding.

Guam DAWR has had documented sightings of Mariana fruit bat (*Pteropus mariannus mariannus*) passing through the parks in which the Action Area is located. During informal consultation via email, DAWR stated they have noticed unexplained movements with fruit bats in our island. Most likely a response to the increase development occurring in habitat used by fruit bats in the past (before development activities). For this specific site on East Hagatna, we have seen fruit bats on the breadfruit trees along the cliff wall, roosting and foraging during breadfruit season. If I recall correctly, that was between 2010 and 2013. There are still some bread fruit trees along the cliff side, therefore fruit bats may forage in the area during breadfruit season, April to October (Bevacqua and Miller 2020; Quitugua 2022).

4.0 Potential Impacts

Based on the known locations of sensitive species and habitat within the study area, the following impact analysis evaluates the potential for impact to ESA species and designated habitat from constructing the Rock Revetment within the ESA Action Area. Compared to other alternatives considered under the feasibility study, implementation of the tribar revetment was tentatively determined to be economically justified, environmentally sound and engineeringly feasible.

Potential vectors for impact per resource are discussed below. BMPs described at Section 2.2 are intended to avoid and/or minimize the following impacts.

4.1 Direct Impacts

4.1.1 Mariana Fruit Bat

The shoreline along East Hagatna Bay has been extensively altered by urban development, and the vegetation observed at the proposed project site during the January 2022 PDT visit reflected this. Construction of the rock revetment requires the removal of 2100 ft of the existing stonewall requiring excavation and subsequent backfill of 20 ft inland of the wall resulting in a temporarily disturbed area of 0.96 acres. It is estimated that 20 trees would be removed during construction and replaced after

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construction with appropriate and desirable native species and all bare ground would be revegetated. None of the trees within the Action Area are species used for roosting or foraging by Mariana fruit bat. Impacts Mariana fruit bat would be temporary during construction. Construction of the alternatives would beneficially protect existing and restored terrestrial habitat between the wall and the road. Mariana fruit bat may pass through the Action Area on their way to roosting or foraging areas at night, outside of project working hours.

In addition to the BMPs described at Section 2.2, the aforementioned potential effects to fruit bats that could result from implementation of the proposed action can be avoided and/or minimized using the following BMPs:

- Avoid construction work at night that requires artificial lighting of the ESA Action Area.

  o Rationale: Artificial lighting can disorient foraging bats at night. Minimizing or avoiding nighttime work entirely would minimize or avoid use of artificial lights that could disorient and potentially cause harm to foraging bats.

USACE anticipates that fruit bats in general would be roosting during the daytime and not in the ESA Action Area. The Proposed Action would not result in direct effects or loss of individual fruit bats, nor would project activities be expected to reduce habitat availability or degrade such habitat so that it becomes unsuitable at a magnitude or duration that could substantially affect the species population.

4.2.2 Sea Turtles

Construction of the rock revetment in the ESA Action Area would temporarily disturb the current beach, involving increased human presence and use of heavy machinery on the beach prior to and during construction, with minimal, limited, and temporary in-water work. Construction activities would likely involve the use of heavy machinery, operated from the land, for clearing of vegetated areas, excavation, and construction of the revetment. If construction must occur at night, artificial lighting may be required.

Potential vectors of impact include disturbance from human activity and equipment operation, exposure to elevated noise levels, exposure to elevated turbidity and sedimentation, exposure to wastes and discharges, disorientation caused by artificial lighting and loss of nesting habitat. Construction of the revetment has the potential to directly strike ESA-listed species should those animals be present when the equipment is operating within the ESA Action Area. Potential injuries and their severity will depend on the animal's proximity to the heavy machinery when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, cracked or crushed carapaces, and amputations, any of which could result in the animal's death. However, sea turtles on land can be clearly seen and avoided and move relatively slowly and construction activities can either be halted or moved to avoid direct impact.

Increased presence of humans at the beach may impact sea turtles by causing a startle reaction and resulting stress should they encounter site preparation and construction activities. The reaction could range from one extreme where an animal calmly approaches and investigates the activity, to an opposite reaction of panicked flight, where an animal injures itself in an attempt to flee. However, sea turtles typically avoid human activity. Thus, the most likely effect of this interaction will be moderate level stress with a moderate to high energy avoidance behavior leading to the animal rapidly leaving project areas without injury.

Construction activities using heavy equipment within the ESA Action Area such as setting of stones and excavating the beach toe will elevate ambient noise levels and may cause sea turtles to avoid the area during construction. USACE does not anticipate noise levels that would cause death or damage hearing because no pile driving is anticipated and because noise rapidly dissipates from uplands into marine waters. Construction activities that emit extreme noise levels on land would be halted when a sea turtle is within 50 yards of the activity.

Sea turtles breathe air and should not be impacted by turbidity generated by minimal construction within the intertidal zone. In addition, the intertidal zone is comprised of coarse grain sediments such as sand and cobble and is expected to settle immediately upon disturbance causing no lasting elevated turbidity or sedimentation beyond the ESA Action Area.

Construction activities along the beach may involve use of plastic trash or other small ingestible trash that, if inadvertently consumed can cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle marine life. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose protected species to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment.

Construction of the revetment will cause the conversion of an estimated 0.82 acres of beach sand to rock revetment within the ESA Action Area. The revetment is designed to prevent imminent loss of remaining beach and prevent erosion of terrigenous sediments into the ocean which would benefit sea turtles. Direct impacts from beach loss are not anticipated because turtles do not nest or bask in the Action Area.

In addition to the BMPs described at Section 2.2, the aforementioned potential effects to sea turtles that could result from implementation of the proposed action can be avoided and/or minimized using the following BMPs:

- Conduct daily pedestrian surveys for turtles in the ESA Action Area prior to beginning on-site work. These surveys should be conducted by a biologist or trained individual. If a turtle is observed, work will cease and USACE will consult USFWS to determine appropriate response.

- Rationale: Conducting daily surveys will avoid any potential for direct impact to turtle nests within the ESA Action Area during construction.

• Project footprints must be limited to the minimum area necessary to complete the project.

- Rationale: During the pre-construction, engineering and design phase, USACE, or its contractor will consider opportunities to reduce the overall dimensions of the revetment (especially longitudinally, parallel to the shoreline) as well as look for opportunities to site the shoreline stabilization structure ABOVE or as close to the current line of littoral vegetation as possible, avoiding placement below the high tide mark Reducing the overall project footprint will minimize impacts to natural resources within the ESA Action Area, in general, and especially minimize impacts to documented nesting beach locations along the west end of the airport runway within the study area. Vegetation lines typically delineate the general height reached by the normal high tide. Siting the revetment as high above the intertidal zone will minimize and potentially eliminate the need for in-water construction activities, and reduce the conversion of beach sand to revetment. Siting the revetment as landward as can be achieved would also maximize opportunity to conduct construction work from the landward (north) side of the ESA Action Area,as well as minimize potential to exacerbate loss of beach area suitable for turtle nesting.

USACE anticipates that sea turtles, in general would avoid the ESA Action Area during the daytime in response to increased human presence and elevated noise levels during construction. Should sea turtles approach the work area, their speed is considerably reduced on land and visibility by on-site personnel is uninhibited on land allowing for construction activities to either halt immediately or adjust to avoid direct impacts to sea turtles. The Proposed Action would not result in direct effects or loss of individual green or hawksbill turtles, nor would project activities be expected to reduce habitat availability or degrade such habitat so that it becomes unsuitable at a magnitude or duration that could substantially affect the species population; however, short-term disturbance of beach areas at which the two species have been previously observed to nest could result from the proposed action.

4.2.3 Coral

Physical damage on coral reefs is often associated with the breakage or dislodging of coral colonies but can also manifest itself less severely (e.g., tissue abrasion). Physical damage that reduces coral cover reduces ecological productivity, protection for other reef species and increases opportunity for colonization by invasive algae and increases vulnerability to further physical damage. Fast growing scleractinian “stony” corals, such as branching Acropora spp. are particularly vulnerable to physical damage because their carbonate skeletons are less dense and relatively brittle compared to slow growing massive corals. However, this characteristic is actually beneficial to corals. Fragmentation is an extremely important mode of distribution and reproduction for many reef building corals, often allowing them to become locally dominant (Highsmith 1982).

2d.(cont.) Draft ESA Biological Evaluation

Direct physical impacts to coral from the Proposed Action would be avoided through implementation of the following BMPs:

- No corals or coralline algae colonies will be directly handled or intentionally fragmented.

- All efforts will be made to maximize the amount of construction work conducted from the landward (north) side of the project site (closest to the runway). Construction activities on beach, splash/spray, and intertidal zones would be minimized to the maximum extent possible. The construction footprint would occur predominantly on the beach and extend temporarily and minimally, during construction only, into the intertidal zone.

- In-water construction activities would not be required to construct the shoreline stabilization measure, so physical impacts to coral or other marine organisms from these sources would not occur through these types of activities.

Based on a recent survey by USFWS of the ESA Action Area, the ESA Action Area is absent of ESA-listed coral species. Accordingly, the project would have no direct impact to ESA-listed corals within the ESA Action Area.

4.3 Indirect and long-term physical impacts

4.3.1 Sediment Erosion/Accretion

The rock revetment would be constructed along and maintain the contours of the existing beach profile. Thus, USACE does not anticipate substantial or permanent exacerbation of erosion of soils or loss of topsoil in the long term. The toe of the revetment would be buried with native sediments consistent with the pre-construction conditions.

4.3.2 Discharge of pollutants

Construction activities along the shoreline involving the use of heavy machinery has the potential for inadvertent spills and discharges that may consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids and other toxicants, which could spread into the marine environment and expose protected species to toxic chemicals. Oil globules can adhere to coral tissue and soluble oil components can be absorbed from the water column by coral polyps (Van Dam 2011). Effects on coral colonies include mortality, tissue death, reduced growth, impaired reproduction, bleaching, reduced photosynthetic rates, and decreased cellular lipid content which is correlated with coral fitness. Spills occurring near or at peak reproductive season (e.g., summer spawning months for most jurisdictions in the Western Pacific Region) could adversely affect an entire year of reproductive effort because coral gametes and eggs are buoyant, potentially bringing them into direct contact with floating oil. Chemical spills into the ocean can also indirectly impact sea turtles by affecting mobility and respiration and by degrading the turtles' food source.

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2d.(cont.) Draft ESA Biological Evaluation

Site preparation and excavation of the revetment footprint could result in indirect impacts to protected resources through the inadvertent exposure or discharge of excavated native subsurface soil and sediments into tidally influenced areas. Release of terrigenous sediments such as silt, clay and organic matter can elevate turbidity levels within and beyond the ESA Action Area through ocean circulation. These fine grain sediments are more easily suspended and take longer to settle out than coarse grain sand and cobble which settles almost immediately. The impact of sedimentation or settling of sediments on coral reefs, depends upon the thickness of the sediment layer and duration of coverage resulting in reduced photosynthesis and diverting energy away from lifecycle activities to sloughing and mucous production and on the extreme end, bleaching and death. Death of native biota can be followed by opportunistic proliferation of invasive species disrupting the balanced ecosystem. Elevated turbidity for extended periods of time reduces solar irradiation affecting photosynthetic organisms and can reduce visibility in the water column for visual foragers and increase vulnerability of prey.

In addition to the BMPs listed at Section 2.2, implementation of the following BMPs could avoid and/or minimize the aforementioned indirect impacts:

- Project operations must be planned to accommodate weather and ocean forecasts. Operations must cease under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.
    - Rationale: Adverse weather and wave conditions facilitate conveyance of land-based pollutants with the marine environment, increasing potential for inadvertent spills or damage to sediment-erosion control measures. These measures would minimize the potential for indirect impacts associated with pollutant releases into the ocean.
- The Contractor must designate on-site personnel responsible for ensuring no inadvertent discharges of debris, petroleum, or other harmful materials into the water.
    - Rationale: This BMP emphasizes on-site responsibility to avoid inadvertent discharges of pollutants to the ocean to avoid indirect impacts to protected resources.

Through best management practices, hydrocarbons would not affect any listed species during construction. No dive boats or other seacraft will be used, so no hydrocarbon spills occurring from these sources would occur. No refuse or matter of any kind (including trash, garbage, oil, and other liquid pollutants) would be discharged because of project activities.

5.0 Effects of the Action

Effects on ESA-listed species were considered adverse if implementation of the proposed Project would result in any of the following (Table 4):

- Substantial loss of a T&E species.
- Reduction of habitat availability or degradation of habitat suitability of a magnitude and/or duration that could substantially affect a T&E species population.
- Substantially interfere with the movement of any migratory T&E species.
- Introduction of or contribution to the substantial spread of an invasive species, pests or diseases that would threaten a T&E species.
- Any effect that was not considered discountable (extremely unlikely to occur), insignificant (size of the impact should never cause take), or beneficial (contemporaneous positive effects without any adverse effects)

In consideration of the potential impacts described in Section 4.0, USACE has considered whether or not such impacts may affect and are likely or not likely to adversely affect ESA-listed species i.e., effects that are not discountable, insignificant or wholly beneficial. Additionally, USACE considered whether or not the proposed action would result in the destruction or adverse modification of critical habitat i.e., alterations that adversely modify any of those physical or biological features that were the basis for determining the habitat to be critical.

When considering the effect, the proposed action would have on the Mariana fruit bat, USACE understands that the ESA Action Area is absent of habitat suitable for and preferred by this species however, bats have previously been observed passing through at dusk and dawn on their way to foraging and roosting areas. USACE does not anticipate this species to coincide in the ESA Action Area with the proposed action or otherwise be affected by the proposed action. **Accordingly, USACE has determined that the proposed action may affect but is not likely to adversely affect Mariana fruit bat.**

When considering the effect the proposed action would have on the coral *Acropora globiceps*, USACE understands that the ESA Action Area is absent of any listed species and that the nearest ESA-listed species occurs approximately 100m offshore of the ESA Action Area therefore, USACE does not anticipate this species to be directly affected by the proposed action. However, although in-water work is not anticipated, the ESA Action Area minimally includes the intertidal area fronting the shoreline and provides a means of conveying project generated turbidity, wastes and discharges to the marine environment. Indirect impacts to water quality may affect listed corals near the ESA Action Area, specifically, *Acropora globiceps*, however, USACE anticipates that due to the work being sited predominately, if not entirely on land and through implementation of BMPs listed at Section 2.2, such adverse impacts are expected to be both insignificant and discountable. **Accordingly, USACE has determined that the proposed action may affect, but is not likely to adversely affect *Acropora globiceps*.**

When considering the effect, the proposed action would have on the Hawksbill sea turtle and Green sea turtle, USACE evaluated both direct and indirect impacts to sea turtles both in water and on land. In-water construction activities would be limited to the intertidal zone for site preparation purposes, if determined necessary at all, with no impediment to visual monitoring to ensure avoidance of direct impacts to sea turtles in water. Construction activities on the beach will have no impediment to visual monitoring coupled with observing the late-April through early August no-construction period and daily surveys to ensure no direct impacts to sea turtles on land. Direct impacts to sea turtles in the water and on land are expected to be discountable. The indirect impacts of beach erosion and potential for loss of suitable nesting habitat is minimal as the revetment will be constructed higher up on the beach profile and is surrounded by suitable habitat known for nesting will be insignificant. The indirect impacts to sea turtles from impaired water quality and exposure to construction debris and wastes, through implementation of BMPs will be insignificant. **Accordingly, USACE has determined that the proposed action may affect but is not likely to adversely affect ESA-listed sea turtles.**

Table 3: Summary of Effects on ESA-Listed Species potentially present on or in the vicinity of the ESA Action Area.

Common Name	Scientific Name	Status	Effect
Sea Turtles			
Green sea turtle	*Chelonia mydas*	Endangered	NLAA
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	NLAA
Terrestrial Species			
Mariana Fruit Bat	*Pteropus mariannus mariannus*	Endangered	NLAA
Coral Species			
small-polyp stony coral	*Acropora globiceps*	Threatened	NLAA
Key: NE = No Effect, NLAA = Not likely to adversely affect.			

There is no designated critical habitat for any ESA-listed species in Guam. **Accordingly, USACE has determined that the proposed action would cause no destruction or adverse modification of critical habitat.**

6.0 Cumulative Effects

Cumulative effects 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 Section 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The potential for cumulative impacts to the environment from the proposed action was evaluated by reviewing other projects and activities in the vicinity of the East Hagatna seawall that could directly or secondarily affect the same environmental resources as the proposed action. The analysis generally includes actions that were recently completed, are currently underway, or are programmed to occur in the foreseeable

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future, and are directly related to coastal shoreline protection, are located within or proximate to the proposed measure sites and/or would directly or secondarily affect resources in Hagatna Bay. Based on a review of the related actions, this analysis incorporates the following past projects and activities:

- Agana Small Boat Harbor O&M breakwater repair and dredging
- Hagatna (Agana) River Flood Risk Management Project. This project was terminated in 2022.

The effects of these actions were considered in combination with the degree and timing of the potential adverse and beneficial effects of the proposed alternatives to determine the types and significance of potential cumulative effects on ESA listed species. For this analysis, implementation of the project is considered cumulatively significant if, in concert with other past, present, or reasonably foreseeable future actions, it would exacerbate the declining status of an identified resource (a resource that is already adversely affected) or create a condition in which an effect is initially minor but is part of an irreversible declining trend.

7.0 Conclusions

In conclusion, USACE has determined the following for the Proposed Action:

- The proposed Project may affect, but is not likely to adversely affect, ESA-listed sea turtle species, coral species, and bats. In general, direct impacts to listed coral species would not occur or are highly unlikely.

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2e. NMFS Concurrence Letter**

2f. USFWS Concurrence Letter**

Attachment 3. MSA / EFH Consultation

**Technical Assistance Request to NMFS is part of Attachment 1b.*
3a. Draft EFH Evaluation
3b. NMFS Concurrence Letter

3a. Draft EFH Evaluation

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT ASSESSMENT

EAST HAGATNA CAP SECTION 14 EMERGENCY SHORELINE PROTECTION PROJECT

East Hagatna, Guam

*Email EFH to Steven McKagan - NOAA Federal **steven.mckagan@noaa.gov** and Jonathan Brown - NOAA Federal **jonathan.brown@noaa.gov** at NMFS PIRO Habitat Conservation Division.

Action Agency:	Honolulu District, U.S. Army Corps of Engineers
Federal Action:	Construction of shoreline protection at East Hagatna, Guam
Consulting Agencies:	National Marine Fisheries Service Pacific Islands Regional Office Protected Resources Division & Habitat Conservation Division United States Fish and Wildlife Service Pacific Islands Fish and Wildlife Office

Honolulu District
U.S. Army Corps of Engineers

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3a. (cont.) Draft EFH Evaluation

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3a. (cont.) Draft EFH Evaluation

1. Introduction

The Emergency Shoreline Protection Project at East Hagatna is being developed as a cost-shared effort between the Honolulu District, U.S. Army Corps of Engineers (USACE) and the Government of Guam, represented by the Guam Department of Public Works (DPW). This emergency shoreline protection feasibility study is authorized under Section 14 of the Flood Control Act of 1946 (Public Law 79-525), as amended. The project will provide emergency shoreline protection from coastal erosion to South Marine Corps Drive and public utilities in the area. The project area includes the west central coast of Guam in Hagatna Bay, east of the capital of Hagatna along South Marine Corps Drive and Trinchera Beach Park.

Note that while the project will take place on Guam, due to the location of USACE staff in Alaska and Hawaii, dates throughout the Integrated Feasibility Report and Environment Assessment, including appendices, are given for Hawaii standard time, not Guam time.

Approximately 2,100 feet (ft) of South Marine Corps Drive is at imminent risk of failure due to storm surge and wave attack. An existing seawall constructed between the shoreline and the main thoroughfare in the study area is threatened by shoreline erosion and is experiencing severe undercutting, leaving South Marine Corps Drive vulnerable to increased future damage. The proposed project consists of replacing approximately 2,100 linear ft of existing, compromised seawall with a rock revetment. The top crest elevation needed for the design to meet the USACE 50-year design requirement for sea level change (SLC) and be adaptable to 100-year SLC under the intermediate scenario is 9ft above Mean Sea Level (MSL), approximately 1 ft higher than the existing seawall. The revetment will be approximately 17 ft wide, constructed parallel to the shoreline and extending seaward.

To that end, USACE has prepared a Draft Integrated Feasibility Report and NEPA Document (IFR/NEPA) for the East Hagatna, Guam - Continuing Authorities Program (CAP), Section 14 Emergency Shoreline Protection project (Proposed Action/Federal Action) pursuant to Engineering Regulation 1105-2-100 and the National Environmental Policy Act (NEPA). The IFR/NEPA identifies, evaluates, and discloses all impacts that would result from the implementation of either of several potential alternatives, including the “No Action” alternative (i.e., Future Without Project Condition, modelled under 50 years of different climate change projections), designed to provide emergency shoreline protection within the study area.

The purpose of this Evaluation is to address the effect of the East Hagatna Emergency Shoreline Protection Project on Essential Fish Habitat established under the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended (16 U.S.C. ch. 38 § 1801 et seq.).

Early coordination and pre-consultation with National Marine Fisheries Service (NMFS), on essential fish habitat was conducted during a coordination workshop with NMFS,

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National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), United States Environmental Protection Agency (USEPA); and Guam Division of Aquatic and Wildlife Resources (GDAWR) on 14 June 2022 (HST).

1.1 Project Purpose and Need

The purpose of the Proposed Project is to replace the existing, compromised seawall with a rock revetment along approximately 2,100 linear ft of shoreline along South Marine Corps Drive in East Hagatna, Guam.

Guam is in an area of the Pacific Ocean that has a high risk for tropical storms and typhoons, and the low-lying coastline of East Hagatna is subject to frequent storm wave attack. Large storm events and associated high waves and storm surge has caused significant erosion, undermining the existing seawall. The existing seawall is not anchored into the limestone foundation and instead, sits atop the ground surface, leaving it vulnerable to wave attack. Continual undermining of the seawall has put South Marine Corps Drive and public utilities in the immediate vicinity of the study area at imminent risk of damage. In some places, less than 20 ft of shoreline separates the road from the beach. Future sea level rise will continue to exacerbate this condition and accelerate the rate of erosion and damage.

South Marine Corps Drive is a major arterial roadway that extends approximately 22 miles from Andersen Air Force Base in Yigo on the northeastern corner of the island down to Naval Base Guam in Santa Rita in the central western area of the island. Both military bases play a vital role in regional and national security. Closure of South Marine Corps Drive or significant traffic delays would result in impacts to the U.S. Military's ability to prepare for and respond to a crisis in the region.

Additionally, South Marine Corps Drive connects numerous island villages on the west side of the island including the capital city of Hagatna. Guam Department of Public Works traffic counts indicate an average of 51,000 vehicles pass through the section of road at risk daily. Damage to the road and public utilities beneath it would delay the southern villages' access to essential services such as hospitals and emergency responders, thereby resulting in health and safety risks, as well as a significant disruption to Guam's economy.

The most critical problem in the study area is the imminent failure of an existing seawall that would leave South Marine Corps Drive subject to heavy damage from storm surge and wave attack. Figures 1 to 3, captured by USACE Project Delivery Team (PDT) members on a site visit in January 2022, show the existing condition of the wall along Trinchera Beach and Veteran's Sunset Beach Park in the study area. The greatest damage to the existing seawall is along Veteran's Sunset Beach Park, where some sections of wall are undercut by up to 2 ft of seawater. This undercutting is already causing the seawall to crack and undermine the structural integrity of the seawall. Figure 3 shows the rocks and concrete skirt eroding out of the seawall on the eastern edge of Veteran's Sunset Beach Park. The western access staircase is in danger of collapsing into the ocean. Erosion has also dislodged some of the larger rocks from the seawall, especially on the eastern end of Veteran's Sunset Beach Park (USACE 2022a).

Figure 1: Existing seawall on eastern edge of Veteran's Sunset Beach Park, facing southwest (USACE 2022a). The beach has eroded below the rocks and concrete skirt, causing the seawall to crack, and undermining its structural integrity.

Figure 2: Existing seawall at Trinchera Beach Park, facing northeast (USACE 2022a)

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Figure 3: Close up view facing south of the undercut Hagatna Bay seawall (USACE 2022a)

If the existing seawall fails, South Marine Corps Drive and associated public utilities will be subject to more frequent and severe storm damage as the shoreline in the study area continues to erode. This will be exacerbated by long-term sea level rise. Heavy damage to the South Marine Corps Drive may necessitate road closure or relocation. This would result in economic loss and the potential for decreased public and emergency service provision for people who depend on the road. Without federal intervention, it is assumed that the Government of Guam will bear the full burden of protecting South Marine Corps Drive. They will be fiscally impacted by this responsibility and will likely need to repair or replace failing sections of wall in a piecemeal approach.

USACE has developed potential alternative plans for shoreline stabilization over a 50-year period of analysis (2026-2076) by identifying coastal hazards and potential structural shoreline stabilization management measures within the study area affected by coastal erosion and future changes to sea level.

USACE and the Guam DPW evaluated the results of the feasibility study and recommend Alternative 2: Rock Revetment: replacing approximately 2,100 linear ft of existing, compromised seawall with a 17 ft wide rock revetment. The revetment crest elevation of 9 ft above mean sea level (MSL) meets the USACE 50-year design requirement for sea level change (SLC) and is adaptable to 100-year SLC under the intermediate scenario at 9 ft above MSL. This alternative is considered most practicable with respect to real estate considerations, costs, and logistics as the Tentatively Selected Plan (TSP) and has been tentatively identified as the Least Environmentally Damaging Practicable Alternative and is carried forward for analysis to either confirm the TSP as the recommended plan or select a different alternative. While maximizing net benefits, it has anticipated positive impacts on nearshore water quality (e.g., by

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minimizing future coastal erosion) and is supported by the Guam Government. The Guam Government supports Alternative 2 as the TSP.

The proposed Action and Action Area for this project will include an area of permanent impact required for placement of the rock revetment and an area of temporary impact for access, construction, and staging areas (COSA). These are described in detail in Section 2. Section 3 describes the listed species and habitats that could be potentially affected by the proposed Project activities, as well as an analysis of effects of the proposed Action on these species and habitats. Section 4 provides a description of the environmental baseline conditions. Section 5 provides a summary of overall effects of the proposed Action and Section 6 includes a discussion of potential cumulative effects. Section 2.2 summarizes the measures and best management practices (BMPs) that would be used to avoid and minimize impacts to the natural resources. Preparation and implementation of these BMPs would reduce the potential construction-related water quality impacts to a less-than-significant level. With implementation of these best management practices, the extent of impacts from the proposed Action are expected to be less than significant.

2. Description of the Proposed Action and Action Area

2.1 Description of the Proposed Action

This Proposed Action is the construction of a 2100 ft long by 17 ft wide (approximately 35,700 ft^2 or 0.82 acres) rock revetment (Figure 4) along the coast at East Hagatna.

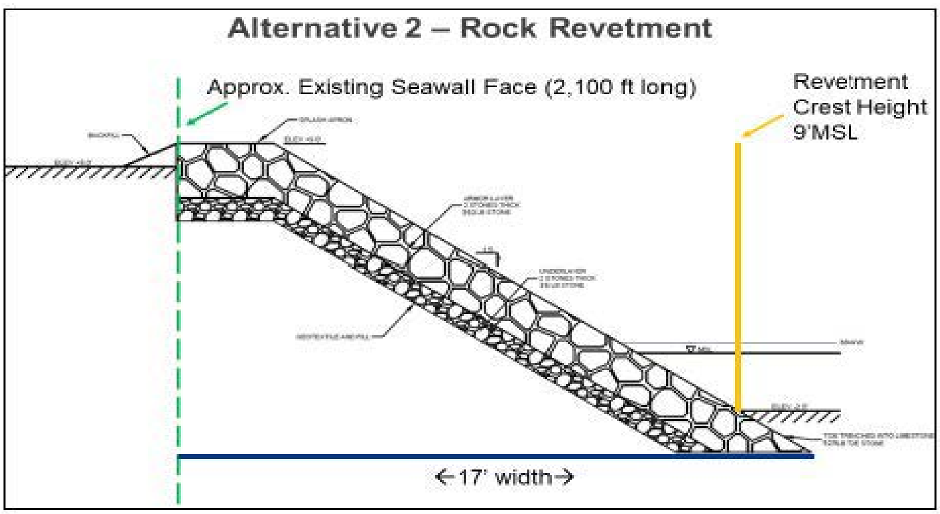

Figure 4: Alternative 2 - Rock Revetment

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The base of the revetment would extend 17 feet toward the ocean from the crest of the existing seawall. The toe of the revetment would be anchored in the limestone. The revetment installation would begin with construction at the toe (-2.5 ft. MSL) and up to the crest elevation (+9ft. MSL), just 1 foot above the current highest point of 8 feet (Figure 4). The present assumption is the revetment could be constructed from the land during low tide without in-water construction. To seat the toe a small trench will need to be dug into the underlying limestone. Excavation, grading, structure demolition, tree and foliage removal, staging, and upland buffer areas are expected to increase the total project footprint to 1.45 ac.

Revetments are a type of "hard" sloping coastal engineering structure that runs parallel to the shoreline to protect landward areas and infrastructure from waves, tides, currents, and storm surge (water build up above the average tide level). They can be used in areas exposed to both high and low wave energy.

The major components of the proposed revetment are the rock armor layer, filter, and toe (Figure 4). The rock armor layer is an erosion resistant material that dissipates the energy of storm waves, prevents further recession of the backshore, and provides basic protection against wave action. The filter layer supports the rock, provides for the passage of water through the structure, and prevents the underlying soil from being washed through the armor. The buried toe prevents displacement of the seaward edge of the revetment. Revetments can be constructed as carefully designed engineered structures protecting long lengths of shoreline with some permeability allowing for increased wave dissipation in the interstices of the revetment in comparison to non-permeable structures such as concrete seawalls that reflect and can accelerate wave energy radially.

2.1.1 Alternative Analysis

Relocation of the road was considered but

Soft engineering strategies (i.e., natural, and nature-based measures) such as vegetation barriers and use of beach fill were considered as potential solutions early in the planning phase of this project. However, these solutions would not be effective in reducing the effects of coastal storm damages in the proposed Action Area. Due to the high wave energy environment in the Action Area, vegetation alone

Revetments are generally considered to cause less damage to the environment than other types of structures, like vertical seawalls, because they are less prone to wave flanking and limit interference with natural sediment processes, thereby maintaining coastal stability while still allowing some natural coastal processes to occur. Natural shoreline erosion supplies adjacent stretches of coastline with sediment, through longshore sediment transport. Burial of the toe of the revetment maintains an area of shoreline sediment to participate in natural sediment transport processes.

Sloping revetments are more effective at dissipating wave energy and less subject to significant loadings because of wave impact. Smooth, vertical seawalls are the least effective at dissipating wave energy; instead, the structures reflect wave energy seawards. Reflection creates turbulence, capable of suspending sediments (Bush et al. 2004), thus making them more susceptible to erosion. The problems of wave reflection and scour can be reduced to some degree by incorporating slopes and irregular surfaces such as tribar into the structure design. Slopes encourage wave breaking and therefore energy dissipation while irregular surfaces scatter the direction of wave reflection (French 2001). Pilarczyk (1990) recommends the use of maximum seawall slopes of 1:3 to minimize scour due to wave reflection. The proposed slope of the tribar revetment is 1:1.5. Scour at the foot of a sloped revetment is less of concern than at the base of a vertical seawall.

Revetments are less susceptible to erosive forces that occur in front of the structure. Seawalls, while effective at preventing erosion of the land area behind the wall, often do not stop erosion in front of the structure which affects localized sediment availability (French 2001). As a result, seawall maintenance costs can be high (Pilarczyk 1990).

The revetment is comprised of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of underlayer stone, a double layer of armor stone, and anchoring by an oversized toe stone. At the specified 1.5H/1V slope, the revetment is expected to be 17 feet wide, extending towards the ocean, with a crest elevation of +9 ft MSL. Depending on the cost and local availability of material, this revetment could be capped with either a two-stone layer of 200 lb. armor stones or pre-cast concrete armor units. This design will meet USACE coastal engineering criteria for expected design life and adaptability to RSLC. The expected design life of this system, assuming proper installation and routine maintenance, is on the order of 50 years.

2.3 Conservation Measures

The following avoidance, minimization, and conservation measures would reduce the effects to habitats and species to less than a significant level. Incorporation of a toe at the foot of the revetment will increase the useful life of the structure. In turn, this longevity will help reduce future impacts to the beach and reef due to maintenance and repair work.

2.3.1 Species Protections

Shoreline work will be done during low tide and equipment will be operated from the upland area to minimize in water work. Construction will cease under unusual conditions such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.

Construction will be scheduled for time periods which minimize conflicts with the recruitment and traditional harvest of culturally-significant reef fishes (manahac), the presence of foraging migratory birds on the inner reef flat, or peak coral spawning season (June 1 to September 30), if practicable.

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Sensitive resource areas, such as corals, coral reefs and seagrass beds known to occur within a project area will be identified on project figures. Project staff will be instructed to avoid the sensitive resource areas to the greatest extent practicable, flagging the areas if appropriate, and securing all in-water equipment in a manner that will prevent the equipment from being dragged across the substrate.

Holes that might be left open overnight will be sealed each night with plywood, soil or other materials to prevent entrapment of reptiles, amphibians and small mammals.

Constant vigilance will be kept for the presence of ESA-listed marine species (sea turtles, marine mammals, sharks, rays) during all aspects of the proposed action. Competent trained observers will be designated to survey the areas adjacent to the action area for ESA-listed marine species. The competent observer will not be simultaneously engaged in any other activity.

Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one half hour. Additional periodic surveys throughout the work day are strongly recommended.

All work shall be postponed or halted when ESA-listed marine species are within 50 meters (54.7 yards, 164 feet) of the proposed work, and will only begin/resume after the animals have voluntarily departed the area.

If ESA-listed marine species are noticed within 50 meters (54.7 yards, 164 feet) after work has already begun, that work may continue only if, in the best judgement of a biologist, the activity will not adversely affect (i.e. disturb or harm) the animal(s).

Project-related personnel shall NOT conduct activities resulting in a take of an ESA-listed species, a species proposed for listing, or listed or proposed critical habitat. "Take" as defined under the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct". Activities that would qualify as take include attempting to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species.

Sensitive resource areas, such as corals, coral reefs and seagrass beds known to occur within a project area must be identified on project figures. Project staff must be instructed to avoid the sensitive resource areas to the greatest extent practicable, including avoiding anchoring in these areas, flagging the areas if appropriate, and securing all in-water equipment in a manner that will prevent the equipment from being dragged across the substrate.

Before any equipment or material enters the water, a site manager will verify that no ESA-listed marine animals are in the area where the equipment or materials are expected to contact the substrate.

Equipment operators will employ "soft starts" when initiating work each day and after each break of 30 minutes or more that directly impacts the bottom. Buckets and other equipment will be sent to the bottom in a slow and controlled manner for the first several cycles before achieving full operational impact strength or tempo. All objects lowered to

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the bottom will be lowered in a controlled manner. This can be achieved by the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.

In-water excavation and movement of large armor stones will not be undertaken if any ESA-listed marine animals are within 50 meters (54.7 yards, 164 feet) of the authorized work, and those operations will immediately shut-down if an ESA-listed marine animal enters within 50 meters (54.7 yards, 164 feet) of the authorized work. This condition is intended to ensure that no ESA-listed marine animals are exposed to sound levels anywhere near the TTS threshold isopleths.

The site of excavation or discharge will contain no known forage or resting habitat for ESA-listed marine species.

Observer logs. All non-take interactions with listed species (e.g. a species entering the shut-down zone and work is shut down correctly) must be documented and reported to the Corps and NMFS in monitoring logs (Table 2 in Appendix B of PacSLOPES 2022). Monitoring logs shall be completed daily. If no ESA-listed species are observed, the observer will record "0" in the daily report. All monitoring logs must be submitted to the NMFS within 90 calendar days of the completion of the project. The Corps will provide final reports to NMFS as part of the annual report. The monitoring logs will be submitted in a digital and queryable database to the NMFS reporting contact, and include:

1. total hours and dates of monitoring

2. identification of which ESA species were observed and in what location and circumstances, including date, numbers of individuals of species observed, the outcome of the species observance relative to the authorized project, and any factors which may have affected visibility,

3. if applicable, observed ESA species behaviors and movement types relative to the project activity at time of observation

If an ESA-listed species is adversely affected as a result of the project, all work must stop until coordination with the Corps and NMFS has been completed. If observers become aware of any injured, sick, or dead marine mammal or turtle (whether or not it may be related to the proposed action), they will immediately call the NOAA Statewide Hawaii Marine Wildlife Hotline at 888-256-9840. As described in Pac-SLOPES 2022.

2.3.2 Pollution Prevention

A pollution control plan for the project site and adjacent areas will be prepared and implemented and at a minimum will include:

- Proper installation and maintenance of equipment diapers, or drip pans.
- A contingency plan to control and clean spilled petroleum products, hydraulic leaks, and other toxic materials.

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- Appropriate materials to contain and clean potential spills will be stored at the work site and be readily available.
- All project-related materials and equipment placed in the water will be free of pollutants.
- Daily pre-work inspections of heavy equipment and vessels for cleanliness and leaks, with all heavy equipment operations and vessel use postponed or halted until leaks are repaired and equipment is cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 50 feet (15 meters) away from the water, preferably over an impervious surface.
- All construction discharge water (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) must be treated before discharge.
- Debris and other wastes will be prevented from entering or remaining in the marine environment during the project.

Fueling, lubrication, maintenance, storage, and staging of vehicles and equipment will not result in a discharge to any waters of the state, and will be located outside of waters of the United States in areas where accidental spills will not enter or affect such waters. All fueling of equipment will be done more than 50 feet from open water. All construction equipment will be properly tuned and maintained prior to and for the duration of onsite operations. The equipment will be checked by a certified mechanic and determine to be running in proper condition before it is operated. If construction related materials reach surface waters, appropriate spill response procedures would be initiated as soon as the incident is discovered. In addition, the Guam EPA will be notified via email and telephone within twenty-four (24) hours of occurrence.

Cover or two feet of free board space will be maintained on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that will be traveling along freeways or major roadways should be covered.

Vehicle speeds on unpaved roads will be limited to 15 miles per hour.

Site access will be treated to a distance of 100 feet from the paved road with a 6 to 12-inch layer of wood chips, mulch, or gravel to reduce generation of road dust and road dust carryout onto public roads.

Idling time will be minimized either by shutting equipment off when not in use or reducing the time of idling to five minutes. Clear signage will be provided that posts this requirement for workers at the entrances to the site.

Drilling and dredging will be restricted to uncontaminated areas, and any associated waste or spoils must be completely isolated and disposed of in an approved upland disposal location.

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2.3.3 Erosion Control

Construction will incorporate best management practices described in the Guam 2017 Erosion and Sediment Control Field Guide, including a stormwater management plan and an erosion control plan.

Appropriate erosion control measures will be incorporated by the construction contractor in order to prevent sediment from entering waterways and to minimize temporary turbidity impacts. Examples include, but are not limited to: straw bales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers. Sediment and erosion control measures will be maintained by the contractor during construction at all times. Control measures will be inspected periodically by the construction contractor, particularly during and after significant rain events.

All deliberately exposed soil or subsoil materials used in the project near water would be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

Silt curtains or other effective containment devices to help contain silt and other suspended particles placed in the water column as a result of excavation and construction activities will be used and properly installed to avoid degradation of adjacent coral reefs, and aquatic vegetation.

Store all dredge spoil behind maintained berms above the influence of the tides.

Temporary access roads and drilling pads must avoid steep slopes, where grade, soil types, or other features suggest a likelihood of excessive erosion or failure; existing access routes must be utilized or improved whenever possible, in lieu of construction of new access routes.

The maximum amount of material placed shall not exceed the minimum needed for erosion protection. All material will be placed in a manner that will avoid erosion by normal or expected high flows.

2.3.4 Habitat Restoration

All tree felling or limbing will be conducted under the supervison of a certified arborist or licensed forester.

All disturbed areas will be immediately stabilized following cessation of activities for any break in work longer than 4 days.

Temporary fills must be removed in their entirety.

All removed trees will be replaced with appropriate species for the particular location. Large trees, greater than 2-inch diameter at breast height, will be used as much as possible based nursery on availability. All areas impacted by construction must be stabilized and revegetated with native species as appropriate. Clearing will be confined to the minimal area necessary to facilitate construction activities, while all bare areas

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will be reseeded and maintained until grass/vegetative cover is established. All areas will be cleaned of any trash and debris and returned, as close as possible, to the condition prior to initiation of project activities.

2.3.5 EFH BMPs

Upon completion of all activities, all project materials shall be removed, and all areas temporarily impacted by construction activities shall be fully restored to their pre-construction conditions.

If anchoring on the seafloor is necessary, then anchors must be placed exclusively in soft sediments. Anchors and anchor components must cause no direct physical impact to corals. Anchor and anchorline footprints of all in-water equipment must be designed to occupy the smallest footprint necessary to achieve safe and effective anchorage.

The construction work plan and all other environmental-compliance related plans i.e., stormwater management, pollution control, must include a contingency planning that details progressive, action-specific, risk-informed responses to faulty equipment, spills, and inadvertent discharges.

If in-water work is required, in-water sediment containment devices must be used to contain project generated turbidity and prevent spread beyond the active work area. Sediment containment devices must be inspected with adequate frequency to minimize potential failure and ensure proper use and installation throughout construction. If a turbid plume is emitted from the enclosure, work must stop until the source is identified and corrected.

2.3 Description of the Study Area and Proposed Action Area

Guam is located in the North Pacific Ocean between the Commonwealth of the Northern Mariana Islands (to the north) and the Federated States of Micronesia (to the south), as shown in the inset map of Figure 5.

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Figure 5: Guam location map with study area

The East Hagatna Emergency Shoreline Protection study area encompasses a 2,100 ft long stretch of Trinchera Beach along Hagatna Bay, which runs parallel to South Marine Corps Drive (also referred to as Highway 1), a main transportation corridor of the island. In some places, less than 20 ft of shoreline separates the road from the beach. The project extent is bounded on the western end by a strip mall parking lot that has an access ramp through the seawall down to the beach, and centers on the Veteran's Sunset Beach Park. Upland of the eastern extent of the project area is the Antonio B. Won Pat International Airport.

The study area includes 2,100 linear ft of existing seawall situated parallel to and between the Hagatna Bay shoreline and South Marine Corps Drive (Figure 5). The project footprint may extend as far as 20 ft seaward from the existing seawall, 30 ft inland of the existing seawall, and 5 ft down into the limestone subgrade. The existing seawall height ranges from approximately 7.5 to 8.9 ft above MSL and is composed of large volcanic rocks cemented together, likely built after a 1993 USACE feasibility study

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for the project area. The study area encompasses the ESA Action Area within which USACE is evaluating the effects of the proposed action on ESA listed species and designated critical habitat.

Figure 6: Approximate extent of the project area along Hagatna Bay.

Hagatna Bay is surrounded by dense residential, commercial, and military development. The low-lying shoreline is bounded to the south by a high cliff inland of South Marine Corps Drive. A strip of small commercial establishments is located between South Marine Corps Drive and the cliff (USACE 1993).

The ESA Action Area is 30 feet inland from the existing seawall to 20 feet seaward of the existing seawall, as depicted in Figure 7 and includes on staging area on an existing parking lot. The habitat within the Action Area is a narrow, highly variable intertidal strand of sand, coral rubble, gravel, and rock, supporting no obvious aquatic communities. NMFS surveys in November 2022 confirmed previous observations (USFWS 1992, NOAA 2005) that the intertidal region within 20 ft of the wall is predominantly sand and does not contain live coral, other macroinvertebrates, seagrasses or fish. Sparse seagrass, macroalgae and fish occur beyond 20 ft. from the existing seawall where the depth reaches 1 ft. The depth is shallow, approximately 1 foot, for several hundred ft from the existing seawall (NMFS 2023).

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Figure 7: Proposed Project Action Area: The proposed active construction and staging area are indicated in black. The project area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. Rock Revetment Footprint. Redline indicates mean lower low water (MLLW), green line indicates mean sea level (MSL), blue line indicates mean higher high water (MHHW). Figure by Catie Dillon, May 31, 2022.

Because work will occur in the water, it has the potential to impact the following ESA-listed species that occur in the area: Central West Pacific Green Turtle (*Chelonia mydas*), Hawksbill Turtle (*Eretmochelys imbricata*), the coral *Acropora globiceps,* and their habitat. The endangered Mariana Fruit Bat *(Pteropus mariannus mariannus)* has been observed passing through the upland area where work will also occur.

Table 1: Proposed Action Area Dimensions

Impact	Area	Height	Width	Length	Surface Area
Permanent	Beach/Intertidal Construction Area	10 ft	17 ft	2100 ft	0.82 ac
Temporary	Intertidal Toe Trenching	-2.5 ft	3 ft	2100 ft	0.14 ac
Temporary	Upland Backfill and Staging Area	10 ft	30 -50 ft	2100 ft	1.45 ac

3. Essential Fish Habitat in the Action Area

The water column from the shoreline to EEZ, and from the surface to 1000 m and all bottom habitat from the shoreline to a depth of 400 m (200 fm) around the islands of

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Guam are designated as EFH by the Western Pacific Fishery Management Council and NMFS and support various life stages for the management unit species (MUS) identified under the Mariana Bottomfish Fishery Ecosystem Plan. The MUS and life stages found in these waters include eggs, larvae, juveniles, and adults of American Samoa Bottomfish and Pelagic Fisheries (WPFMC 2009).The NMFS EFH Mapper was accessed on April 19, 2022 for the area within and surrounding East Hagatna Harbor. While Hagatna Bay is part of the Guam Bottomfish EFH and Mariana Islands Coral Reef Ecosystem EFH, it does not contain any Habitat Areas of Particular Concern (HAPC) or EFH Areas Protected from Fishing (EFHA) (Figure 6).

Guam bottomfish management unit species (MUS) means the following fish:

Local name	Common name	Scientific name
lehi/maroobw	red snapper, silvermouth	*Aphareus rutilans*
tarakitu/etam	giant trevally, jack	*Caranx ignobilis*
tarakiton attelong, orong	black trevally, jack	*Caranx lugubris*
bueli, bwele	lunartail grouper	*Variola louti*
buninas agaga', falaghal moroobw	red snapper	*Etelis carbunculus*
abuninas, taighulupegh	red snapper	*Etelis coruscans*
mafuti, atigh	redgill emperor	*Lethrinus rubrioperculatus*
funai, saas	blueline snapper	*Lutjanus kasmira*
buninas, falaghal-maroobw	yellowtail snapper	*Pristipomoides auricilla*
buninas, pakapaka, falaghal-maroobw,	pink snapper	*Pristipomoides filamentosus*
buninas, falaghal-maroobw	yelloweye snapper	*Pristipomoides flavipinnis*
	pink snapper	*Pristipomoides seiboldii*
buninas rayao amariyu, falaghal-maroobw	flower snapper	*Pristipomoides zonatus*

EFH for the Marianas FEP extends through the water column from the shoreline to EEZ, and from the surface to 1000 m deep and includes all bottom habitat from the shoreline to a depth of 400 m (200 fm) (WPFMC 2018).

In terms of substrate EFH, soft beach substrate that is periodically covered by normal high tide is the primary habitat type and comprises approximately 67% of the of the proposed Action Area (includes unconsolidated sediments, e.g., sandy beach, rubble, and scattered boulders). Seaward of the project footprint, beyond the intertidal zone is a reef flat comprised of healthy coral reef. The reef flat is characterized by water depth of approximately 0.1 - 2 m over primarily Hard Bottom Pavement with smaller areas of Mixed Habitat Structure consisting of Scattered Coral Rock in Unconsolidated Sediment. Habitat Complexity at the reef flat was low with relief generally less than 1 m. The nearest live coral colony is approximately 27 m away from the edge of runway cement and approximately 10 m outside of the proposed Action Area. Specific habitats considered as EFH are listed in Table 3.

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Table 2: Bottom Habitat and Ecosystems of the Guam Bottomfish EFH within the EFH Action Area

Bottom Habitat/Ecosystem	Present in EFH Action Area
intertidal	Yes
mangrove forest	No
seagrass bed	No
coral reef	Yes
deep reef slopes, banks, and seamounts	No
deep ocean and pelagic ecosystems	No

There are intertidal and coral reef bottom habitats within the EFH Action Area. There are no mangrove forest, seagrasses, deep reef slopes, banks and seamounts, deep ocean, or pelagic ecosystems occurring within the EFH Action Area. These EFH habitats are not discussed or considered further in this analysis.

4.0 Potential Impacts

Based on the known locations of sensitive species and habitat within the study area, the following impact analysis evaluates the potential for impact to ESA species and designated habitat from constructing the Rock Revetment within the ESA Action Area. Compared to other alternatives considered under the feasibility study, implementation of the tribar revetment was tentatively determined to be economically justified, environmentally sound and engineeringly feasible.

Potential vectors for impact per resource are discussed below. BMPs described at Section 2.2 are intended to avoid and/or minimize the following impacts.

4.1 Direct Impacts

4.3 Indirect and long-term physical impacts

4.3.1 Sediment Erosion/Accretion

The rock revetment would be constructed along and maintain the contours of the existing beach profile. Thus, USACE does not anticipate substantial or permanent exacerbation of erosion of soils or loss of topsoil in the long term. The toe of the revetment would be buried with native sediments consistent with the pre-construction conditions.

4.3.2 Discharge of pollutants

Construction activities along the shoreline involving the use of heavy machinery has the potential for inadvertent spills and discharges that may consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids and other toxicants, which could spread into the marine environment and expose protected species to toxic chemicals. Oil globules can adhere to coral tissue and soluble oil components can be absorbed from the water column by coral polyps (Van Dam 2011). Effects on coral

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colonies include mortality, tissue death, reduced growth, impaired reproduction, bleaching, reduced photosynthetic rates, and decreased cellular lipid content which is correlated with coral fitness. Spills occurring near or at peak reproductive season (e.g., summer spawning months for most jurisdictions in the Western Pacific Region) could adversely affect an entire year of reproductive effort because coral gametes and eggs are buoyant, potentially bringing them into direct contact with floating oil. Chemical spills into the ocean can also indirectly impact sea turtles by affecting mobility and respiration and by degrading the turtles' food source.

Site preparation and excavation of the revetment footprint could result in indirect impacts to protected resources through the inadvertent exposure or discharge of excavated native subsurface soil and sediments into tidally influenced areas. Release of terrigenous sediments such as silt, clay and organic matter can elevate turbidity levels within and beyond the ESA Action Area through ocean circulation. These fine grain sediments are more easily suspended and take longer to settle out than coarse grain sand and cobble which settles almost immediately. The impact of sedimentation or settling of sediments on coral reefs, depends upon the thickness of the sediment layer and duration of coverage resulting in reduced photosynthesis and diverting energy away from lifecycle activities to sloughing and mucous production and on the extreme end, bleaching and death. Death of native biota can be followed by opportunistic proliferation of invasive species disrupting the balanced ecosystem. Elevated turbidity for extended periods of time reduces solar irradiation affecting photosynthetic organisms and can reduce visibility in the water column for visual foragers and increase vulnerability of prey.

In addition to the BMPs listed at Section 2.2, implementation of the following BMPs could avoid and/or minimize the aforementioned indirect impacts:

- Project operations must be planned to accommodate weather and ocean forecasts. Operations must cease under unusual conditions, such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.
  - Rationale: Adverse weather and wave conditions facilitate conveyance of land-based pollutants with the marine environment, increasing potential for inadvertent spills or damage to sediment-erosion control measures. These measures would minimize the potential for indirect impacts associated with pollutant releases into the ocean.
- The Contractor must designate on-site personnel responsible for ensuring no inadvertent discharges of debris, petroleum, or other harmful materials into the water.
  - Rationale: This BMP emphasizes on-site responsibility to avoid inadvertent discharges of pollutants to the ocean to avoid indirect impacts to protected resources.

Through best management practices, hydrocarbons would not affect any listed species during construction. No dive boats or other seacraft will be used, so no hydrocarbon

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spills occurring from these sources would occur. No refuse or matter of any kind (including trash, garbage, oil, and other liquid pollutants) would be discharged because of project activities.

5.0 Effects Determination and Conclusions

In terms of EFH, an effect is adverse if the impact reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. The Corps has considered the potential for adverse effects resulting from the proposed action and anticipates impacts to be minimal--temporary and limited to the intertidal zone (between high and low tide mark) and immediately adjacent shallow-water habitats. Through implementation of the project BMPs, the proposed action would not reduce the quantity of EFH and would minimially affect the quality of EFH. **Accordingly, the Corps has determined that the proposed action may adversely affect EFH, but does not have the potential to cause substantial adverse effects.**

6. Cumulative Effects

Cumulative effects 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 Section 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The potential for cumulative impacts to the environment from the proposed action was evaluated by reviewing other projects and activities in the vicinity of the East Hagatna seawall that could directly or secondarily affect the same environmental resources as the proposed action. The analysis generally includes actions that were recently completed, are currently underway, or are programmed to occur in the foreseeable future, and are directly related to coastal shoreline protection, are located within or proximate to the proposed measure sites and/or would directly or secondarily affect resources in Hagatna Bay. Based on a review of the related actions, this analysis incorporates the following past projects and activities:

- Agana Small Boat Harbor O&M breakwater repair and dredging
- Hagatna (Agana) River Flood Risk Management Project. This project was terminated in 2022.

The effects of these actions were considered in combination with the degree and timing of the potential adverse and beneficial effects of the proposed alternatives to determine the types and significance of potential cumulative effects on ESA listed species. For this analysis, implementation of the project is considered cumulatively significant if, in concert with other past, present, or reasonably foreseeable future actions, it would exacerbate the declining status of an identified resource (a resource that is already

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adversely affected) or create a condition in which an effect is initially minor but is part of an irreversible declining trend.

7.0 Conclusions

In conclusion, USACE has determined the following for the Proposed Action:

- The proposed Project is not likely to adversely affect any EFH, the project has the potential to have minimal, temporary effects on EFH, but by following the proposed avoidance and minimization measures as described, the proposed Action would not be likely to adversely affect EFH. As described above, the effects of this project will be temporary and restricted to a confined area of coastline. In water-work would not be expected to be conducted and all practical means to work from the landward side of the project site will be considered so that impacts to EFH are avoided.

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3b. NMFS Concurrence Letter**

Attachment 4. CWA Consultation

4a. CWA Section 404(b)(1) evaluation

Section 404(b)(1) Clean Water Act 40 CFR Part 230

Evaluation of the Effects of Discharge of Dredged or Fill Materials into the Waters of the United States

East Hagåtña Continuing Authorities Program (CAP) Section 14 Emergency Shoreline Protection

Hagåtña, Guam

I. **PROJECT DESCRIPTION**

The following is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (CWA) (Public Law 95-217, 33 U.S.C. § 1251 et seq.). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredge or fill material into the waters of the United States (WOTUS). As such, it is not meant to stand-alone and relies heavily upon information provided in the environmental document to which it is attached, the East Hagåtña, Guam CAP Section 14 Emergency Shoreline Protection Integrated Feasibility Report and Environmental Assessment (IFR/EA).

The project will provide emergency shoreline protection from coastal erosion to South Marine Corps Drive and public utilities in the area. The project area includes the west central coast of Guam in Hagåtña Bay, east of the capital of Hagåtña along South Marine Corps Drive and Trinchera Beach Park. Under the Recommended Plan, 2,100 feet of existing seawall would be replaced with a rock revetment (Figure 1). The base of the revetment would extend 17 feet toward the ocean from the crest of the existing seawall. The toe of the revetment would be anchored in the limestone. The revetment installation would begin with construction at the toe (approximately -2.5 ft. MSL) and up to the crest elevation (approximately +9ft. MSL), 1 foot above the current highest estimated point of 8 feet (Figure 2). The present assumption is the revetment could be constructed from the land during low tide without operating from the beach or marine waters. To seat the toe a small trench will need to be dug into the underlying limestone. The footprint provided for the revetment in Figure 1 shows the maximum extent that could be needed for construction. The footprint of the finished revetment is estimated to be 0.82 acres (ac). The direct in-water footprint will vary along the project length with the existing shoreline. Excavation, grading, structure demolition, tree, and foliage removal, staging, and upland buffer areas are expected to increase the total project footprint to 1.45 ac.

4a. (cont.) CWA Section 404(b)(1) evaluation

Figure 1: Proposed Project Area: The proposed active construction and staging area (COSA) are indicated in black. The project area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. Rock Revetment Footprint. Redline indicates mean lower low water (MLLW), green line indicates mean sea level (MSL), blue line indicates mean higher high water (MHHW). Figure by Catie Dillon, May 31, 2022.

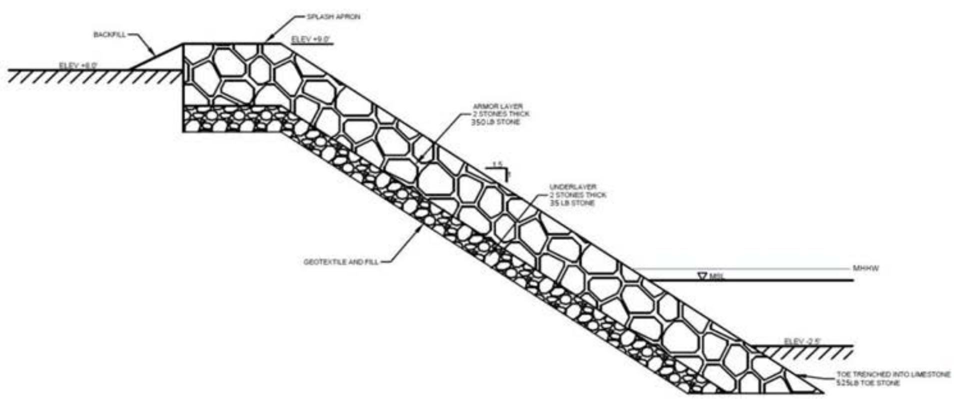

Figure 2: Rock revetment cross section, showing where MSL and MHHW will potentially intersect with the structure. Figure by Catie Dillon, May 31, 2022.

The revetment is comprised of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of underlayer stone, a double layer of armor stone, and anchoring by an oversized toe stone. At the specified 1.5H/1V slope, the revetment is expected to be 17 feet

4a. (cont.) CWA Section 404(b)(1) evaluation

wide, extending towards the ocean, with a crest elevation of +9 ft MSL. Depending on the cost and local availability of material, this revetment could be capped with either a two-stone armor layer or pre-cast concrete armor units. This design will meet USACE coastal engineering criteria for expected design life and adaptability to RSLC. The expected design life of this system (assuming proper installation and routine maintenance) is on the order of 50 years.

A. Authority

Authorization for the East Hagåtña Emergency Shoreline Protection Feasibility Study is provided by Section 14 of the 1946 Flood Control Act, as amended.

This activity is regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA (33 U.S.C § 1344). Section 230.10(a) of the 404(b)(1) guidelines state “an alternative is practicable if it is available and capable of being done after taking into considerations costs, existing technology, and logistics in light of overall project purposes.” Pursuant to the Section 404(b)(1) Guidelines (40 CFR 230), the least environmentally damaging practicable alternative (LEDPA) must be practicable in terms of technology, cost, and logistics in light of overall project purpose, and produce the least environmental damage. Impacts to aquatic and terrestrial habitat would be avoided where possible, minimized where avoidance is not possible, and compensated when they occur. The rock revetment is the only practicable alternative that meets design requirements and CAP 14 funding constraints.

B. General Description of Dredged and Fill Material

Construction of the proposed revetment would involve:

- various sized rock material for the armor stones, underlayer stones, and toe stones
- Excavation of sand and limestone rock to place the toe stone
- Compacted fill as the foundation and base grade layer
- Geotextile fabric on top of the compacted fill
- Installing and removing all mitigation measures

An estimated 5491 cubic yards of various grades of rock material would be used to build the revetment, while approximately 537 cubic yards of fill and 191 cubic yards of excavated sand would be placed to create the foundation and backfill the toe and revetment. The majority of the revetment structure would be placed upland; the lower, seaward portion would extend below the high tide line in most places (see Figure 2; the USACE is using the Mean Higher High Water (MHHW) vertical datum as a reasonable proxy for the high tide line), and therefore constitute a discharge to WOTUS under Section 404 of the CWA.

Armor stone, and other large rock would likely come from a quarry on the island, while fill material may be obtained from onsite or other island sources. Sand excavated during trenching of the structure toe will be used to bury the toe after structure completion.

An estimated 584 cubic yards of material would be excavated from the shoreline of Hagåtña Bay during construction, for placement of the toe. This material is expected to consist primarily

4a. (cont.) CWA Section 404(b)(1) evaluation

of sand and limestone rock. Material that is not used as fill during project construction would be placed at an upland disposal site, as yet to be determined.

C. Description of the Proposed Discharge Site

The floor of Hagåtña Bay in the project area is approximately 2.5 feet of sand over limestone bedrock (Burdick 2005). There are varying amounts of sandy beach present between the existing seawall and the ocean. In some locations toward the eastern end of the project extent, there is approximately 15 feet of beach. In other areas, such as Veteran's Sunset Beach Park, there is no beach at all. Trinchera Beach extends along approximately 3,400 feet of the East Hagåtña shoreline (USACE 1993). The beach material is fine calcareous sand with extensive coral rubble, gravel, and marine debris. Portions of the shoreline are covered almost exclusively with gravel, rocks, rubble, and small limestone boulders. Small sand and alluvial deltas had formed in the vicinities of storm drains and the inner reef flat has a covering of fine sand and silt (USACE 1993). The footprint of the finished revetment is estimated to be 0.82 acres (ac). The direct in-water footprint will vary along the project length with the existing shoreline.

D. Description of Discharge Methods

Preferably, we will be able to do the construction from land at low tide and have no in water construction. Material will be excavated from the shoreline and placed for the revetment using an excavator located on the upland. Fill for the revetment would be placed by excavator and other construction machinery.

II. FACTUAL DETERMINATION

A. Physical Substrate Determinations

Most of the material discharged at the construction site will originate in the construction site. The rock revetment will be coarser than the majority of the existing sandy beach and substrate, replacing 0.82 acres of predominantly sandy substrate with a high-relief rocky substrate.

B. Water Circulation. Fluctuation and Salinity Determinations

The rock revetment would reduce wave energy within and near the area, which will cause localized changes to water circulation along the beach. The rock revetment would protect a portion of the shoreline along Hagåtña Bay from further erosion. No freshwater streams enter the project area and the existing culverts would be extended oceanward with the structure extents, but no noticeable effects on salinity are anticipated.

C. Suspended Particulate/Turbidity Determinations

Guam Environmental Protection Agency reported background turbidity severity in Hagåtña Bay in 2020 and 2021 as none to mild and visibility as 2.5 to 18.5 meters as measured by secchi disk (NWQMC 2022). Excavation is expected to be performed with an excavator operated from the upland area. Construction activities will be confined mainly to the shoreline area with little in-

4a. (cont.) CWA Section 404(b)(1) evaluation

water work. Excavation of materials seaward of the existing seawall will be conducted so as to minimize turbidity. As far as is practicable and feasible, necessary excavations in the intertidal zone will be conducted during low tide conditions to minimize turbidity effects. Construction materials will be relatively free of silt or other fine particulate material. There may be some localized, transient increases in turbidity created by excavation and setting of stones under all structural improvements. No significant long- term effects on water quality are anticipated under any of the project alternatives. Project construction is not expected to have any significant impacts on the marine environment. Any turbidity effects generated by site preparation and placement of stones are expected to be localized and transient: particulates should quickly settle to the bottom or be carried away by wave action and currents. Generation of turbidity will be minimized by avoiding excavation work during periods of high water.

D. Contaminant Determinations

There are no records of chemical contamination in the project area, though World War II era unexploded ordinance are a risk on most accessible shorelines of Guam. Dungca's Beach and Trinchera Beach along East Hagåtña Bay are reported to be impaired for bacteria (GEPA 2020). West Hagåtña Beach, outside the project area, was also reported to be impaired for bacteria (GEPA 2020). Bacterial contamination along the beaches has been attributed to 30 stormwater outfalls (CEPA 1979 and Chan 1977 cited in USACE 1990) which also discharge large amounts of solids and nitrate-nitrogen (Zolan et al. 1978 cited in USACE 1990), wastewater, sewage overflow, and stormwater runoff (GEPA 2020). At low tide, odors are produced from anaerobic conditions and algal growth on storm drain deltas, the largest of which occur off the Naval Air Station drain along Trinchera Beach and the Tamuning drains along Dungca's Beach (USACE 1990). Shoreline algal growth appears to be a natural phenomenon caused by greatly elevated nutrient concentrations in groundwater seepage (USACE 1990).

Care will be exercised to ensure that no contamination of the marine environment results from construction activities. Best management practices will be employed to ensure that no debris, petroleum products or other deleterious material is allowed to fall, flow, leach or otherwise enter the water.

The Clean Water Act Section 404(b)(1) guidelines state, "Dredged or filled material is most likely to be free from chemical, biological, or other pollutants where is composed primarily of sand, gravel, or other naturally occurring inert material. Dredged material so composed is generally found in areas of high current or wave energy..." (40 CFR 230.60). As described in previous sections, the material to be excavated consists of a few feet of wave-driven coarse sand and gravel, on top of much denser formations of weathered bedrock. The USACE determines that the material to be excavated meets the above description from 40 CFR 230.60 and is highly unlikely to have received and retained contaminants.

E Aquatic Ecosystem and Organism Determinations

As described above in Section 1C, the habitat that would be directly impacted by the proposed project is a narrow, highly variable intertidal strand of sand, coral rubble, gravel, and rock, supporting no obvious aquatic communities. A previous survey of the Hagåtña Bay benthic

4a. (cont.) CWA Section 404(b)(1) evaluation

environments (NOAA 2005) found the benthic habitat within several hundred meters of shore consists of uncolonized sand, or sand sparsely colonized by seagrasses. The nearest areas of coral were found well offshore.

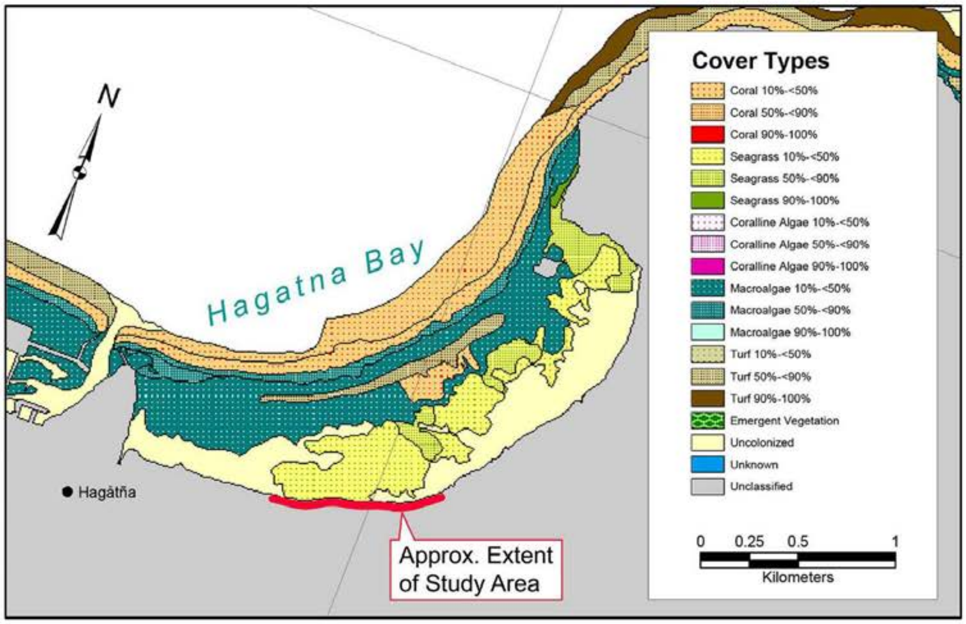

Figure 3. Benthic habitat cover types within Hagåtña Bay (adapted from NOAA 2005).

F. Proposed Discharge Site Determinations

Construction of the rock revetment would replace approximately 0.82 acres of a flat sandy substrate with a high-relief rock substrate. The rock structures would be similar to large boulders and bedrock outcroppings observed on the seafloor near the rocky headland west of the project site (see the Biological Evaluation and Essential Fish Habitat Assessment in Attachment 2a for further descriptions). They would be expected to recruit similar communities of marine algae and invertebrates.

G. Determination of Cumulative Effects on the Aquatic Ecosystem

The construction of the rock revetment may alter the local ecosystem in the long term, although not necessarily in a negative way. The rocky substrate should support new communities of aquatic organisms not currently found along Trinchera Beach, but similar to those found in nearby rocky coastal habitat.

4a. (cont.) CWA Section 404(b)(1) evaluation

III. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

A. Adaptation of the Section 404(b)(l) Guidelines to this Evaluation

The proposed project complies with the requirements outlined in the Environmental Protection Agency's Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic

If the excavated material is suitable for the purpose, some of it may be used in project construction. All other material will be disposed of in an as yet to be determined upland site.

C. Compliance with Applicable State Water Quality Standards

The proposed project will not lead to exceedances of applicable Guam water quality standards.

D. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 Of the Clean Water Act

No toxic effluents that would affect water quality parameters are associated with the proposed project. Therefore, the project complies with toxic effluent standards of Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973

The USACE has been in informal consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), under Section 7 of the Endangered Species Act (ESA). The ESA-listed species that have been considered under this study are summarized in Table 1. The USACE has determined that no listed species will be adversely affected by this project (see Appendix 3, Attachment 2a). USFWS and NMFS have/have not concurred.

Table 1. ESA-Listed Species Potentially Affected by the Proposed Action

Species Common Name	Listed Population	ESA Status	USACE Determination of Effect	Critical Habitat Adversely Modified?	Agency Jurisdiction
Mariana Fruit Bat		Endangered	Not likely to adversely affect	No	USFWS
Coral Acropora globiceps		Threatened	Not likely to adversely affect	No	NMFS
Green Sea Turtle	Central West Pacific	Endangered	Not likely to adversely affect	No	NMFS in water USFWS on shore

4a. (cont.) CWA Section 404(b)(1) evaluation

Hawksbill sea turtle		Endangered	Not likely to adversely affect	No	NMFS in water USFWS on shore

F. Evaluation of Extent of Degradation of the Waters of the United States

There are no municipal or private water supplies in the area that could be negatively affected by the proposed project. Commercial interests would benefit from shoreline stabilization. There would be no significant adverse impacts on plankton, fish, shellfish, wildlife, or special aquatic sites.

G. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

Shoreline work will be done during low tide and equipment will be operated from the upland area to minimize in water work. Construction will cease under unusual conditions such as large tidal events and high surf conditions, except for efforts to avoid or minimize resource damage.

Construction will be scheduled for time periods which minimize conflicts with the recruitment and traditional harvest of culturally-significant reef fishes (manahac), the presence of foraging migratory birds on the inner reef flat, or peak coral spawning season (June 1 to September 30), if practicable.

Sensitive resource areas, such as corals, coral reefs and seagrass beds known to occur within a project area will be identified on project figures. Project staff will be instructed to avoid the sensitive resource areas to the greatest extent practicable, including avoiding anchoring in these areas, flagging the areas if appropriate, and securing all in-water equipment in a manner that will prevent the equipment from being dragged across the substrate.

Construction will incorporate best management practices described in the Guam 2017 Erosion and Sediment Control Field Guide. Silt curtains or other effective containment devices to help contain silt and other suspended particles placed in the water column as a result of excavation and construction activities will be used and properly installed to avoid degradation of adjacent coral reefs, and aquatic vegetation. All deliberately exposed soil or subsoil materials used in the project near water would be protected from erosion and stabilized as soon as possible with geotextile filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc. All disturbed areas must be immediately stabilized following cessation of activities for any break in work longer than 4 days.

All project-related materials and equipment placed in the water will be free of pollutants. Debris and other wastes will be prevented from entering or remaining in the marine environment during the project. Excavation will be restricted to uncontaminated areas.

The maximum amount of material placed shall not exceed the minimum needed for erosion protection. All material will be placed in a manner that will avoid erosion by normal or expected high flows.

4a. (cont.) CWA Section 404(b)(1) evaluation

Before any equipment or material enters the water, a site manager shall verify that no ESA-listed marine animals are in the area where the equipment or materials are expected to contact the substrate.

Temporary fills will be removed in their entirety. All areas impacted by construction will be stabilized and revegetated with native species as appropriate. All removed trees will be replaced with appropriate species for the particular location. Large trees, greater than 2-inch diameter at breast height, will be used as much as possible based on nursery availability. Some trees are currently located within the existing wall (i.e. the rock and concrete was poured around the trunk) or are located very close to the wall, where as they grow their roots would begin to interfere with the project's stability. These trees will be will replaced in a location that is more conducive to tree survival and will not interfere with the project's stability. Clearing would be confined to the minimal area necessary to facilitate construction activities, while all bare areas would be reseeded and maintained until grass/vegetative cover is established. All areas will be cleaned of any trash and debris and returned, as close as possible, to the condition prior to initiation of project activities.

H. On the Basis of the Guidelines. the Proposed Disposal Site(s) for the Discharge of Dredged or Fill Material is Specified as complying with the requirements of these guidelines.

4a. (cont.) CWA Section 404(b)(1) evaluation

IV. FINDING OF COMPLIANCE

No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation. The proposed project would 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.

A review of the proposed project indicates that:

1. The discharge represents the least environmentally damaging practicable alternative, and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem.

____X____ Yes ___________No

2. The activity does not appear to (1) violate applicable state water quality standards or effluent standards prohibited under the CWA, or (2) jeopardize the existence of federally listed endangered or threatened species or designated marine sanctuary.

____X____ Yes ___________No

3. 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.

_____X_____ Yes ___________No

4. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

_____X______ Yes ___________No

Note: A negative response indicates that the proposed project does not comply with the guidelines.7. On the basis of the guidelines the proposed disposal site for the discharge of dredged material is specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

4a. (cont.) CWA Section 404(b)(1) evaluation

V. REFERENCES

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National Water Monitoring Council (NWQMC). 2022. Water Quality Data Portal. https://www.waterqualitydata.us/. Accessed 5 July 2022. Organization Identifier: 21Guam. Sites: East Hagåtña Bay Reef Flat, East Hagåtña Bay Seagrass, West Hagåtña Bay Reef Flat, and West Hagåtña Bay Seagrass.

United States Army Corps of Engineers (USACE). 1990. East Agana, Guam, Shore Portection Study.

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4b. CWA Section 401 Water Quality Certification**

Attachment 5. CZMA Consultation

5a. Project Notification to Guam Coastal Management Program

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Edwin Reyes
Administrator, Guam Coastal Management Program
Government of Guam, Bureau of Statistics and Plans
P.O. Box 2950
Hagatna, Guam 96932

Dear Administrator Reyes:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.), as amended, USACE invites the Guam Coastal Management Program (GCMP) to participate in this study and requests any available information regarding resources occurring within the study area. For the purposes of this request, the study area comprises the area within which USACE is considering direct and indirect impacts to protected resources. As more information is gathered, the impact areas relative to each protected resource will be further refined.

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the general public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a cooperating agency and participating agency workshop scheduled for June 9, 2022. We

5a. (cont.) Project Notification to Guam Coastal Management Program

will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations. This letter of request for information from your agency constitutes USACE's scoping request pursuant to NEPA. To reduce redundancy, a separate NEPA scoping letter will not be sent to your office. Any additional comments provided pursuant to NEPA will be fully considered and incorporated into the administrative record.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

5a. (cont.) Project Notification to Guam Coastal Management Program

-3-

Enclosure 1

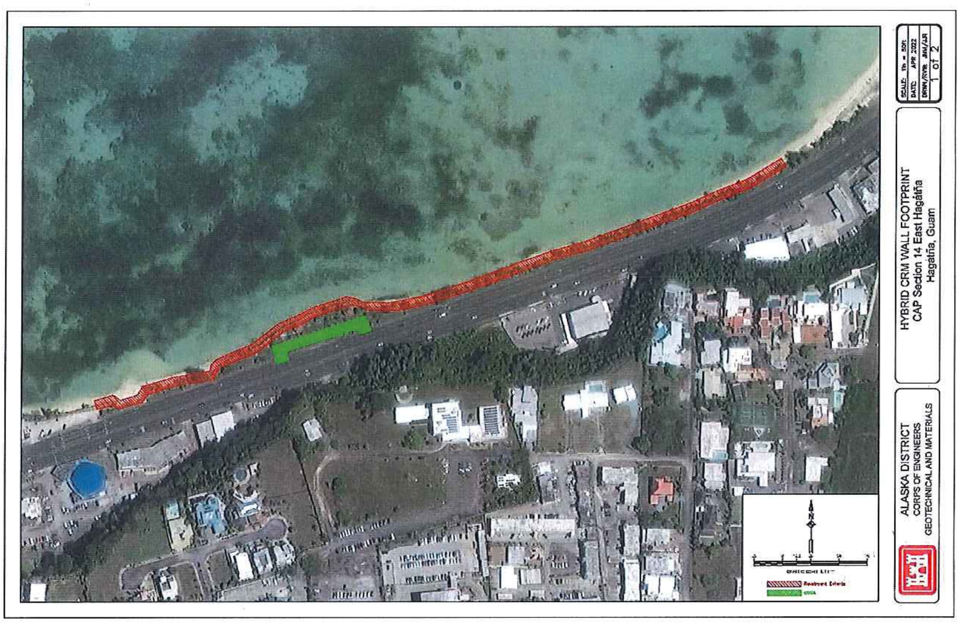

Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

5b. CZMA Federal Consistency Determination

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
230 OTAKE STREET, BUILDING 230
FORT SHAFTER, HAWAII 96858-5440

July 13, 2023

Civil and Public Works Branch
Programs and Project Management Division

Edwin Reyes
Administrator, Guam Coastal Management Program
Government of Guam, Bureau of Statistics and Plans
P.O. Box 2950
Hagatna, Guam 96932

Dear Administrator Reyes,

The Honolulu District, United States Army Corps of Engineers (Corps) is investigating the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam pursuant to Section 14 of the Continuing Authorities Program. In accordance with Section 307(c) of the Coastal Zone Management Act of 1972 (16 USC § 1456) the Corps understands that the proposed development project that may affect coastal uses and/or resources is subject to review by your office, to ensure consistency with the Guam Coastal Zone Management (CZM) Program.

As described during the June 9, 2022, Agency Coordination Workshop, the Corps evaluated measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along South Marine Corps Drive adjacent to Hagatna Bay. Initial measures considered included rock revetment, modified concrete masonry wall, and vertical concrete and sheet piling wall. The Recommended Plan is the Rock Revetment, which may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

The Corps has reviewed the enforceable policies of the Guam Coastal Management Program and determined that based on the described activities have a range of coastal effects, some of which may include reasonably foreseeable effects on coastal uses or resources or direct or indirect environmental benefits and determined that the proposed federal action is consistent, to the maximum extent practicable, with the Guam CZM Program. The Corps seeks your concurrence on this determination. Transmitted with this letter is the Guam CZM Program Assessment and Supplemental Information Form (Enclosure 1) for your review and the draft Integrated Feasibility Report and NEPA Document (Enclosure 2) for your reference.

5b. (cont.) CZMA Federal Consistency Determination

-2-

Should you have any questions or comments, please reference the East Hagatna Emergency Shoreline Protection Project and contact either our Environmental Coordinator, Mrs. Marian Dean at (808) 379-8223 or via email at marian.dean@usace.army.mil or the Project Manager, Mr. Mike Terlaje at 671-727-2491 or via email at michael.j.terlaje@usace.army.mil. Thank you for your cooperation.

Sincerely,

Steven Howard
Acting Chief, Civil and Public Works

Enclosures

5b. (cont.) CZMA Federal Consistency Determination

The GCMP Assessment Format and Supplemental Information Form may be reproduced and submitted along with other required information to the BSP.

GUAM COASTAL MANAGEMENT PROGRAM ASSESSMENT

DATE OF APPLICATION: 13 July 2023

NAME OF APPLICANT: U.S. Army Corps of Engineers (USACE), Honolulu District

ADDRESS: 230 Otake Street, Fort Shafter, HI 96858-5440

TELEPHONE NO. 808-835-4031 Fax No. N/A Cell No: 808-379-8223

E-MAIL ADDRESS: Marian.Dean@usace.army.mil

TITLE OF PROPOSED PROJECT: East Hagatna Emergency Shoreline Protection

COMPLETE FOLLOWING PAGES

FOR BUREAU OF STATISTICS AND PLANS ONLY:

DATE APPLICATION RECEIVED: ____

OCRM NOTIFIED: ____ LIC. AGENCY NOTIFIED: ____

APPLICANT NOTIFIED: ____ PUBLIC NOTICE GIVEN: ____

OTHER AGENCY REVIEW REQUESTED: ____

DETERMINATION:

( ) CONSISTENT ( ) NON-CONSISTENT ( ) FURTHER INFORMATION REQUESTED

OCRM NOTIFIED: ____ LIC. AGENCY NOTIFIED: ____

APPLICANT NOTIFIED: ____

ACTION LOG:

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

DATE REVIEW COMPLETED: ____

East Hagatna Emergency Shoreline Protection Study 1
Guam CMP Assessment and Federal Consistency Supplemental Information Form

5b. (cont.) CZMA Federal Consistency Determination

FEDERAL CONSISTENCY SUPPLEMENTAL INFORMATION FORM

Date: 13 July 2023

Project/Activity Title or Description: East Hagatna Emergency Shoreline Protection

The Recommended Plan is the replacement of 2,100 feet of seawall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E with a Rock Revetment (Figures 1 and 2) which would extend 17 feet toward the ocean from the crest of the existing seawall. The toe of the revetment would be anchored in the limestone. The revetment installation would begin with construction at the toe (-2.5 ft. MSL) and up to the crest elevation (+9ft. MSL), just 1 foot above the current highest point of 8 feet (Figure 2). The present assumption is the revetment could be constructed from the land during low tide without operating from the beach or marine waters. To seat the toe a small trench will need to be dug into the underlying limestone. The footprint provided for the revetment in Figure 1 shows the maximum extent that could be needed for construction. The footprint of the finished revetment is estimated to be 0.82 acres (ac). The direct in-water footprint will vary along the project length with the existing shoreline. Excavation, grading, structure demolition, tree and foliage removal, staging, and upland buffer areas are expected to increase the total project footprint to 1.45 ac.

Figure 1: Proposed Project Area: The proposed active construction and staging area (COSA) along South Marine Corps Drive are indicated in black. Redline indicates mean lower low water (MLLW), green line indicates mean sea level (MSL), blue line indicates mean higher high water (MHHW). USACE, 2022.

East Hagatna Emergency Shoreline Protection Study 2
Guam CMP Assessment and Federal Consistency Supplemental Information Form

5b. (cont.) CZMA Federal Consistency Determination

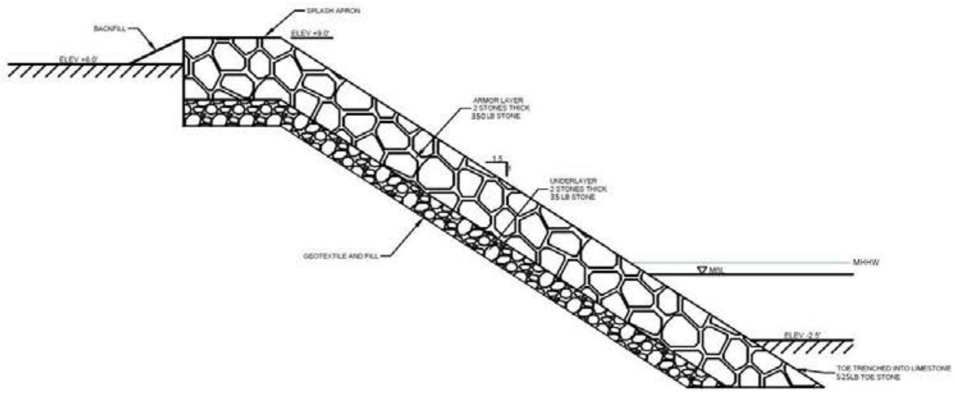

Figure 2: Rock revetment cross section, showing where MSL and MHHW will potentially intersect with the structure. USACE, 2022.

The revetment is comprised of compacted fill as the foundation and base grade, a geotextile filter fabric, a double layer of underlayer stone, a double layer of armor stone, and anchoring by an oversized toe stone. Depending on the cost and local availability of material, this revetment could be capped with either a two-stone armor layer or pre-cast concrete armor units. This design will meet USACE coastal engineering criteria for expected design life and adaptability to RSLC. The expected design life of this system (assuming proper installation and routine maintenance) is on the order of 50 years.

Trinchera Beach extends along approximately 3,400 feet of the East Hagatna shoreline (USACE 1993). The beach material is fine calcareous sand with extensive coral rubble, gravel, and marine debris which varies in width from 15 feet toward the eastern end of the project extent, to no beach at all along Veteran's Sunset Beach Park (PDT 2022). The project will replace approximately 0.82 acres of this shoreline habitat with a rock revetment. The direct in-water footprint will vary along the project length.

Location: 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive

Other applicable area(s) affected, if appropriate:

Up to 17 feet seaward of the wall and 30 feet upland of the wall for the 2100 foot length, see Figure 1

Est. Start Date: 2026 Est. Duration: 12 months

APPLICANT

Name & Title Marian Dean, Environmental Planner

Agency/Organization: U. S. Army Corps of Engineers, Honolulu District

Address 230 Otake Street,

Fort Shafter, HI Zip Code 96858-5440

East Hagatna Emergency Shoreline Protection Study 3
Guam CMP Assessment and Federal Consistency Supplemental Information Form

5b. (cont.) CZMA Federal Consistency Determination

Telephone No. during business hours:

C: 808-379-8223

Fax (____) ____________________

E-mail Address: ___ marian.dean@usace.army.mil ______

AGENT

Name & Title ______________________________________

Agency/Organization Address ______________________________ Zip Code ______________

Telephone No. during business hours:

A/C (___) ____________________

A/C (___) ____________________

Fax (___) ____________________

E-mail Address: _____________________________

CATEGORY OF APPLICATION (check one only)

(X) I - Federal Agency Activity

( ) II - Federal Permit or License

( ) III - Federal Grants & Assistance

TYPE OF STATEMENT (check one only)

(X) Consistency

( ) General Consistency (Category I only)

( ) Negative Determination (Category I only)

( ) Non-Consistency (Category I only)

APPROVING FEDERAL AGENCY (Categories II & III only)

Agency ____

Contact Person ____

Telephone No. during business hours:

Area Code ( ) ______________________________

Area Code ( ) ______________________________

5b. (cont.) CZMA Federal Consistency Determination

FEDERAL AUTHORITY FOR ACTIVITY

Title of Law The 1946 Flood Control Act, as amended (33 USC 701r) for Emergency Shoreline Protection under the Continuing Authorities Program

Section Section 14

OTHER GUAM APPROVALS REQUIRED:

Date of	Agency	Type of Approval	Application Status
2025	Guam EPA	Clean Water Act Section 401 Water Quality Certification	To be submitted after Preconstruction Engineering & Design in 2024 and before start of construction in 2026

5b. (cont.) CZMA Federal Consistency Determination

DEVELOPMENT POLICIES (DP):

DP 1. Shore Area Development

Intent: To ensure environmental and aesthetic compatibility of shore area land uses.

Policy: Only those uses shall be located within the Seashore Reserve which:

- enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- can demonstrate dependence on such a location and the lack of feasible alternative sites.

Discussion: Consistent. The proposed project is located within the Seashore Reserve and is necessary to reduce beach erosion and coastal storm risk along the East Hagatna shoreline. An existing seawall, protecting South Marine Corps Drive and associated landside infrastructure, is in need of repair. The Recommended Plan proposes to replace the damaged seawall to restore protection to the existing development ensures the environmental and aesthetic compatibility of shore area land uses. The Recommended Plan must occur within the Seashore Reserve because that is the location of the current seawall and relocating South Marine Corps Drive is not possible within funding and authorization constraints. The Recommended Plan replaces all or part of the existing seawall and therefore ensures environmental and aesthetic compatibility of the existing shore area land uses.

See Section 2 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing shoreline and Section 4 for more information on the potential project effects on the shoreline.

DP 2. Urban Development

Intent: To cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.

Policy: Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within appropriate zone as outlined on the Guam Zoning Code.

Discussion: Consistent. The project occurs in the already developed urban area of Tamuning, just east of Hagatna. A seawall already exists in the Shore Area as protection for the beach parks, South Marine Corps Drive, and associated infrastructure. This project is a replacement of the existing damaged seawall to provide increased protection to the existing development.

See section 2.3.1 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing land use and section 4.3.1 for more information on the potential project effects on land use.

DP 3. Rural Development

Intent: To provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.

Policy: Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewering is provided.

5b. (cont.) CZMA Federal Consistency Determination

Discussion: Not Applicable. The project occurs in the already developed urban area of East Hagatna. The project area does not have rural land use designation.

See section 2.3.1 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing land use and section 4.3.1 for more information on the potential project effects on land use.

DP 4. Major Facility Siting

Intent: To include the national interest in analyzing the siting proposals for major utilities, fuel and transport facilities.

Policy: In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, Guam shall recognize the national interest in the siting of such facilities, including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.

Discussion: Not Applicable. The project is a seawall replacement and does not meet the definition of a major facility.

DP 5. Hazardous Areas

Intent: Development in hazardous areas will be governed by the degree of hazard and the land use regulations.

Policy: Identified hazardous lands, including flood plains, erosion-prone areas, air installations' crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.

Discussion: Consistent. The project area is identified as a coastal high hazard flood zone (Zone VE - 1% Annual Chance Flood Hazard) in the FEMA Flood Insurance Rate Maps. The proposed project is water dependent and in order to reduce beach erosion and coastal storm risk, the locale in direct proximity to the waterline is necessary. Project activities within the flood zone would comply with all applicable laws and regulations. The project is not located in geologically unstable zones, such as cliff lines or severe slopes. The construction of the proposed project would reduce the risk to human life and safety and facilitate floodplain management.

See section 2.1 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing physical environment and section 4.1 for more information on the potential project effects on the physical environment.

DP 6. Housing

Intent: To promote efficient community design placed where the resources can support it.

Policy: The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and manmade hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

Discussion: Not Applicable. The project is a seawall replacement and does not include housing.

5b. (cont.) CZMA Federal Consistency Determination

DP 7. Transportation

Intent: To provide transportation systems while protecting potentially impacted resources.

Policy: Guam shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, coral reefs and other coastal resources.

Discussion: Consistent. The project protects potentially impacted transportation resources. The project is the replacement of an existing seawall providing protection to South Marine Corps Drive and other existing infrastructure. While construction of the rock revetment will have temporary effects on the nearshore marine environment during construction, best management practices will be used to minimize temporary effects to the maximum extent practicable and to ensure no lasting effects to coastal resources of Hagatna Bay. The protection of South Marine Corps Drive will also avoid the need to build additional transportation corridors to replace it.

See section 2 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing coastal resources and section 4 for more information on the potential project effects on the coastal environment.

DP 8. Erosion and Siltation

Intent: To control development where erosion and siltation damage is likely to occur.

Policy: Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use regulations, as well as other related land use guidelines for such areas.

Discussion: Consistent. The proposed project is water dependent and in order to reduce beach erosion and coastal storm risk, the locale in direct proximity to the waterline is necessary. The project is replacement of an existing seawall providing protection to South Marine Corps Drive and other existing infrastructure. While construction of the rock revetment will have temporary minimal effects on the nearshore marine environment during construction, best management practices will be used to minimize temporary effects such as elevated turbidity to the maximum extent practicable and to ensure no lasting effects to Hagatna Bay.

See section 2.1 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing physical environment, section 4.1 for more information on the potential project effects on the physical habitat, and Attachment 6 of Appendix 3 for best management practices to be used to minimize effects.

RESOURCES POLICIES (RP):

RP 1. Air Quality

Intent: To control activities to ensure good air quality.

Policy: All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.

Discussion: Consistent. The proposed project would comply with all air and water quality laws, including the implementation of BMPs. Construction vehicles would be operated in accordance with the provisions of the Clean Air Act. The proposed action would not include the

5b. (cont.) CZMA Federal Consistency Determination

disposal of any hazardous substances into the air or other media.

See section 4.1.2 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on the potential project effects on air quality, section 4.1.5 for potential effects on water quality, Attachment 6 of Appendix 3 for best management practices to be used to minimize effects and Section 3 of Appendix 3 for discussion of project compliance with the Clean Water Act and Clean Air Act.

RP 2. Water Quality

Intent: To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.

Policy: Safe drinking water shall be assured and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuaries, reef and aquifer areas.

Discussion: The proposed project is water dependent and in order to reduce beach erosion and coastal storm risk, the locale in direct proximity to the waterline is necessary. Construction would strictly comply with erosion, sedimentation, and related land and water use districting guidelines, as well other related land and water use policies. USACE would operate in accordance with the provisions of the Clean Water Act and all other local and Federal policies governing water pollution. The proposed action would not include the disposal of any hazardous substances into the water or other media. BMPs would be in place to minimize the accidental release of materials into the waterways. A Clean Water Act (CWA) 404(b)(1) analysis can be found in Appendix 3 of the IFR/NEPA. The Rock Revetment would temporarily impact approximately 1 acre below the MHHW line, which represents the jurisdictional boundary of the CWA. Avoidance, minimization, and conservation measures established by the Permit and IFR/NEPA would be implemented to reduce effects to water quality (see Attachment 6 of Appendix 3 for detailed mitigation strategies). Since the total disturbance would be greater than one acre, the contactor would be required to obtain a Construction General Permit (Section 402 of the CWA, 33 U.S.C. § 1342; 40 C.F.R. § 122.26), implement stormwater controls, and prepare a Stormwater Pollution Prevention Plan (SWPPP) to minimize the amount of sediment and other pollutants associated with construction sites from being discharged in stormwater runoff. Temporary erosion control BMPs would be used, such as straw wattles, silt curtains, or erosion matting to prevent sediment runoff into the bay. The proposed project would comply with all air and water quality laws, including the implementation of BMPs. Construction vehicles would be operated in accordance with the provisions of the Clean Air Act. The proposed action would not include the disposal of any hazardous substances into the air or other media. The project would comply with all appropriate Federal and local policies to ensure that subsurface work would have no impact on groundwater. The proposed project does not include the drilling or operation of wells.

See section 2.1.5 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information about the existing water quality, section 4.1.5 for more information on potential project impacts on water quality; sections 2.1.3 and 2.1.4 for hydrology, hydraulics, and geomorphology of the area; section 2.1.2 for air quality; Attachment 6 of Appendix 3 for avoidance and minimization mitigation implementation, and Section 3 of Appendix 3 for discussion of project compliance with the Clean Water Act and Clean Air Act.

RP 3. Fragile Area

Intent: To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.

5b. (cont.) CZMA Federal Consistency Determination

Policy: Development in the following types of fragile areas including Guam's Marine Protected Areas (MPA) shall be regulated to protect their unique character.

- historical and archeological sites
- wildlife habitats
- pristine marine and terrestrial communities
- limestone forests
- mangrove stands and other wetlands
- coral reefs

Discussion: Consistent. The proposed project does not occur in an MPA, pristine marine and terrestrial communities, limestone forests, mangrove stands, other wetlands or coral reefs.

No known historic properties have formally been reported within the Area of Potential Effect (APE) at this time; however, consultation has identified at least one burial within the APE and there is a likelihood that subsurface cultural resources and/or other burials exist that could be impacted by construction along the shoreline. Consultation with the Guam State Archaeologist identified additional cultural resources and burial locations that have not yet been formally reported (J. M. Joseph, pers. comm. 2022). USACE has therefore proposed to conduct a phased identification and evaluation effort pursuant to 36 CFR § 800.4(b)(2) and to develop a Memorandum of Agreement (MOA) in accordance with 36 CFR § 800.6 that will identify actions to minimize or mitigate significant impacts as required. The project will be developed in compliance with Section 106, NHPA. See section 4.5 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on potential project impacts to cultural, historic, and archeological resources.

The project is water dependent and in order to reduce beach erosion and coastal storm risk, the locale in direct proximity to the waterline is necessary. Since the coral reef lies approximately 100 yards offshore, the proposed activities would not take place within or near reefs. There would be no direct negative effect on living marine resources. There would be no change to water flow, nutrient levels, or other natural processes that would in turn impact the reefs. Standard best management practices (BMPs) would be used during construction to prevent siltation in the lagoon. Standard BMPs would be used as necessary during construction to minimize effects.

The project area is on public land with no residential dwellings. The proposed project would be built on a sandy shoreline next to a pre- existing structure (a pedestrian walkway). Standard avoidance, minimization, and conservation measures such as a pre-construction surveys would be used to avoid any significant impact to wildlife. This proposed project is designed to prevent shoreline erosion.

See section 4 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on potential project impacts affecting the hydrology, hydraulics, and geomorphology of the area, including potential effects to the island shoreline. For more information on potential effects to coral reefs, refer to section 4.2 in the East Hagatna Emergency Shoreline Protection IFR/NEPA.

RP 4. Living Marine Resources

Intent: To protect marine resources in Guam's waters.

Policy: All living resources within the waters of Guam, particularly fish, shall be protected from

5b. (cont.) CZMA Federal Consistency Determination

over harvesting and, in the case of corals, sea turtles and marine mammals, from any taking whatsoever.

Discussion: Consistent. The proposed project would take place in accordance with the requirements of the Endangered Species Act, the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act and the Essential Fish Habitat Provisions of the Magnuson Stevens Act. The proposed project would not result in the degradation of wildlife habitat or harm the function or integrity of the reefs or seagrass beds in Hagatna Bay. The East Hagatna Emergency Shoreline Protection IFR/NEPA further discusses potential effects to federally protected natural resources, as well as avoidance and minimization measures to reduce these effects. No part of the project would involve the take or collection of fish, marine mammals, or Guam listed species for any purpose. No part of the proposed project would be perceptible to fish, marine mammals, or species on the Guam endangered species list, or otherwise significantly affect their behavior or the quality of their habitat.

See section 4.2 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on potential project impacts to marine habitat and species, and special-status species. See Attachment 6 of Appendix 3 for discussion of mitigation measures that would minimize many adverse environmental impacts.

RP 5. Visual Quality

Intent: To protect the quality of Guam's natural scenic beauty

Policy: Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways and trails.

Discussion: Consistent. The proposed project would preserve the scenic resources of the Commonwealth, and would be in compliance with sign, litter, zoning, building codes, and related land use laws. The proposed seawall would raise the height of the existing seawall by 1 foot to ensure adequate structural integrity and in consideration of climate change. The minor change in elevation would not obstruct or degrade scenic views.

See section 4.5.3 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on potential project effects to aesthetics and visual resources.

RP6. Recreation Areas

Intent: To encourage environmentally compatible recreational development.

Policy: The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife, marine conservation and marine protected areas, scenic overlooks, parks, and historical sites.

Developments, activities and uses shall comply with the Guam Recreational Water Use Management Plan (RWUMP).

Discussion: Consistent. The proposed activities would allow recreational and subsistence usage and includes the incorporation of maintaining existing access to the beach. The rock revetment would reduce the risk of shoreline erosion from harming the Bay and reefs. There

5b. (cont.) CZMA Federal Consistency Determination

would be no significant effects to the Bay or reefs from either alternative. The sea grass beds off the shore would be preserved and the quality and value of the beds would not be degraded. Standard best management practices (BMPs) would be used during construction to prevent siltation in the bay. There would be no effect on areas of historical and cultural significance.

The proposed project would not preclude or inhibit the development or enhancement of recreational facilities compatible with the surrounding environment. The project would protect the recreational infrastructure along South Marine Corps Drive.

See section 4.2 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on effects to marine resources.

RP 7. Public Access

Intent: To ensure the right of public access.

Policy: The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas and their public lands. Agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.

Discussion: Consistent. Means of Public Access to the shoreline are part of the Project Design and neither proposed alternative would disrupt existing public access. Public Access may be temporarily impacted during construction but would not be permanently interrupted or otherwise affected by the proposed federal action. The proposed wall is designed at a slope to allow walking along its surface.

See section 4.3 of the East Hagatna Emergency Shoreline Protection IFR/NEPA for more information on potential project impacts on public access.

RP 8. Agricultural Lands

Intent: To stop urban types of development on agricultural land.

Policy: Critical agricultural land shall be preserved and maintained for agricultural use.

Discussion: Not applicable. The proposed action would not take place on or near commercial or private agricultural lands, including grazing lands. The project area is urban and has no neighboring agricultural activities or landuse designations.

References

Bureau of Statistics and Plans – Guam Coastal Management Program (BSP-GCMP). 2020. 2021-2025 Section 309 Assessment and Strategy Report. https://bsp.guam.gov/wp-bsp-content/uploads/2021/05/GCMP_Section309_2020_FINAL_er-2.12.2021.pdf

BSP-GCMP. 2011. Procedures Guide for Achieving Federal Consistency with the Guam Coastal Management Program.

Burdick, D.R. 2005. Guam Coastal Atlas. 149 pages. https://www.uog.edu/_resources/files/ml/technical_reports/114Burdick_2005_UOGMLTechReport114.pdf.

Project Development Team (PDT). 2022. Trip Report.

5b. (cont.) CZMA Federal Consistency Determination

USACE. 1993. Draft East Agana, Territory of Guam, Detailed Project Report and Environmental Assessment, U.S. Army Corps of Engineers, Honolulu Engineer District, July 1993 (terminated at Sponsor's request).

USACE. 2023. East Hagatna Emergency Shoreline Protection Draft Integrated Feasibility Report ad NEPA Document.

Conclusion

Based upon the above information, data and analysis USACE finds that the proposed federal action is consistent to the maximum extent practicable with the enforceable policies of the Guam Coastal Zone Management Program. Pursuant to 15 CFR § 930.41, the Guam Coastal Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR §930.41(b). The State's concurrence will be presumed if the State's response is not received by the USACE on the 60th day from receipt of this determination.

We request that the Guam CZM Program response, or any questions or concerns regarding the proposed activities, be sent to Marian Dean at marian.dean@usace.army.mil.

5c. CZMA Federal Consistency Certification**

Attachment 6. Cultural Resources Consultation

6a. USACE Project Notification to Guam Preservation Trust (GPT), Guam Department of Chamorro Affairs (GDCA), Guam State Historic Preservation Officer (SHPO)
6b. USACE Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO
6c. USACE Assessment of Effect submitted to GPT, GDCA, and SHPO
6d. GPT response to USACE

6a. Notification of Project to Guam Preservation Trust, Guam DCA, and Guam SHPO

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

February 24, 2022

CEPOA-PM-C-ER

Joseph Quinata
Chief Program Officer
Guam Preservation Trust
P.O. Box 3036
Hagatna, GU 96932

Dear Mr. Quinata:

The U.S. Army Corps of Engineers (USACE), Honolulu District, is conducting a study to determine the feasibility of shoreline protection along part of Hagatna Bay in East Hagatna, Guam. The feasibility study is being conducted in partnership with the Government of Guam. In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the purpose of this letter is to notify you of a Federal undertaking [36 CFR § 800.3(f)].

You are receiving this letter because we believe that the Guam Preservation Trust may have an interest in cultural resources in the general project area. A letter addressed to the Guam State Historic Preservation Officer, which provides more information about the project area and anticipated timeline, is enclosed. We invite you to bring any relevant cultural resources concerns or information to our attention.

If you have any questions or concerns about this study, please contact me by phone at 907-753-2672 or by email at kelly.a.eldridge@usace.army.mil.

Sincerely,

Kelly A. Eldridge

Kelly A. Eldridge
Archaeologist
Environmental Resources Section
Alaska District

6a. (cont.) Notification of Project to Guam Preservation Trust, Guam DCA, and Guam SHPO

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

February 24, 2022

CEPOA-PM-C-ER

Melvin Won Pat-Borja
President
Guam Department of Chamorro Affairs
P.O. Box 2950
Hagatna, GU 96932

Dear President Won Pat-Borja:

The U.S. Army Corps of Engineers (USACE), Honolulu District, is conducting a study to determine the feasibility of shoreline protection along part of Hagatna Bay in East Hagatna, Guam. The feasibility study is being conducted in partnership with the Government of Guam. In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, the purpose of this letter is to notify you of a Federal undertaking [36 CFR § 800.3(f)].

You are receiving this letter because we believe that the Department of Chamorro Affairs may have an interest in cultural resources in the general project area. A letter addressed to the Guam State Historic Preservation Officer, which provides more information about the project area and anticipated timeline, is enclosed. We invite you to bring any relevant cultural resources concerns or information to our attention.

If you have any questions or concerns about this study, please contact me by phone at 907-753-2672 or by email at kelly.a.eldridge@usace.army.mil.

Sincerely,

Kelly A. Eldridge
Archaeologist
Environmental Resources Section
Alaska District

6a. (cont.) Notification of Project to Guam Preservation Trust, Guam DCA, and Guam SHPO

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

February 24, 2022

CEPOA-PM-C-ER

Mr. Patrick Lujan
State Historic Preservation Officer
Guam Historic Resources Division
Department of Parks and Recreation
490 Chalan Palasyo
Agana Heights, GU 96910

Dear Mr. Lujan,

The U.S. Army Corps of Engineers (USACE), Honolulu District, is conducting a study to determine the feasibility of shoreline protection along part of Hagatna Bay in East Hagatna, Guam. More specifically, the project will focus on approximately ½ mile of the Trinchera Beach along Marine Corps Drive at Veteran's Sunset Beach Park (Figure 1). In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (54 USC § 306108), the purpose of this letter is to notify you of a Federal undertaking [36 CFR § 800.3(c)(3)].

Authority

The USACE is conducting this study under the Continuing Authorities Program (CAP), as authorized by Section 14 of the 1946 Flood Control Act, as amended (33 USC § 701r). The Federal Interest Determination for this project was approved by the USACE Pacific Ocean Division on September 23, 2020. The study timeline is meant to comply with USACE Engineering Pamphlet 1105-2-58.

Study Timeline

On January 10th, 2022, the USACE conducted a Site Visit at the proposed project area to delineate the extent of shoreline erosion and further clarify study boundaries. We submitted a Request for Assistance to your office later that day and met with your staff on January 11th to discuss the proposed project. On January 26th, in response to our Request for Assistance, your staff notified us of the availability of the requested documents. Over the next few months, the USACE and its Non-Federal Sponsor, the Government of Guam, will develop an array of alternatives that can address the shoreline erosion. We anticipate that these potential alternatives will be narrowed down to a Tentatively Selected Plan

6a. (cont.) Notification of Project to Guam Preservation Trust, Guam DCA, and Guam SHPO

Figure 1. East Hagatna project area, Guam (red line is approximate erosion study area).

(TSP) in June 2022. At that time, the USACE will assess the potential effect of the proposed TSP on historic properties within the Area of Potential Effect and seek your concurrence on our assessment. A Public Comment Period on the Draft Feasibility Study and Integrated Environmental Assessment is anticipated to begin in August 2022. If you have any questions or concerns about this study, please contact me by phone at 907-753-2672 or by email at kelly.a.eldridge@usace.army.mil.

Sincerely,

Kelly A. Eldridge
Archaeologist
Environmental Resources Section
Alaska District

cc:
Mr. Joseph Quinata, Chief Program Officer, Guam Preservation Trust
Mr. Melvin Won Pat-Borja, President, Guam Department of Chamorro Affairs

6b. Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Melvin Won Pat-Borja
President
Guam Department of Chamorro Affairs
P.O. Box 2950
Hagatna, Guam 96932

Dear President Won Pat-Borja

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

USACE is evaluating measures to both repair and replace either sections or the entire 2,100 linear foot long existing sea wall along Marine Corps Drive adjacent to Hagatna Bay (Figure 1). Initial measures under consideration include rock revetment, modified concrete masonry wall, vertical concrete, and sheet piling wall. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone (Figure 1). The study is still in the early planning phase; no specific measures have been developed and no final recommendations proposed.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, USACE invites the Guam Department of Chamorro Affairs to participate in this study and requests any available information regarding resources occurring within the study area. For the purposes of this request, the study area comprises the area within which USACE is considering direct and indirect impacts to resources. As more information is gathered, the impact areas relative to each resource will be further refined.

As part of this scoping initiative, we are collaborating with federal, state, and local agencies and the public to provide input as we prepare a NEPA environmental assessment for the study. We respectfully request your agency's attendance at a

6b. (cont.) Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO

cooperating agency and participating agency workshop scheduled for June 9, 2022. We will continue coordination of the workshop logistics via email (forthcoming). During the workshop, we will discuss the status of the feasibility study, existing information to inform the study, resource and regulatory agencies' concerns, issues, and needs to complete the study, including completing necessary coordination and consultations and obtaining all environmental compliance permits. In addition, pursuant to Section 1501.8(b)(6) of NEPA and Section 1005(g)(1) of WRRDA 2014, we will develop a schedule for reviewing the feasibility study and complying with applicable environmental laws and regulations.

Should you have any questions or comments, please contact our Environmental Coordinator, Mr. Christopher Floyd at 907-753-2700 or via email at christopher.b.floyd@usace.army.mil and Project Manager, Mr. Jeffrey Herzog at 808-835-4029 or via email at jeffrey.a.herzog@usace.army.mil. Thank you for your cooperation.

Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

6b. (cont.) Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO

-3-

Enclosure 1

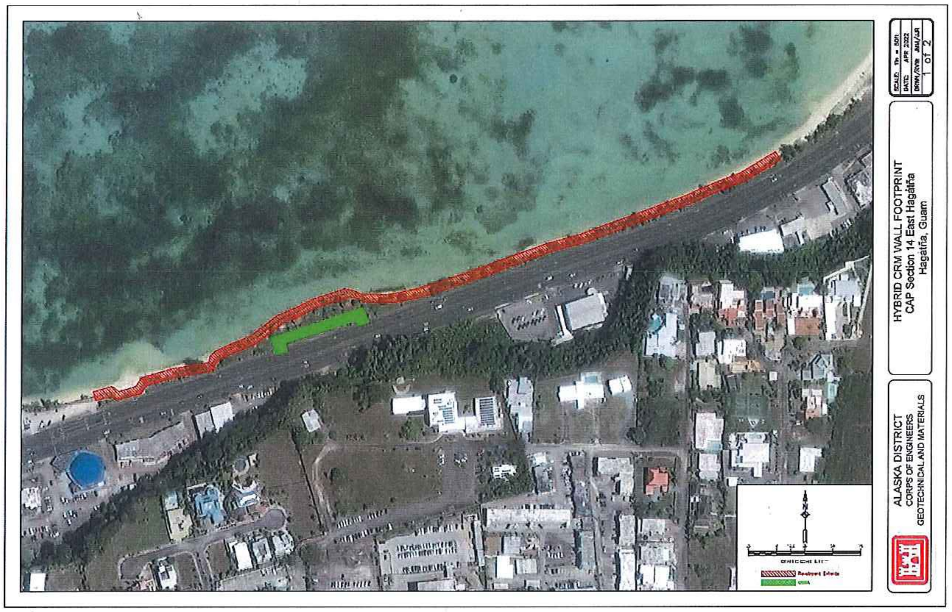

Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along South Marine Corps Drive. The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

6b. (cont.) Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Joseph Quinata
Chief Program Officer
Guam Preservation Trust
P.O. Box 3036
Hagatna, Guam 96932

Dear Mr. Quinata:

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6b. (cont.) Cooperating Agency Workshop Notification to GDCA, GPT, and SHPO

-2-

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Sincerely,

R. Kucharski

Rhiannon Kucharski, WRCP
Chief, Civil and Public Works
and Legislative Liaison

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-3-

Enclosure 1

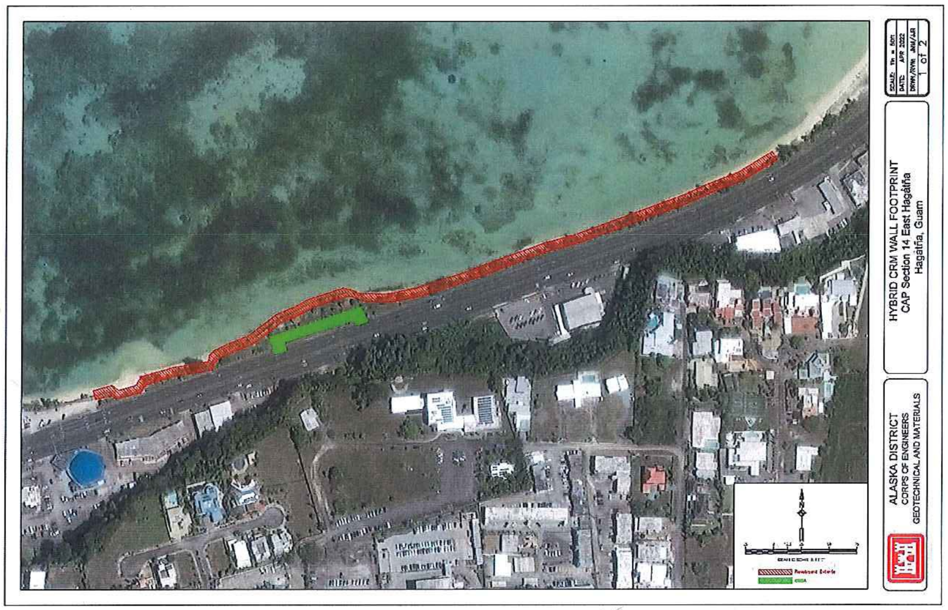

Figure 1: Proposed Project Area: The proposed active construction area is red. The proposed staging area is green. The study area includes 2100 linear feet of existing sea wall from (east end) 13.480339N, 144.768446E to (west end) 13.478478N, 144.762843E along Marine Corps Drive (labeled as South Marine Corps Drive on some maps). The project footprint may extend as far as 20 feet into the water from the existing seawall, 30 feet upland of the seawall, and 5 feet down into the limestone.

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

02 JUN 2022

Civil and Public Works Branch
Programs and Project Management Division

Patrick Lujan
State Historic Preservation Officer
Guam Historic Resources Division
Department of Parks and Recreation
490 Chalan Palasyo
Agana Heights, Guam 96910

Dear Mr. Lujan:

The United States Army Corps of Engineers (USACE) Honolulu District, and the Government of Guam are in the early stages of a feasibility study for the East Hagatna Emergency Shoreline Protection Project pursuant to Section 14 of the Continuing Authorities Program. The purpose of the study is to investigate the feasibility of emergency shoreline protection of South Marine Corps Drive, Hagatna, Guam. As part of the feasibility study, USACE is preparing appropriate documentation to comply with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. § 4321).

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Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, USACE invites the Guam State Historic Preservation Office to participate in this study and requests any available information regarding resources occurring within the study area. For the purposes of this request, the study area comprises the area within which USACE is considering direct and indirect impacts to resources. As more information is gathered, the impact areas relative to each resource will be further refined.

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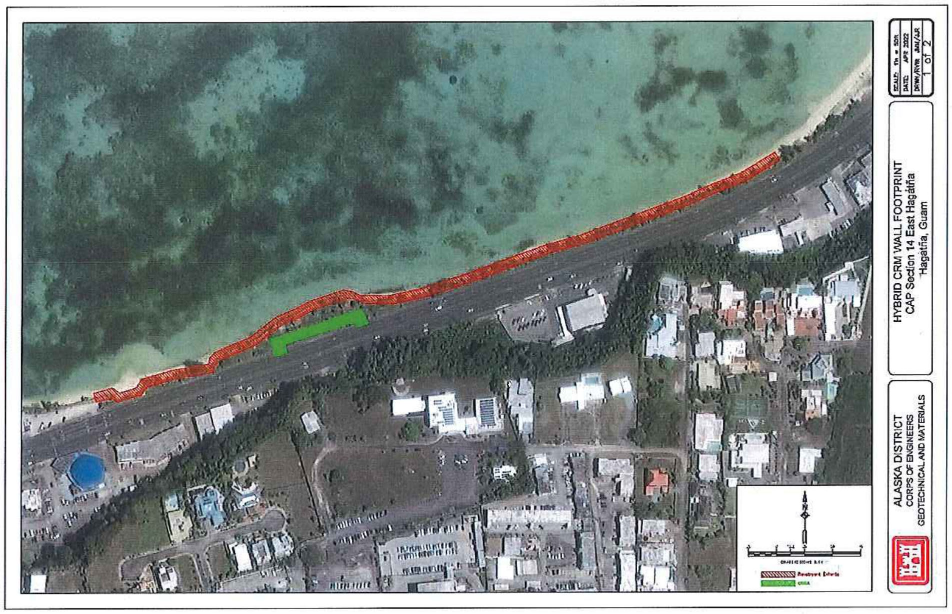
-3-

Enclosure 1



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6c. USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

March 15, 2023

CEPOA-PMC-E

Joseph Quinata
Chief Program Officer
Guam Preservation Trust
P.O. Box 3036
Hagatna, GU 96932

Dear Mr. Quinata:

The U.S. Army Corps of Engineers (USACE), Honolulu District, under the Civil Works Program is conducting a feasibility study on shoreline protection along part of Hagåtña Bay on the island of Guam. This study is being conducted in partnership with the Government of Guam, our Non-Federal Sponsor. In compliance with Section 106 of the National Historic Preservation Act (NHPA), the purpose of this letter is to invite your consultation on our assessment of the proposed undertaking's effect on historic properties (36 CFR § 800.3(f)).

You are receiving this letter because we believe that the Guam Preservation Trust may have an interest in cultural resources in the general project area. A letter addressed to the Guam State Historic Preservation Officer (SHPO), which assesses the proposed undertaking, is enclosed. It describes the known cultural resources in the area and the potential impact that the proposed undertaking may have on those resources. Per Section 101(b)(3) of the NHPA, the SHPO advises and assists Federal agencies in carrying out Section 106 responsibilities. Per 36 CFR § 800.3(c)(4), the SHPO has 30 days to respond to USACE's notification; within this time period, we invite you to bring any cultural resources concerns or information to our attention.

If you have any questions about this project or would like to share information with us, please contact me by phone at (907) 753-2672 or by email at kelly.a.eldridge@usace.army.mil.

Sincerely,

Kelly A. Eldridge

Kelly A. Eldridge
Archaeologist
Environmental Resources Section
Alaska District

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

March 15, 2023

CEPOA-PMC-E

Melvin Won Pat-Borja
President
Guam Department of Chamorro Affairs
P.O. Box 2950
Hagatna, GU 96932

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DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 6898
JBER, AK 99506-0898

March 15, 2023

CEPOA-PMC-E

Mr. Patrick Lujan
State Historic Preservation Officer
Guam Historic Resources Division
Department of Parks and Recreation
490 Chalan Palasyo
Agana Heights, GU 96910

Dear Mr. Lujan:

The U.S. Army Corps of Engineers (USACE), Honolulu District, is conducting a study to determine the feasibility of shoreline protection along part of Hagåtña Bay on the island of Guam. The tentatively selected plan, a rock revetment, would be placed along approximately 2,100 feet of Trinchera Beach bordering Marine Corps Drive in Tamuning, Guam (Figure 1). The proposed rock revetment constitutes an undertaking pursuant to 36 CFR § 800.3(a) and therefore requires consultation under Section 106 of the National Historic Preservation Act (54 USC § 306108). In compliance with the implementing regulations of Section 106 of the NHPA, the purpose of this letter is to seek your concurrence on an assessment of effect (36 CFR § 800.4(b)(2)).

Study Authority

USACE is conducting this study with its Non-Federal Sponsor, the Government of Guam, under the Continuing Authorities Program (CAP) authorized by Section 14 of the 1946 Flood Control Act, as amended (33 USC § 701r). The Federal Interest Determination for this project was approved by the USACE Pacific Ocean Division on September 23, 2020. The Government of Guam and USACE Honolulu District executed a Federal Cost Share Agreement for this study on August 18, 2021. For the purposes of compliance with Section 106 of the NHPA, USACE is the lead agency.

Project Description

The existing rock seawall along the Trinchera Beach shoreline which protects Marine Corps Drive along Hagåtña Bay has been severely compromised by erosion (Figures 2 and 3). This seawall was constructed in the 1990s by the Government of

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

Guam (E. Reyes, personal communication 2022). To address this erosion and protect Marine Corps Drive, USACE and the Government of Guam propose to replace approximately 2,100 linear feet of the existing rock seawall with a rock revetment.

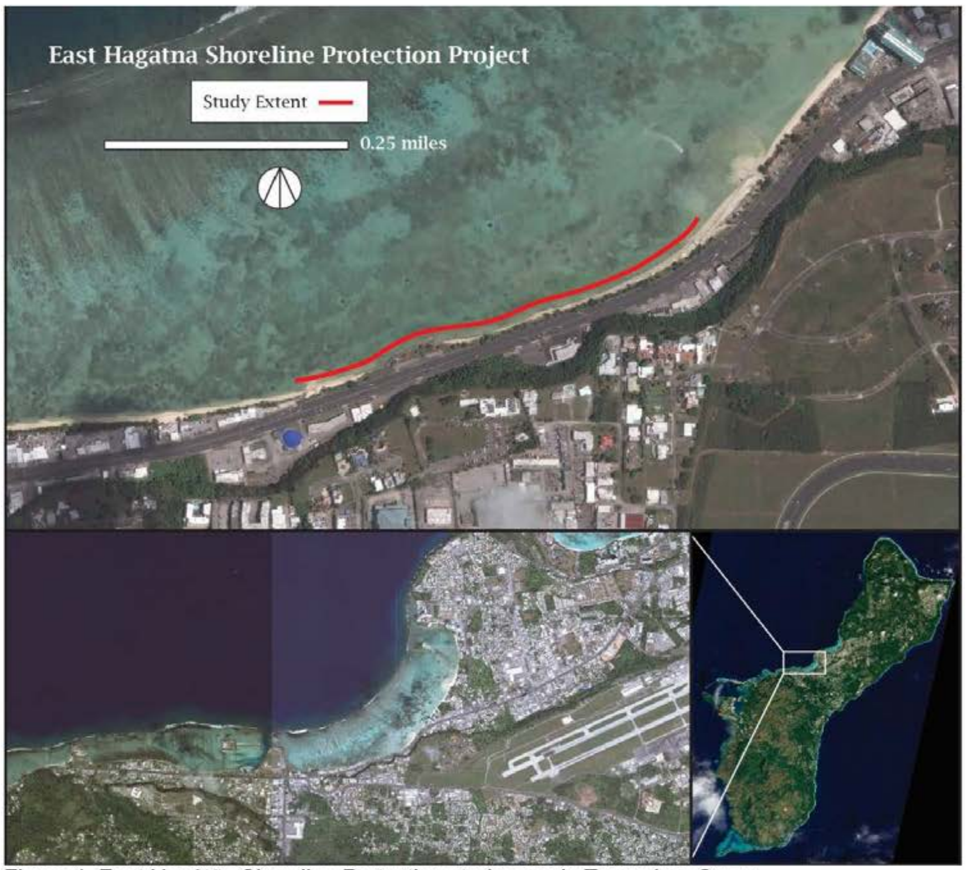

Figure 1. East Hagåtña Shoreline Protection study area in Tamuning, Guam.

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

Figure 2. Existing rock seawall along Trinchera Beach.

Figure 3. Existing rock seawall at Veteran's Beach Sunset Park.

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

The proposed revetment will consist of compacted fill at its foundation, upon which geotextile filter fabric, a double layer of underlayer stones (35 lbs/stone), and a double layer of armor stone (350 lbs/stone) will be placed. The revetment will be anchored on the seaward side by a toe composed of oversized stone (525 lbs/stone). In order to meet the USACE 50-year design requirement for sea level change and be adaptable to a 100-year modeled sea level change, the crest elevation of the revetment will be constructed to 9 feet above Mean Sea Level, raising the existing elevation by 1 foot. At the required design slope, the revetment is expected to extend 17 feet seaward from the crest (Figure 4).

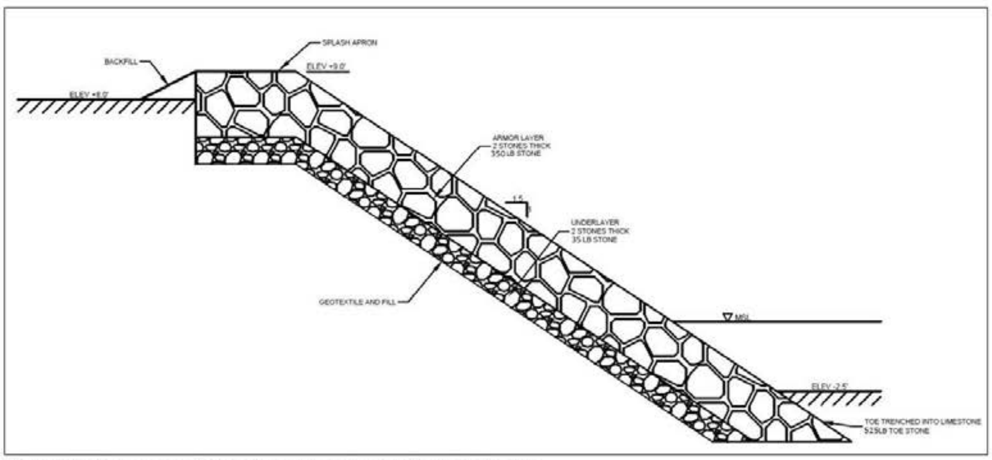

Figure 4. Cross-section of proposed revetment design.

Area of Potential Effect

The proposed rock revetment approved for funding and construction by USACE constitutes an undertaking pursuant to 36 CFR § 800.3(a), requiring compliance with Section 106 of the NHPA. The proposed undertaking will impact approximately 2,150 feet of Trinchera Beach, centered on the Veteran's Sunset Beach Park. Although the ground disturbance anticipated during removal of the current seawall and construction of the revetment will not extend much further inland than the existing seawall, it is likely that materials and equipment will be staged along the grassy park area between Marine Corps Drive and Hagåtña Bay.

In accordance with 36 CFR § 800.4(a), USACE has identified the proposed undertaking's area of potential effects (APE) to include both the revetment footprint and staging areas (see Figure 5). The APE encompasses approximately 1.8 hectares (4.5 acres).

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

Figure 5. Area of potential effects (APE) outlined in yellow; approximate locations of known cultural features indicated with red dots; approximate boundary of the San Antonio Village site (66-01-261) outlined in red.

Background

The island of Guam was first occupied more than 3,500 years ago by seafaring peoples from Southeast Asia, ancestors of the CHamoru people. The history of Guam is broadly divided into six periods: Pre-Latte, Latte, Spanish, First American, Japanese Occupation, and Second American (Guam Historic Resources Division 2022). When the Spanish first anchored in Hagåtña Bay in 1668, Hagåtña was one of the principal villages on Guam. Although the Spanish missionaries were initially welcomed by the CHamoru and given land to build their church, the good relationship did not last. The island's first foreign military installation, thought to have been constructed near the beach in Hagåtña, was completed in 1683 (Walth et al. 2016). During the Spanish-Chamorro Wars, the CHamoru built a stone wall from the cliff edge to the water in the vicinity of Trinchera Beach. However, by the early 1700s the East Hagåtña Bay area had been abandoned due to population reduction (Moore et al. 1988; Davis 1990). In the early 1800s, immigrant Carolinians settled in the area. Occupation of this new community, referred to as Tamuning, began in 1816. In 1884, the Spanish created a settlement in Tamuning called Maria Cristina where they consolidated all Carolinians on the island. In 1901, the Carolinians were expelled from Guam by the United States (Moore et al. 1988).

Previous Archaeological Investigations

The earliest archaeological excavations in the general vicinity of the study area were conducted in the 1920s by Hans G. Hornbostel on behalf of the Bernice P. Bishop Museum of Hawai'i. This investigation, among others, have recovered evidence of

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

extensive occupations during the Latte Period. Cultural materials dating to the Pre-Latte Period have also been identified by Hunter-Anderson et al. (2006) and Amesbury et al. (2015). Walth et al. (2016:215) reviewed radiocarbon dates collected from multiple archaeological investigations in the area and determined that 14% of the archaeological sites in Hagåtña Bay date to the Pre-Latte Period, 62% date to the Latte Period, and 24% date to the Spanish/First American Period.

Most archaeological investigations in the area have been undertaken in association with cultural resource management of various construction projects. These previous projects include road work (Moore et al. 1988; Amesbury et al. 1991; Walth et al. 2016) and building developments (Brown and Haun 1989; Amesbury et al. 1990; Davis 1990; Haun et al. 1990; Olmo 1997, 1999; Beardsley 2003; Hunter-Anderson et al. 2006; Amesbury et al. 2015). USACE has previously conducted limited archaeological investigations in association with feasibility studies in both the general area (Pangelinan and Price 1986; Cordy and Allen 1988) and along Trinchera Beach (Watanable 1994). More recent archaeological investigations, for which reports have not yet been finalized, include sewer line installations and cell phone tower installations; burials were identified at multiple locations (J. M. Joseph, pers. comm. 2022).

Identification of Historic Properties

In January 2022, USACE archaeologist Kelly Eldridge conducted a non-invasive pedestrian survey of the APE. Shovel-testing was not conducted out of concern that digging holes along the landward side of the existing seawall would further destabilize the damaged structure. No surficial cultural resources were identified. A review of the published literature, as well as grey literature and other documentation provided to USACE by the Guam Historic Resources Division in response to Requests for Assistance, identified 14 known cultural resources in the general vicinity of the APE (Table 1; see also Figure 5). Nine of the known cultural resources are subsurface archaeological sites identified during construction efforts, and of those, at least six are historic properties in accordance with 36 CFR § 800.16(l).

Table 1. Known cultural resources in the general vicinity of the study area (GHRD 2022).

GHPI Number	Site Name	Cultural Period	NRHP Status
66-01-0177	Apotgun: Graphic Center	Pre-Latte, Latte	Eligible for Listing
66-01-0177	Apotgun: Agana Beach Condo	Latte, Spanish	Eligible for Listing
66-01-0259	Maria Cristina: Excavation Unit 1-1	Latte	Eligible for Listing
66-01-0260	Maria Cristina: Excavation Unit 1-2	Latte	Eligible for Listing
66-01-0261	San Antonio Village & SLC Burial Trench	Latte, Spanish	Eligible for Listing
66-01-0262	Maria Cristina: Burial Site	Spanish	Eligible for Listing
66-01-0263	Maria Cristina: Excavation Unit 4-1	Spanish	*Unknown*
66-01-0299	Apotgun: Ryoko Condo Site	Pre-Latte, Latte	Eligible for Listing
66-01-1016	Charlie Corn House	Second American	*Unknown*

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

66-01-1035	U.S. Naval Cemetery	First American, Second American	Listed
66-01-1052	Agana Japanese Caves	Japanese Occupation	*Unknown*
66-01-1082	Agana Pillbox	Japanese Occupation	Listed
66-01-1105	Dungcas Beach Defense Guns	Japanese Occupation	Listed
-	Tick Tock	Latte	*Unknown*
-	ABC Condo	Spanish	*Unknown*

GHPI = Guam Historic Properties Inventory
NRHP = National Register of Historic Places

The pedestrian survey did not identify any cultural resources in the project area. The review of published and available grey literature did not identify known cultural resources within the APE; however, personal communications with the Guam State Archaeologist, Mr. John Mark Joseph, have indicated the existence of cultural resources within the APE that will be described in forthcoming reports from multiple entities. There are no records that the Government of Guam uncovered any subsurface cultural materials during construction of the existing rock seawall during the 1990s. Additionally, when questioned during the January site visit and at subsequent meetings, Government of Guam representatives did not know of any cultural resources that were identified during the construction of the seawall.

Assessment of Effect

The USACE has made a reasonable and good faith effort to identify historic properties per 36 CFR § 800.4(b)(1). Extensive subsurface cultural materials and burials have been recovered to the east and west of the APE, and at least one burial has been identified within the APE. The presence of these subsurface cultural resources suggests that there is a strong potential that subsurface cultural resources will be affected during revetment construction on the beach side of Marine Corps Drive, within the APE.

Of particular concern is the possibility that previously unknown human burials could be identified during construction. The historic U.S. Naval Cemetery is located approximately 1,500 feet west of the APE, and burials have been identified at subsurface archaeological sites approximately 1,400 feet west and 1,200 feet east of the APE, as well as within the southwestern corner of the APE itself. In accordance with Territory of Guam Executive Order 89-24, if "such burials cannot practically be left undisturbed, removal shall be done with proper archaeological methods and documentation" and any analyses will be limited. Any individuals removed from their original burial locations would be reburied in an appropriate and respectful manner at a location approved by the Guam State Historic Preservation Officer.

Due to the inability to determine whether there are subsurface cultural resources within the APE, USACE proposes to conduct a phased identification and evaluation effort in accordance with 36 CFR § 800.4(b)(2), formally documented in a Memorandum

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

of Agreement (MOA) developed in accordance with 36 CFR § 800.6. The MOA is expected to require, at minimum, that an on-site archaeologist who meets the *Secretary of the Interior's Historic Preservation Professional Qualification Standards* (36 CFR § 61; 48 FR 44716) monitor all ground-disturbing construction activities within the APE. The MOA will also include development of a Human Remains Recovery Plan that meets the requirements of Guam Territorial Executive Order No. 89-24 and adheres to the Guam Department of Parks and Recreation's 2010 Section IV Reburial Guidelines Amendment.

Conclusion

USACE and its Non-Federal Sponsor, the Government of Guam, plan to replace an existing damaged seawall with a rock revetment along Trinchera Beach in East Hagåtña Bay to address shoreline erosion along Marine Corps Drive. Due to the likelihood that subsurface cultural resources and/or burials exist within the APE, USACE seeks your concurrence on a phased identification and evaluation effort pursuant to 36 CFR § 800.4(b)(2) and invites you to participate in the development of an MOA in accordance with 36 CFR § 800.6. If you have any questions or concerns about this study, please contact USACE Archaeologist Kelly Eldridge by phone at 907-753-2672 or email at kelly.a.eldridge@usace.army.mil.

Sincerely,

ELDRIDGE.KELLY.ANNE.1377123170 Digitally signed by ELDRIDGE.KELLY.ANNE.1377123170 Date: 2023.03.15 15:38:13 -08'00'

Kelly A. Eldridge
Environmental Resources Section
Alaska District

cc:
Mr. Joseph Quinata, Chief Program Officer, Guam Preservation Trust
Mr. Melvin Won Pat-Borja, President, Guam Department of Chamorro Affairs

6c. (cont.) USACE Assessment of Effect submitted to GPT, GDCA, and SHPO

References

Amesbury, J.R., Moore, D.R., and E.F. Wells
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6d. GPT Response to USACE

GUAM PRESERVATION TRUST

INANGOKKON INADAHI GUÅHAN

P.O. Box 3036, Hagåtña, Guam 96932 • Tel: 671-472-9439/40 • Fax: 671-477-2047 • guampreservationtrust.org

March 16, 2023

Ms. Kelly A. Edridge
Archaeologist, Environmental Resources Division
Alaska District
U.S. Army Corps of Engineers
JBER, AK 99506-0898

Dear Ms. Edridge,

Thank you for your March 15 letter regarding the project of conducting a feasibility study on shoreline protection along part of Hagåtña Bay and the potential impact of the proposed undertaking on cultural resources identified.

As a partner in preservation, GPT appreciates the invitation to express our concerns with the project which balances the need of historic preservation with the needs of the proposed revetment to meet the USACE 50-year design requirement for sea level change and protect the Trinchera Beach shoreline and Marine Corps Drive in Hagåtña. I agree with the plans to develop a Memorandum of Agreement as the identified Area of Potential Effect was determined to have a strong potential to affect cultural resources. I also appreciate the reasonable and good faith effort that the USACE has done to be in accordance with the various provisions of the National Historic Preservation Act and other local regulations and statutes.

In your letter, you invited us to bring any cultural resources concerns or information to your attention. At this moment, while we have no further concerns on historic properties that have already been identified by your office, GPT is interested in the cumulative and total effects that the project will have on traditional cultural practices such as traditional fishing that occur at the area and to ensure studies and plans are able to take account of these cultural practices and resources. Upon concurrence with the Guam State Historic Preservation Office on your phased identification and evaluation effort, GPT looks forward to joining in any future discussions regarding this project where we can be of assistance. Should you have any questions, please feel free to contact me at jqpreservation@guam.net or by phone at (671) 472-9439.

Sincerely,

JOE QUINATA
Chief Program Officer

Attachment 7. Draft Finding of No Significant Impact

DRAFT FINDING OF NO SIGNIFICANT IMPACT

EAST HAGATNA EMERGENCY SHORELINE PROTECTION
HAGATNA, GUAM

The U.S. Army Corps of Engineers, Honolulu District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Draft Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated 25 July 2023, for the East Hagatna Emergency Shoreline Protection addresses protection of 2100 feet of shoreline on Hagatna Bay along South Marine Corps Drive in Hagatna, Guam. The final recommendation is contained in the report of the Chief of Engineers, dated *TBD*.

The Draft IFR/EA, incorporated herein by reference, evaluated four (4) alternatives n detail, including the No Action Alternative, synonymous with no Federal Action, and analyzed as the Future Without Project (FWOP) condition for comparison with the three (3) action alternatives, including the Proposed Action. The Proposed Action (Alternative 2) is the National Economic Development (NED) Plan , least cost and environmentally acceptable plan and entails replacement of 2100 linear feet of a seawall with a 17 ft wide, 9 ft tall rock revetment to reduce the threat of coastal erosion to South Marine Corps Drive and adjacent utilities. Construction of the revetment will require:

- Demolition of approximately 2100 linear feet of existing seawall
- Excavation to hard substrate
- Compacted graded fill and geotextile underlayer
- Installation of an oversized toe stone
- Installation of double layer of underlayer stone
- Installation of a double layer of armor stone

A crest elevation of 10 ft above MSL meets the USACE 50-year design requirement for sea level change (SLC) and is adaptable to 100-year SLC.

In addition to a “no action” plan, three (3) alternatives were evaluated as described in Section 5. The alternatives included:

- Alternative 2: Rock Revetment
- Alternative 3: Precast Concrete Seawall
- Alternative 4: Concrete Rubble Masonry (CRM) Wall

Natural and Nature-based measures considered included beach fill which was not carried forward because renourishment would be necessary for performance over the 50-year period of analysis and was not feasible under CAP 14 authority. The non-structural measure of relocation of South Marine Corps Drive and buried utilities inland to avoid coastal storm damages was not carried forward because the associated costs were too high. Section 3.4 of the IFR/EA includes a description and section 5.0 includes a comparison of these alternatives.

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 S-1:

Table S-1: Summary of Potential Effects of the Recommended Plan.
*****Mitigation in the context of this Table refers to the avoidance and minimization measure (BMPs) outlined in Section 6.9 Environmental Commitments of the IFR/EA

	Significant effects	Less than significant effects	No Effect	Beneficial Effect
Climate	☐	☐	☒	☐
Air Quality*	☐	☒	☐	☐
Geology	☐	☒	☐	☐
Hydrology	☐	☒	☐	☐
Water Resources and Quality*	☐	☒	☐	☐
Hazardous, Toxic & Radioactive Wastes	☐	☐	☒	☐
Noise*	☐	☒	☐	☐
Terrestrial Habitats and Species*	☐	☒	☐	☐
Marine Habitats and Species*	☐	☒	☐	☐
Threatened/Endangered Species/Critical Habitat*	☐	☒	☐	☐
Essential Fish Habitat*	☐	☒	☐	☐
Special Aquatic Sites*	☐	☒	☐	☐
Invasive Species*	☐	☒	☐	☐
Land use*	☐	☐	☐	☒
Public infrastructure*	☐	☐	☐	☒
Socioeconomics	☐	☐	☐	☒
Environmental justice	☐	☐	☐	☒
Historical and Archaeological Resources*	☐	☒	☐	☐
Other cultural resources*	☐	☒	☐	☐
Aesthetics	☐	☒	☐	☐

*Effect would cause no substantial adverse change in the environment as measured by the applicable significance criteria; however, standard best management practices have been incorporated that would avoid or reduce the environmental effects to less-than-significant levels.

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan, which include best management practices (BMPs) as detailed in section 6.9 of the IFR/EA

The USACE published a public notice on 25 July 2023. Public review of the draft IFR/EA document and FONSI was completed on *24 August 2023*. All comments submitted during the public review period were responded to in the Final IFR/EA and FONSI.

ENDANGERED SPECIES ACT
INFORMAL CONSULATION:

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the USACE determined that the Proposed Action is not likely to adversely affect the following federally listed species or their designated critical habitat: Green Sea Turtle (*Chelonia mydas*); Hawksbill Sea Turtle (*Eretmochelys imbricate*); the coral *Acropora globiceps,* and Mariana Fruit Bat (*Pteropus mariannus mariannus)* and its designated critical habitat; *U.S. Fish and Wildlife Service (FWS) (did not) concur(red) with USACE determination on TBD. National Marine Fisheries Service (NMFS) (did not) concur(red) with USACE determination on TBD*

NATIONAL HISTORIC PRESERVATION ACT
HISTORIC PROPERTIES NOT ADVERSELY AFFECTED:

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 potential to cause adverse effects on historic properties. The Guam Historic Preservation Office (GHPO) concurred with the finding on April 29, 2023 that no historic properties would be affected by the project. However, consultation has identified at least one burial within the APE and there is a likelihood that subsurface cultural resources and/or other burials exist that could be impacted by construction along the shoreline. Consultation with the Guam State Archaeologist identified additional cultural resources and burial locations that have not yet been formally reported. USACE has therefore proposed to conduct a phased identification and evaluation effort pursuant to 36 CFR § 800.4(b)(2) and to develop a Memorandum of Agreement (MOA) in accordance with 36 CFR § 800.6 that will identify actions to minimize or mitigate significant impacts as required.

CLEAN WATER ACT SECTION 404(B)(1) COMPLIANCE

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 Attachment 4a of Appendix A-3 of the IFR/EA.

CLEAN WATER ACT SECTION 401 COMPLIANCE:
401 WQC PENDING:

A water quality certification pursuant to section 401 of the Clean Water Act will obtained from the Guam Environmental Protection Agency (GEPA) prior to construction. USACE has obtained a letter of confirmation from the GEPA dated *TBD* stating that GEPA has no preliminary issues with the USACE moving forward with further designs of this project. All conditions of the water quality certification will be implemented in order to minimize adverse impacts to water quality.

COASTAL ZONE MANAGEMENT ACT
CZMA CONSISTENCY PENDING:

A determination of consistency with the Guam Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 was sent to the Guam CZM Program. All conditions of the consistency determination shall be implemented in order to minimize adverse impacts to the coastal zone.

OTHER SIGNIFICANT ENVIRONMENTAL COMPLIANCE:

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

USACE has coordinated this project with NMFS pursuant to the requirements of the Marine Mammal Protection act (MMPA) and determined that a MMPA permit is not required due to the determination that the type of activities associated with this project do not have the potential to cause a take of a marine mammal.

Implementing the Recommended Plan would result in minimal adverse effects to Essential Fish Habitat (EFH) with no potential for substantial adverse effect to EFH or Managed Unit Species. In the long-term, there are no expected residual adverse effects to EFH or Managed Unit Species. The USACE has determined that a general conformity determination is not required for the Proposed Action. The Proposed Action complies with the requirements of Section 176(c) of the Clean Air Act.

In accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, the USACE has determined that Environmental Justice Communities would not be subject to disproportionately high and adverse human health or environmental effects because of the Proposed Action. Therefore, the Proposed Action complies with this Executive Order.

No wetlands are located within the proposed project area. Therefore, the Proposed Action complies with Executive Order 11990, Protection of Wetlands.

The Proposed Action would not modify the existing floodplain or flow conveyance capacity of any stream or waterway or change the 100-year floodplain. Therefore, the Proposed Action complies with Executive Order 11988, Floodplain Management.

Technical 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.[1] 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	**NAME** **RANK,** Corps of Engineers District Commander

Appendix A-4

Draft Real Estate Plan

East Hagatna, Guam, Emergency Shoreline Protection Integrated Feasibility Report
Continuing Authorities Program (CAP)
Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r)

September 2022

Prepared for:
U.S. Army Corps of Engineers, Honolulu District

Prepared by:

Tiffany Murray **Realty Specialist** **USACE Honolulu District**	**Date**

Reviewed by:

Erica Labeste **Chief, Real Estate Branch** **USACE Honolulu District**	**Date**

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Appendix A-4

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1 Executive Summary

The East Hagatna, Guam, Emergency Shoreline Protection Integrated Feasibility Report (Study) is authorized under Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r) for Emergency Shoreline Protection under the Continuing Authorities Program.

A Tentatively Selected Plan (TSP) was selected based on cost, ecological output, economic benefits, completeness, effectiveness, efficiency, and acceptability. TSP project features include the removal and replacement of a rock revetment: construction area with access, and a staging area. The minimum estate required for the rock revetment is a perpetual flood protection levee easement totaling 1.5 acres. The minimum estate required for staging, construction, and site access is a temporary work area easement totaling 1.2 acres. The temporary work area easement is required for one (1) year during project construction.

The NFS for the Study is the Government of Guam, as represented by the Department of Public Works. Real estate acquisition will be coordinated with the Guam Department of Public Works. The NFS is responsible for ensuring that it possesses the appropriate real estate interests for all real property required for the proposed project.

The estimated real estate cost associated with the TSP is approximately $697,600, including all recommended lands, easements, rights-of-way, relocations, and disposals (LERRDs), administrative costs to be carried out by the NFS, and Government costs for LERRDs monitoring and certification. The NFS will be assessed on its capability to acquire and provide the LERRDs necessary for the proposed project.

2 Authority and Purpose

The East Hagatna, Guam, Emergency Shoreline Protection Integrated Feasibility Report (Study) is authorized under Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r) for Emergency Shoreline Protection under the Continuing Authorities Program. As a Continuing Authorities Program (CAP) Section 14 project, USACE policy limits federal participation to $5 million.

The NFS for the Study is the Government of Guam, as represented by the Department of Public Works. The U.S. Army Corps of Engineers (USACE), in partnership with the NFS is identifying and assessing management alternatives. The purpose of Study is to evaluate the threat to critical infrastructure posed by coastal erosion and to identify potential alternatives to emergency shoreline protection to critical infrastructure in East Hagatna. The East Hagatna shoreline is subject to frequent storm wave attack and big wave events. Coastal erosion due to these factors puts Marine Corps Drive, a major highway in the capitol city of Hagatna, Guam, at risk of imminent damage and failure. The Study documents the results of evaluating alternatives and recommends a plan as the basis for project construction authorization.

Past studies include Guam Comprehensive Study, 1979 (identified the water resource problems and needs for the Territory of Guam), Shoreline Investigation, 1981 (described existing shoreline features, structures, and conditions), Flood Insurance Study, 1983 (investigated the existence and severity of flood hazards, developed flood risk data), Guam Comprehensive Study, 1984 (identified problems of coastal flooding in the Agana Bay area), Typhoon Stage-Frequency Analysis for Agana Bay, 1987 (determine the frequency of flood levels along Agana Bay shoreline), Agana Bayfront Storm Surge Protection Study, 1989 (identified coastal flooding problems and needs of the low-lying areas of Agana Bay), East Agana, Territory Guam, Shore Protection Study, Reconnaissance Report, 1990 (predecessor to the 1993 feasibility phase investigation), Draft East Agana, Territory of Guam, Detailed Project Report and Environmental Assessment, 1993 (terminated at the request of the Non-Federal sponsor).

It is assumed that an Environmental Assessment is the appropriate National Environmental Policy Act (NEPA) document for the final array of alternatives. Environmental analysis will comply with all environmental laws as applicable. The analysis is anticipated to be completed by relying on existing literature, remote sensing technologies, and data available from other agencies.

Generally, the Real Estate Plan (REP) is prepared by the USACE Honolulu District (District) as an appendix to the Study. The REP presents the real estate requirements, proposes the acquisition strategy, develops a cost estimate for real estate acquisition, and incorporates an internal technical review. USACE Mapping reviews tract ownerships and acreages to prepare exhibits for the REP. USACE Appraisal prepares (or contracts for) and approves a cost estimate or gross appraisal, as needed for acquisitions. USACE Environmental provides applicable compliance memoranda and/or documentation in accordance with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), and USACE Hazardous, Toxic, and Radioactive Waste (HTRW) policy.

Project real estate requirements include a review of NFS-owned parcels as well as recommended lands, easements, rights-of-way, relocations, and disposals (LERRDs) to be carried out by the NFS. LERRDs are requirements that the U.S. Government has determined the NFS must meet for the construction, operation, and maintenance of the project. If LERRDs are required, USACE Real Estate coordinates with the NFS and provides the NFS with a partner packet outlining the NFS's responsibilities and notice informing the NFS of the risks of early acquisition.

The information contained herein is tentative for planning purposes only. Final real property acquisition acreages, limitations, and cost estimates are subject to change after approval of a final Feasibility Report, including plan modifications that occur during the Preconstruction Engineering and Design Phase (PED).

3 Project Description and Location

Guam is an organized, unincorporated territory of the United States in the Micronesia subregion of the western Pacific Ocean. The Territory of Guam is located approximately 3,800 miles west of Honolulu. The 209 square-mile island of Guam is approximately 30 miles long and ranges from 4 to 8.5 miles wide (Figure 3-1). Guam is the largest island in the Western Pacific. The northern part of Guam is a result of its volcanic base covered with layers of coral reef turning into limestone, and then being thrust upward by tectonic activity to create a plateau. The rugged southern part of the island is a result of more recent volcanic activity.

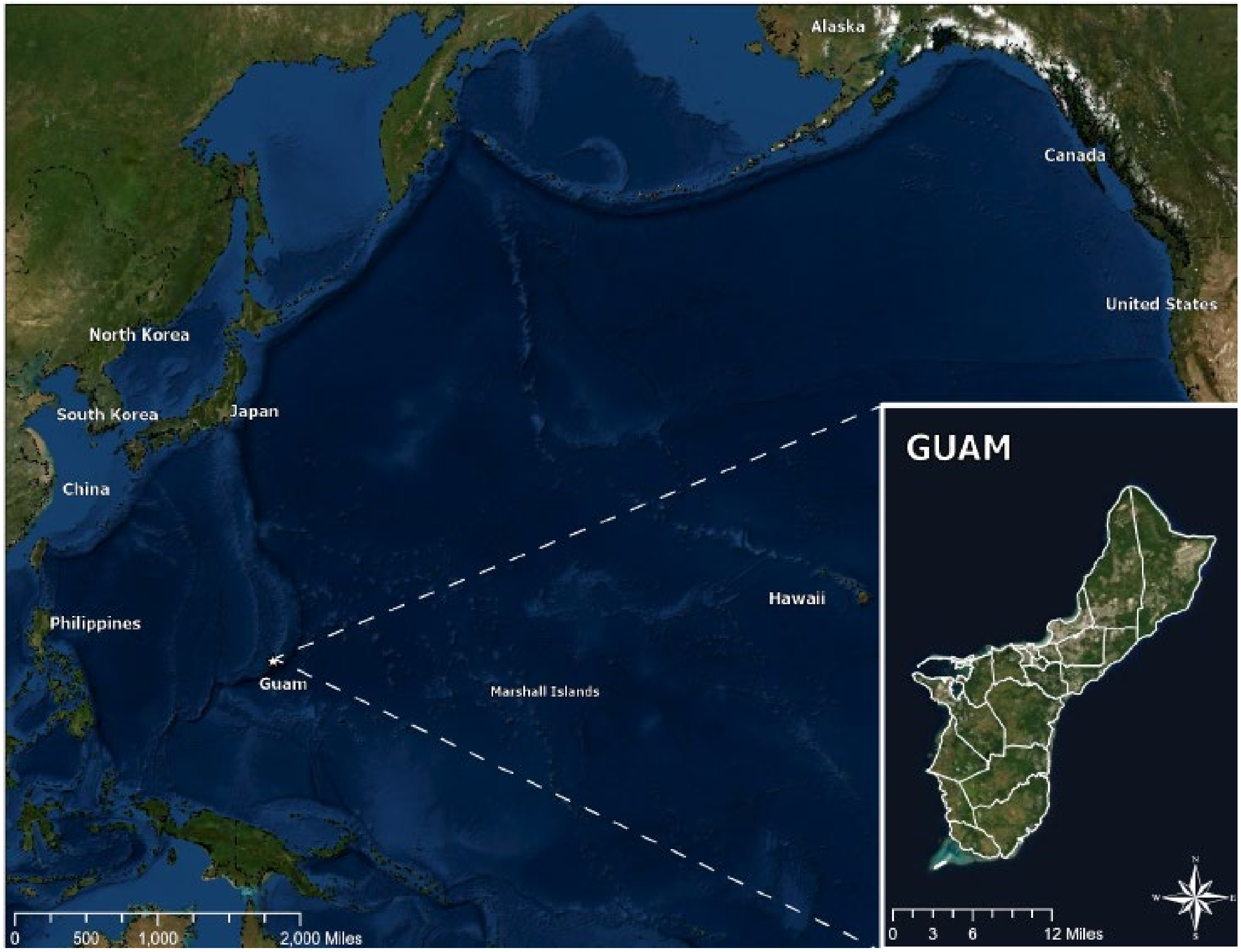

Figure 3-1. Study Location

Hagatna, the capital of Guam, is located at the mouth of the river and associated wetlands form the eastern boundary of the city. The study area is centrally located on the west central Guam coast along Hagatna Bay. The Study area encompasses approximately 2,100 feet of Trinchera Beach along Hagatna Bay, which runs parallel to South Marine Corps Drive/Highway 1. On the western side, the Study area is bounded by a strip mall parking lot that has an access ramp through the seawall down to the beach. The existing seawall ranges from approximately 3 to 10 feet in height and is composed of large volcanic rocks cemented together. (Figure 3-2).

Figure 3-2. Study Area

Guam is located in close proximity to a breeding ground for tropical storms and typhoons. The low-lying coastline of East Hagatna is subject to frequent storm wave attack. High wave heights reaching the shoreline during severe storm periods have caused erosion to the beach, resulting in undermining of the existing seawall. This damage to the existing shore protection has put South Marine Corps Drive and public utilities in the immediate vicinity of the project area at imminent risk. Future sea level rise is expected to continue to exacerbate erosion.

A final array of structural alternative plans was formulated through combinations of screened management measures. Final Study alternatives included:

- Alternative 1: No Action Alternative
- Alternative 2: Rock Revetment
- Alternative 3: Precast Concrete Seawall
- Alternative 4: Concrete Rubble Masonry (CRM) Wall

3.1 Tentatively Selected Plan: Rock Revetment

Alternative 2: Rock Revetment was selected as the Tentatively Selected Plan (TSP). Under CAP Section 14 project authority, the least-cost environmentally acceptable alternative is selected as the TSP. Alternative 2 involves the removal and replacement of 2,100 ft of existing seawall. Beach material excavated during construction would be replaced at the beach in front of the completed structure so that no loss of beach sand would result. The Project area width is approximately 50 feet to accommodate construction of the revetment. TSP project features include:

1. Rock Revetment: 2,100 linear feet (average 40 feet wide)

2. Construction Area/Access: 2,100 linear feet alongside project feature (average 20 feet wide)
3. Staging Area: 0.2 acres

Figure 3-3. Project Feature Map

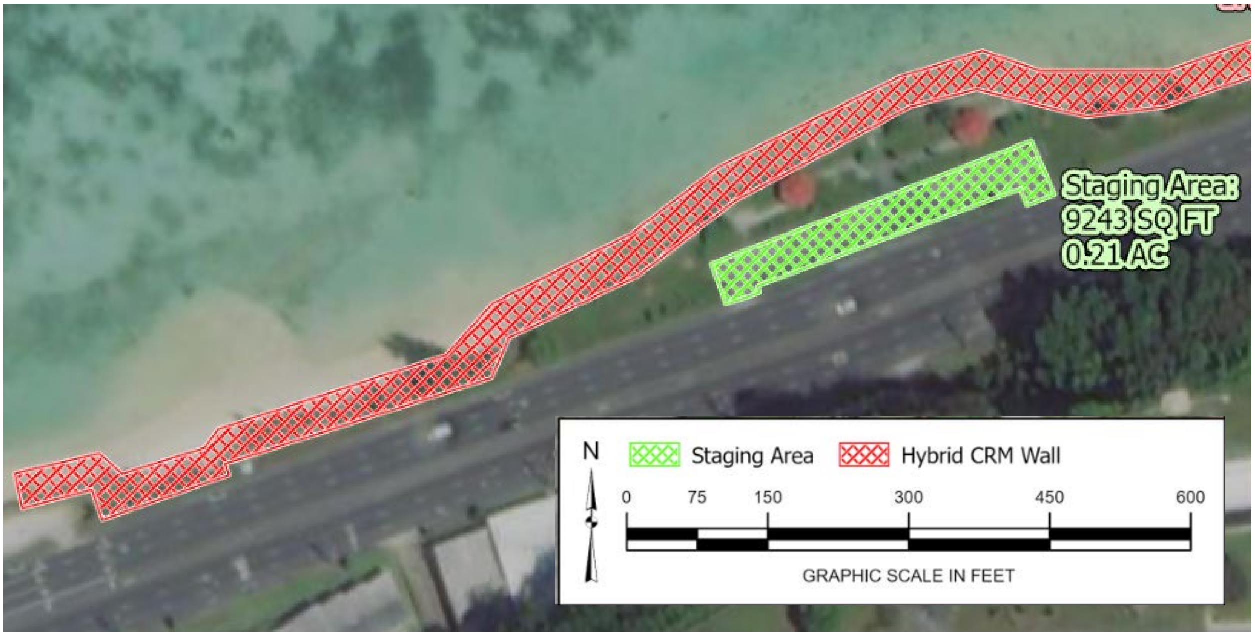

Figure 3-4. Project Detail Map 1

Figure 3-5. Project Detail Map 2

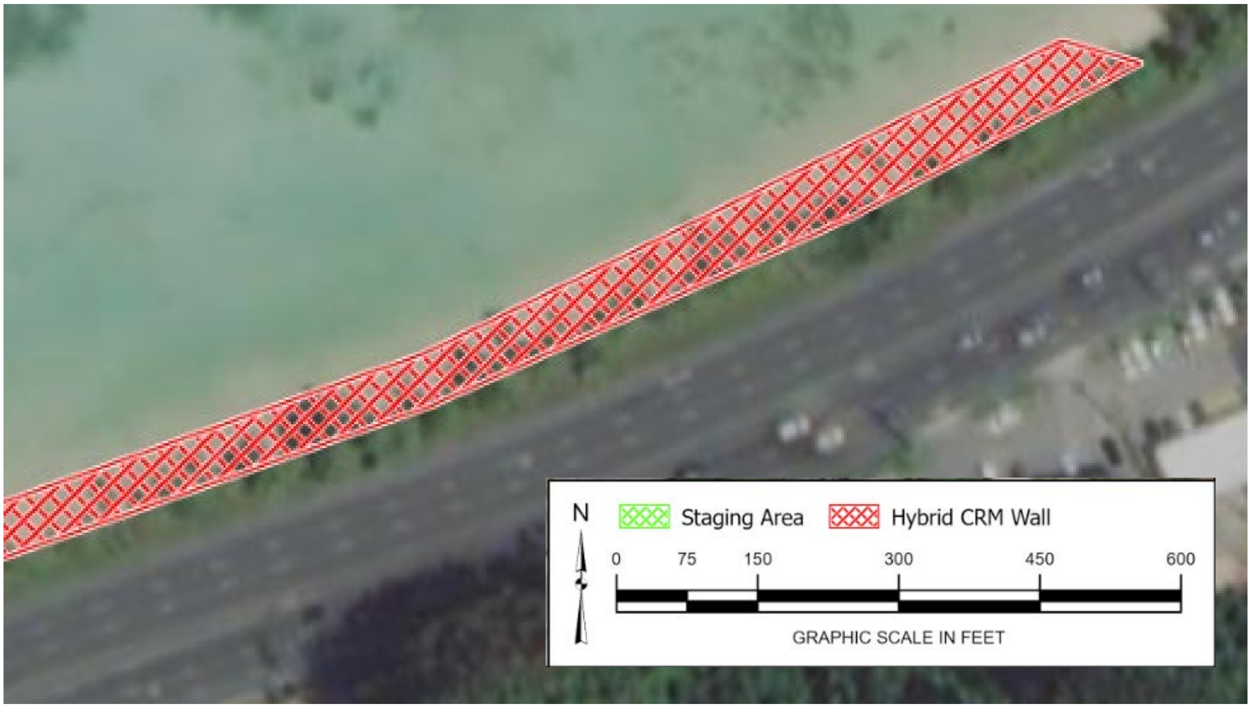

Figure 3-6. Project Detail Map 3

3.2 Structures in the Area

As the proposed project footprint is located along the shoreline, project features are not anticipated to affect structures in the area.

3.3 Staging and Construction

Storage of material and equipment will be required, and a staging area has been identified adjacent to the rock revetment. Any material stored in the staging area would be covered to reduce the loss of material due to erosion and avoid impacts to the adjacent environment. The staging area would be restored upon construction completion.

Construction of the revetment would occur using conventional land-based earth moving equipment. The revetment would be constructed from the toe (-2.5 ft. MSL) up to the crest elevation (+9ft. MSL). The limestone bench will need to be excavated approximately 1-1.5 ft. to seat the toe stone. To accommodate the crest elevation of the structure, the existing ground will need to be excavated approximately 2.3 ft. to accommodate the 1 ft. increase in elevation. Some of the excavated material from seating the crest can be used as backfill both underneath the structure and to tie the structure back to the ground elevation.

Construction is anticipated for one (1) year. Minimal operations and maintenance requirements are expected for the TSP.

3.4 Site Access

It is anticipated that personnel, equipment, and imported materials would access project construction along Marine Corps Drive parallel to the project area. Access points identified within the public roadways can be used without additional perpetual real estate interests for operations and maintenance. Access points identified adjoining construction areas outside of the public roadway will be included in the temporary work area easement.

Additionally, lateral beach access would not be interrupted by the proposed project. Two walkways from the sidewalk across the revetment to the beach are planned for the project.

3.5 Ownership by Project Feature

The following table summarizes the land areas and real estate interests by project feature and ownership.

Table 3-1. Real Estate Interest Required by Project Feature

Project Feature	Lot Number	Approximate Area (Acres)	Owner	Zoning/ Property Class	Interest Required
1. Rock Revetment	Public	1.5	Public	Recreation	Flood protection levee easement (perpetual)
2. Construction Area/Access	Public	1.0	Public	Recreation	Temporary work area easement (1 year)
3. Staging Area	Public	0.2	Public	Recreation	Temporary work area easement (1 year)

See Figures 3-3 to 3-6.

1. Rock Revetment: 2,100 linear feet (average 40 feet wide)
2. Construction Area/Access: 2,100 linear feet alongside project feature (average 20 feet wide)
3. Staging Area: 0.2 acres

4 Sponsor’s Real Estate Interests

Based on a review of information from the Guam Department of Land Management and 2020 real property tax assessment rolls provided by the Guam Department of Revenue and Taxation, the Government of Guam holds title to the project features. Therefore, no acquisition is anticipated for:

1. Rock Revetment: 2,100 linear feet (average 40 feet wide)
2. Construction Area/Access: 2,100 linear feet alongside project feature (average 20 feet wide)
3. Staging Area: 0.2 acres

5 Estates Required

The NFS will provide all LERRDs required for the construction, operation, and maintenance of the project. The NFS is instructed to acquire the minimum real estate interests necessary for the project. LERRDs required for the proposed project include:

5.1 Flood Protection Levee Easement

1. Rock Revetment: 1.5 acres.

The minimum estate required for the rock revetment is a perpetual flood protection levee easement totaling approximately 1.5 acres.

<u>Flood Protection Levee Easement Standard Estate</u>

A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos, ____, ____ and ____) to construct, maintain, repair, operate, patrol, and replace a flood protection (levee) (floodwall)(gate closure) (sandbag closure), including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land 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.

5.2 Temporary Work Area Easement

2. Construction Area: 1.0 acres
3. Staging: 0.2 acres

The minimum estate required for construction and staging, including access, is a temporary work area easement totaling approximately 1.2 acres. The temporary work area easement is estimated to be required for one (1) year during project construction.

<u>Temporary Work Area Easement Standard Estate</u>

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 of possession 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.

6 Federal Projects/Ownership

Any interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit. There are no current proposed project features with prior Federal project credit. Additionally, there are no Federally owned lands within the LERRDs required for the proposed project.

7 Navigation Servitude

The navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (U.S. CONST. art.I, §8,cl.3) to use, control, and regulate the navigable waters of the United States and the 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. 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.

Generally, it is the policy of the USACE to utilize the navigation servitude in all available situations, whether or not the project is cost-shared or fully Federally funded. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or another project to which a navigation nexus can be shown. Navigation servitude is not applicable to this Study.

8 Maps

Maps are intended as a preliminary tool to illustrate the Study area and required LERRDs. During the Planning, Engineering, & Design (PED) phase, detailed real estate drawings will be provided to the NFS in a Notice to Acquire (NTA) LERRDs. For the Study location and Study area, refer to Figures 3-1 and 3-2. For LERRDs requirements, refer to Figures 3-3 to 3-6.

9 Induced Flooding

It is not anticipated that the proposed project would cause any induced flooding.

10 Baseline Cost Estimate for Real Estate

The baseline cost estimate for all project LERRDs is estimated at $697,600, which includes required interests, relocation assistance, incremental real estate contingency, and incidental acquisition costs for both the NFS and Government.

Table 10-1. Baseline Cost Estimate for Real Estate

Real Estate Requirement	Size (Acres)	Cost Estimate
Flood Protection Levee Easements	1.5 acres	$542,500
Temporary Work Area Easements	1.2 acres	$108,400
Improvements		$0
Hazard Removals		$0
Mineral Rights		$0
Damages		$0
Facility/Utility Relocations		$0
Uniform Relocation Assistance		$0
Incremental Real Estate Costs		$32,500
Incidental Acquisition Costs: NFS		$8,000
Incidental Acquisition Costs: Government		$6,200

TOTAL		**$697,600**

The values for structural features of the baseline cost estimate were obtained from a Land Cost Estimate Report prepared by a licensed USACE appraiser, Northwestern Division, effective September 1, 2022. In accordance with USACE Real Estate Policy Guidance Letter 31, Real Estate Support to Civil Works Planning, a cost estimate is sufficient for projects in which the value of LERRDs is not expected to exceed 15 percent of total project costs. A cost estimate is not an appraisal as defined by the Uniform Standards Professional Appraisal Practice (USPAP); however, it conforms to USACE regulations. Cost is an estimate of fact, not an opinion of value, based upon land planning and engineering design parameters at a specific level of detail. As the design parameters are refined, the engineering and land planning facts may change necessitating a change in the cost estimate.

Incremental real estate costs are estimated at 5% of required real estate costs (flood protection levee easements and temporary work area easements) for risk-based contingencies.

Incidental acquisition costs are estimated to include NFS costs incurred for title work, appraisals, review of appraisals, coordination meetings, review of documents, legal support, and other costs that are incidental to project LERRDs as well as Government costs for staff monitoring and reviewing and approving LERRDs.

11 Public Law 91-646 Relocation Benefits

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, PL 91-646, as amended, commonly called the Uniform Act, is the primary law for acquisition and relocation activities on Federal or federally assisted projects and programs. The NFS is required to follow the guidance of PL 91-646.

No displacement of towns or persons will occur, and there will be neither habitable nor commercial structures affected as a result of the proposed project. The proposed project is not eligible for the provisions of PL 91-646 related to relocation expenses.

12 Minerals, Timber, and Crop Activity

There are no known surface or subsurface minerals that would impact the proposed project. Additionally, no known timber or crops are anticipated to be affected by the proposed project.

13 Assessment of Sponsor's Acquisition Capability

An Assessment of the NFS's Real Estate Acquisition Capability will be conducted jointly with the NFS in preparation for the final Real Estate Plan. A sample Sponsor's Acquisition Capability Assessment is included in Attachment 1.

14 Zoning

According to the Guam Department of Land Management, Planning Division, all lands required for project features are zoned Recreational. Preliminary investigations indicate that no enactments of zoning ordinances are proposed in lieu of, or to facilitate, acquisition in connection with the proposed project.

15 Acquisition Milestones

The following preliminary schedule estimates fifteen (15) months for NFS LERRDs planning and acquisition. The planned timeline below will be mutually agreed upon by USACE Real Estate, Project Management, and the NFS.

The NFS's preliminary acquisition planning is estimated at seven (7) months as follows:

Survey/Map/Title	90 Days
Legal Description	30 Days
Appraisal	90 Days

The NFS's LERRD acquisition is estimated at eight (8) months as follows:

Documentation	90 Days
Negotiation	120 Days
Payment	60 Days
LERRD Certification	30 Days

16 Public Facility or Utility Relocations

A preliminary review of the Civil Engineering Appendix and aerial maps indicate, at this phase of design, there are no utility or facility relocations anticipated for the proposed project. Additional utility and facility review will occur as project feature design is refined. The minimal risk of facility/utility relocations is included in the current cost estimate contingency.

17 Environmental Impacts

Potential environmental impacts resulting from the proposed project are being considered, including investigation under the National Environmental Policy Act (NEPA), Hazardous, Toxic, and Radioactive Waste (HTRW) Policy, National Historic Preservation Act (NHPA), Clean Water Act, Endangered Species Act, Coastal Zone Management Act, Fish and Wildlife Coordination Act, and Magnuson-Stevens Fishery Conservation and Management Act.

National Environmental Policy Act (NEPA)
It is assumed that an Environmental Assessment is the appropriate NEPA document for the final array of alternatives. Environmental analysis will comply with all environmental laws applicable. Analysis will be completed by relying on existing literature, remote sensing technologies, and data available from other agencies.

Hazardous, Toxic, and Radioactive Waste (HTRW) Policy
In Guam, Unexploded Ordinance (UXO) is a danger with any ground disturbance beneath or outside the current wall base.

National Historic Preservation Act (NHPA)
In accordance with Section 106 of the National Historic Preservation Act (NHPA), USACE will consult with the Guam Historic Preservation Division, indigenous groups, and other interested individuals during the feasibility study process. Formal NHPA Section 106 consultation was initiated in February 2022.

18 Landowner Concerns

No landowner concerns are anticipated at this time. Discussions between the NFS and landowners are ongoing as plan is refined. The Government of Guam supports Alternative 2 as the TSP. Alignment for the support was coordinated with the Governor of Guam. Concurrent with the draft decision document release, the study team expects to coordinate a site visit to Guam to complete necessary outreach with the public, local agencies, and stakeholders, including the Guam Department of Planning and Development, Department of Land Management, Guam EPA, Department of Public Works, Guam Restoration & Development Authority, and Bureau of Statistics & Plans.

19 Notification to Sponsor

The NFS, Government of Guam, represented by the Guam Department of Public Works, is involved in the planning process. The NFS will be provided a Local Sponsor Toolkit and advised of the risks of acquiring LERRDs before the execution of the PPA. A Sample Letter Advising Against Early Acquisition is included in Attachment 2.

Additionally, once the LERRDs are finalized, a Notice to Acquire Letter will be transmitted to the NFS. The Notice to Acquire Letter serves as the formal instruction for the NFS to acquire the real estate interests needed for the proposed project. A Sample Notice to Acquire Letter is included in Attachment 3.

20 Other Relevant Real Estate Issues

There are no other known relevant real estate issues in the Study area.

21 References

Guam Department of Land Management, Planning Division, “Zoning Maps,” retrieved February 2021.

Guam Department of Land Management, Survey Division, “GIS Maps,” retrieved July 2022.

U.S. Army Corps of Engineers, Honolulu District. *East Hagatna, Guam, Emergency Shoreline Protection Integrated Feasibility Report,* July 2022.

U.S. Army Corps of Engineers, Northwestern Division. *Land Cost Estimate,* effective September 1, 2022.

Attachment 1: Sponsor's Acquisition Capability Assessment

Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability

Project: East Hagatna, Guam, Emergency Shoreline Protection Project
Project Authority: Continuing Authorities Program (CAP) Project, as authorized under Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r)
Non-Federal Sponsor: Government of Guam
Guam Department of Public Works
Name, Title
Address
Phone, email

Legal Authority	**Yes**	**No**
1. Does the NFS have legal authority to acquire and hold title to real property for project purposes? (statutory citation)		
2. Does the NFS have the power of eminent domain for the project (statutory citation)		
3. Does the NFS have "quick-take" authority for this project?		
4. Are there any lands/interests in land required for the project that are located outside the NFS's authority boundary?		✓
5. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?		
6. Will the NFS's in-house staff require training to become familiar with the real estate requirements of Federal projects, such as PL 91-646, as amended?		
7. If #6 is yes, has a reasonable plan been developed to provide training?		NA
Willingness to Participate	**Yes**	**No**
8. Has the NFS stated its general willingness to participate in the project and its understanding of the general scope and role?		
9. Is the NFS agreeable to signing a Project Partnership Agreement and supplying funding as stipulated in the agreement?		
10. Was the NFS provided the Local Sponsor Toolkit? Date		
Acquisition Experience and Capability	**Yes**	**No**
11. Taking into consideration the project schedule and complexity, does the NFS have the capability, with in-house staffing or contract support, to provide the necessary services, including surveying, appraisal, title, negotiation, condemnation, closing, and relocation assistance, as required for the project?		
12. Is the NFS's projected in-house staffing level sufficient considering its workload?		
13. Can the NFS obtain contractor support, if required, in a timely manner?		
14. Is the NFS's staff located within reasonable proximity to the project site?		
15. Will the NFS likely request USACE assistance in acquiring real estate?		
Schedule Capability	**Yes**	**No**
16. Has the NFS approved the tentative project real estate schedule and indicated its willingness and ability to utilize its financial, acquisition, and condemnation capabilities to provide the necessary project LERRDs in accordance with the proposed project schedule so the Government can advertise and award a construction contract as required by overall project schedules and funding limitations? The anticipated NFS real estate acquisition timeframe for the project is twelve (12) months. **NFS Initials:**		

LERRD Crediting	Yes	No
17. Has the NFS indicating its understanding of LERRD credits and its capability and willingness to gather the necessary information to submit LERRD credits within six (6) months after possession of all real estate and completion of relocations so the project can be financially settled? **NFS Initials:**		

Past Action and Coordination	Yes	No
1. Has the NFS performed satisfactorily on other USACE projects?		
2. Has the assessment been coordinated with NFS?		
3. Does the NFS concur with the assessment? (provide explanation if no)		

With regard to the project, the NFS is anticipated to be:	Select One
Fully Capable: previous experience; financial capability; authority to hold title; in-house staff can perform necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Moderately Capable: financial capability; authority to hold title; can perform, with contract support, necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Marginally Capable: financial capability; authority to hold title; will rely on approved contractors to provide necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Insufficiently Capable (provide explanation): financial capability; will rely on another entity to hold title; will rely on approved contractors to provide necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	

USACE Prepared by:	NFS Reviewed by:
Tiffany Murray Realty Specialist USACE Honolulu District	Name Title Office
Date:	Date:

USACE Approved by:	
Considering the capability of the NFS and the ancillary support to be provided by contract services, it is my opinion that the risks associated with LERRDs acquisition and closeout of the project have been properly identified and mitigated.	
Erica Labeste Chief, Real Estate Branch U.S. Army Corps of Engineers Honolulu District	Date:

Attachment 2: Sample Letter Advising Against Early Acquisition

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

August 17, 2022

Real Estate Division

SUBJECT: East Hagatna, Guam, Emergency Shoreline Protection Project, Risks of Early Acquisition

Name
Title, Office
Address
City, State

Dear xx:

Reference is made to the East Hagatna, Guam, Emergency Shoreline Protection Integrated Feasibility Report, Continuing Authorities Program (CAP) Project, as authorized under Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r). The Guam Department of Public Works on behalf of the Government of Guam, as the Non-Federal Sponsor, is responsible for ensuring that it possesses the authority to acquire and hold title for all real property required for the proposed project. The Non-Federal Sponsor shall provide one hundred percent (100%) of the lands, easements, rights-of-way, utility or public facility relocations, and dredged or excavated material disposal areas (LERRDs) as well as operation, maintenance, and repair required by the project.

The United States Army Corps of Engineers, Honolulu District, advises your office that there are risks associated with the acquisition of LERRDs prior to the execution of a Project Partnership Agreement (PPA) or Local Cooperation Agreement (LCA). The Government of Guam will assume full and sole responsibility for any and all costs and liabilities arising out of premature acquisition. Project risks generally include, but are not limited to:

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/LCA mutually agreed to by the Non-Federal Sponsor and the Government may not be executed;

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 interest or estates that are later determined by the Government to be inappropriate, inefficient, or otherwise not required for the project;

f. The Non-Federal Sponsor may initially acquire insufficient or excessive real property acreage, which could result in additional negotiations and or/benefit payments under Public Law 91-646 or additional payment of fair market value to affected landowners;

g. The Non-Federal Sponsor may incur costs or expenses in connection with its decision to acquire LERRDs in advance of the executed PPA/LCA and the Government's Notice to Acquire (NTA).

If you have further questions, please contact the USACE Honolulu District, Real Estate Branch, at (808) 835-4055.

Sincerely,

Erica Labeste
Chief, Real Estate Branch
U.S. Army Corps of Engineers
Honolulu District

Attachment 3: Sample Notice to Acquire Letter

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

August 17, 2022

Real Estate Division

SUBJECT: East Hagatna, Guam, Emergency Shoreline Protection Project, Notice to Acquire

Name
Title, Office
Address
City, State

Dear xx:

This letter serves as your Notice to Acquire the real estate interests needed from the Government of Guam for the East Hagatna, Guam, Emergency Shoreline Protection, Continuing Authorities Program (CAP) Project, as authorized under Section 14 of the Flood Control Act of 1946, as amended (33 U.S.C. § 701r). Enclosed are the final Authorization for Entry for Construction, Attorney's Certificate of Authority, and project real estate drawings. Also enclosed is the standard language to be used for the Flood Protection Levee Easement and Temporary Work Area Easement conveyance documents between the Government of Guam, as the Non-Federal Sponsor, and private landowners.

In accordance with the Project Partnership Agreement (PPA) dated xx, the Government of Guam is responsible for xx% of project costs and shall provide the real property interests and relocations required for the construction, operation, and maintenance of the project. As required by the PPA, the U.S. Government has determined the Flood Protection Levee Easements and Temporary Work Area Easements as shown on the real estate drawings are required for project implementation. The PPA also requires the Government of Guam to comply with the Uniform Relocations and Assistance and Real Property Acquisition Policies Act. 42 U.S.C. § 4601, et. seq., and the Uniformed Regulations, 49 C.F.R. part 24. More information can be found at http://www.fhwa.dot.gov/realestate/realprop.

After acquisition of the required real estate interests, the Government of Guam shall complete and sign the Authorization for Entry for Construction and Attorney's Certificate of Authority. Please return the original signed authorization documents to the Corps of Engineers, Honolulu District Real Estate Branch, by mail to the address contained in the letterhead. In addition, the Government of Guam shall provide copies of all conveyance documents for required real estate acquisitions to the Corps of Engineers. The Corps of Engineers requires the conveyance documents prior to advertising a construction contract. Copies of conveyance documents may be scanned and submitted electronically to the contact person below.

If you have any questions, please contact Tiffany Murray, Realty Specialist, at (808) 835-4065 or tiffany.murray@usace.army.mil.

Sincerely,

Erica Labeste
Chief, Real Estate Branch
U.S. Army Corps of Engineers
Honolulu District

Enclosures