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Programmatic Environmental Assessment for Implementation of the Tyndall Air Force Base Coastal Resilience Implementation Plan

Prepared for

Air Combat Command
325th Fighter Wing
Tyndall AFB, Florida

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Contents

Figures

Acronyms and Abbreviations

325 CES/CEIE	325th Civil Engineer Squadron/Environmental Element
325 CES/CEIEC	325th Civil Engineer Squadron, Environmental Element, Compliance
ACAM	Air Conformity Applicability Model
ACM	asbestos-containing materials
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFMAN	Air Force Manual
AICUZ	Air Installations Compatibility Use Zones
avg.	average
BA	Biological Assessment
BASH	bird/wildlife aircraft strike hazard
BFE	base flood elevation
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CH_4	methane
CIE	Crooked Island East
CIW	Crooked Island West
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRIP	Coastal Resilience Implementation Plan
CRO	Cultural Resources Office
CT	Census Tract
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DAF	Department of the Air Force
dB	decibel(s)
dBA	A-weighted decibel(s)
DEP	Florida Department of Environmental Protection
DFE	design flood elevation
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EFH	Essential Fish Habitat
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
ESA	Endangered Species Act
FCMP	Florida Coastal Management Program
FEMA	Federal Emergency Management Agency
FL	functional loss
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
ft^2	square foot (feet)
FWC	Florida Fish and Wildlife Conservation Commission

GIS	geographic information system
HCD	Habitat Conservation Division
HCMB	Horseshoe Creek Mitigation Bank
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
LBP	lead-based paint
MBTA	Migratory Bird Treaty Act
MHW	mean high water
MLLW	mean lower low water
msl	mean sea level
mtpy	metric ton(s) per year
N/A	not applicable
N_2O	nitrous oxide
NA	not available
NAAQS	National Ambient Air Quality Standards
NAVD 88	North American Vertical Datum of 1988
NBS	nature-based solutions
NEI	National Emissions Inventory
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NTU	nephelometric turbidity unit
NWI	National Wetlands Inventory
OSHA	Occupational Safety and Health Administration
PEM	Palustrine Emergent
PFAS	perfluoroalkyl and polyfluoroalkyl substances
PFO	Palustrine Forested
PSS	Palustrine Scrub Shrub
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
POL	petroleum, oil, and lubricants
PRD	Protected Resources Division
PSD	Prevention of Significant Deterioration
RCW	red-cockaded woodpecker
RICE	Reciprocating Internal Combustion Engine
ROI	region of influence
SAV	submerged aquatic vegetation
SC GHG	social costs of greenhouse gas
SEARCH	Southeastern Archaeological Research, Inc.
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TNC	The Nature Conservancy
tpy	ton(s) per year

U.S.	United States
UF	University of Florida
UFC	Unified Facilities Criteria
UMAM	Uniform Mitigation Assessment Method
USACE	U.S. Army Corps of Engineers
USC	*United States Code*
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WOTUS	waters of the United States
WWTP	wastewater treatment plant

1. Purpose and Need for Action

1.1 Introduction

The Department of the Air Force (DAF) proposes to implement the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP) (DAF 2022), which has been developed to improve the resilience of Tyndall AFB against storm-surge inundation, sea-level rise, and associated coastal flooding impacts through traditional and nature-based solutions (NBS). The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the base. Four NBS pilot projects are also proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These are the first NBS projects proposed to be implemented under the CRIP and include creation of a living shoreline breakwater, oyster reef breakwater, and shoreline stabilization breakwater, and enhancement of seagrass habitat.

The DAF has prepared this Environmental Assessment (EA) to analyze the potential environmental impacts associated with implementing the Tyndall AFB CRIP and the four associated NBS pilot projects. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) (42 *United States Code* [USC] 4331 et seq.), the regulations of the Council on Environmental Quality (CEQ) that implement NEPA procedures (40 *Code of Federal Regulations* [CFR] 1500–1508), and 32 CFR 989, "Environmental Impact Analysis Process (EIAP)."

Tyndall AFB is approximately 13 miles east of Panama City in the southeastern corner of Bay County, Florida (Figure 1-1). The base is approximately 18 miles long by 3 miles wide and encompasses approximately 29,276 acres on a peninsula that is surrounded by the waters of the Gulf of Mexico to the south, St. Andrew Bay to the west, and East Bay to the north. The flood defense strategies recommended in the Tyndall AFB CRIP include a combination of traditional structural options such as constructing levees and floodwalls around flood-prone areas, nonstructural options such as elevating flood-prone facilities, and NBS options to be implemented where appropriate throughout Tyndall AFB and adjacent nearshore waters. All the flood defense strategies recommended in the CRIP are conceptual and analyzed on a programmatic level in this EA. In contrast, this EA provides a detailed analysis of the four proposed pilot projects, which would be the first NBS projects implemented under the CRIP. These projects have defined locations, layouts, and materials and, therefore, are analyzed in detail in this EA. All the other traditional and NBS options under the CRIP that are analyzed programmatically in this EA would undergo separate environmental review by Tyndall AFB if they are proposed to be implemented in the future. The subsequent environmental review of these projects can be tiered off the analyses in this Programmatic EA, as applicable.

1.2 Purpose and Need for Action

The purpose of the Proposed Action is to improve the resilience of Tyndall AFB against storm-surge inundation and associated coastal flooding impacts through the implementation of the CRIP and proposed NBS pilot projects. The traditional and NBS strategies identified in the CRIP have been developed for this purpose and address current flood risks and future flooding potential at the base. The Proposed Action is needed to (1) address Tyndall AFB's susceptibility to coastal flooding based on its low elevations and location in a hurricane-prone area and (2) minimize disruptions to Tyndall AFB's military mission from storm-related flooding of critical base infrastructure and operational areas.

Figure 1-1. Location of Tyndall Air Force Base

1.3 Intergovernmental Tribal Consultation

Consistent with National Historic Preservation Act (NHPA) of 1966 implementing regulations (36 CFR 800), Department of Defense (DoD) Instruction 4710.02, *DoD Interactions with Federally Recognized Tribes*, Department of the Air Force Instruction 90-2002, *Interactions with Federally Recognized Tribes*, and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*, the DAF is consulting with federally recognized tribes that are historically affiliated with the geographic region being considered for the Proposed Action regarding the potential to affect properties of cultural, historical, or religious significance to the tribes. The tribal coordination process is distinct from NEPA consultation or the intergovernmental coordination processes and requires separate notification of all relevant tribes. The timelines for tribal consultation are also distinct from those of intergovernmental consultations.

Six federally recognized Native American tribes have a historic affiliation with the area encompassed by Tyndall AFB and its vicinity; these tribes are the Miccosukee Tribe of Indians of Florida, Muscogee (Creek) Nation, Seminole Tribe of Florida, Seminole Nation of Oklahoma, Poarch Band of Creek Indians, and Thlopthlocco Tribal Town. Intergovernmental consultation between Tyndall AFB and the six affiliated tribes on the Proposed Action is being conducted in accordance with Section 106 of the NHPA and its implementing regulations. Scoping letters for the Proposed Action were sent to the affiliated tribes on April 6, 2023. The draft EA was sent to the tribes for review and comment on [TBD]. Documentation of

intergovernmental consultation on the Proposed Action is included in Appendix A. Comments received from the tribes are addressed in Section 3.4.

1.4 Public Participation

A public notice was published in the *Panama City News Herald* on September 8, 2022 (Appendix B), to announce the 30-day early public review period for the Proposed Action, which is required by Section 2(b) of Executive Order (EO) 11990, "Protection of Wetlands," and Section 2(a)(4) of EO 11988, "Floodplain Management," to provide opportunity for early public review of proposed federal actions in wetlands or floodplains. This notice specifically applies to the four in-water pilot projects that are analyzed in detail in this EA. All other flood defense strategies presented in the CRIP are conceptual at this stage and would have their own public notice in the future if they are proposed to occur in wetlands and/or floodplains. No comments were received in response to the early public notice.

A Notice of Availability is being published in the *Panama City News Herald* to announce the 30-day availability of the draft EA and Finding of No Significant Impact (FONSI)/Finding of No Practicable Alternative (FONPA) for public review and comment. Copies of the draft EA and FONSI/FONPA are being made available for public review at the Bay County Public Library and on the Tyndall AFB public website. Comments from the public will be included in Appendix B and addressed in the final EA.

1.5 Interagency Consultation

In compliance with NEPA guidance, the environmental analysis process includes the coordination of the Proposed Action with other pertinent agencies and organizations. This interagency consultation occurs during early scoping prior to the development of the EA and during subsequent review of the draft EA. Per the requirements of the Intergovernmental Cooperation Act of 1968 (42 USC Section 4231[a]) and EO 12372, "Intergovernmental Review of Federal Programs," federal, state, and local agencies with jurisdiction are being consulted for their input on the Proposed Action, including the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FWC), State Historic Preservation Office (SHPO), and other state agencies through the Florida State Clearinghouse. Scoping letters for the Proposed Action were sent to NMFS, USFWS, FWC, and SHPO on March 13, 2023. A Phase I submerged archaeological resources survey was conducted for the four pilot projects in March 2023. The draft survey report was sent to SHPO on November 10, 2023. The draft EA was sent to these agencies for review and comment on [TBD]. Review of the draft EA by other state agencies was coordinated by the Florida Department of Environmental Protection (DEP) through the Florida State Clearinghouse. Documentation of interagency consultation on the Proposed Action is included in Appendix A.

1.5.1 Coastal Zone Management Consistency

The federal Coastal Zone Management Act (CZMA) provides assistance to states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. According to Section 307 of the CZMA, federal projects that affect land uses, water uses, or coastal resources in a state's coastal zone must be consistent, to the maximum extent practicable, with the enforceable policies of that state's federally approved coastal zone management plan.

The Florida Coastal Management Program (FCMP) is based on a network of agencies implementing 24 statutes that protect and enhance Florida's natural, cultural, and economic coastal resources. DEP implements the FCMP through the Florida State Clearinghouse. The Clearinghouse routes applications for federal activities, such as EAs, to the appropriate state, regional, and local reviewers to determine federal agency consistency with the FCMP. Following their review of the EA, the FCMP state agencies provide comments and recommendations to the Clearinghouse based on their statutory authorities. Based on an evaluation of the comments and recommendations, DEP makes the state's CZMA consistency determination for the proposed federal activity. Comments and recommendations regarding federal agency consistency are then forwarded to the applicant in the state clearance letter issued by the Clearinghouse.

A copy of the draft EA and the DAF's federal CZMA consistency determination, provided as Appendix C, were sent to the Florida State Clearinghouse on [TBD], to obtain the state's concurrence and comments. Documentation of CZMA consistency consultation on the Proposed Action is included in Appendix A.

2. Proposed Action and Alternatives

2.1 Proposed Action

2.1.1 CRIP Implementation

The Proposed Action is to implement the Tyndall AFB CRIP (DAF 2022), which has been developed to guide coastal resilience planning and implementation at Tyndall AFB in concert with the mission of the base. Tyndall AFB is highly susceptible to storm surge impacts based on its low elevations and location in a hurricane-prone area. Coastal resilience planning has been emphasized throughout the recovery and rebuilding of Tyndall AFB following Hurricane Michael, which made landfall at the base as a Category 5 hurricane in October 2018. The Tyndall AFB CRIP has been developed to improve the resilience of the base against coastal flooding impacts from strong storms and sea-level rise, which are expected to increase over time due to climate change. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure and operational areas at the base to minimize disruptions to the military mission. It is intended to guide coastal resilience project planning, design, funding, and implementation at Tyndall AFB through the evolution of coastal flood risk expected to occur over time. Specifically, the CRIP analyzes long-term coastal resilience out to Year 2100 with emphasis on improvements needed over the next 40 years for mission assurance. The CRIP will be implemented by the 325th Fighter Wing in coordination with the Air Force Civil Engineer Center (AFCEC) Natural Disaster Recovery, Tyndall Integration Branch.

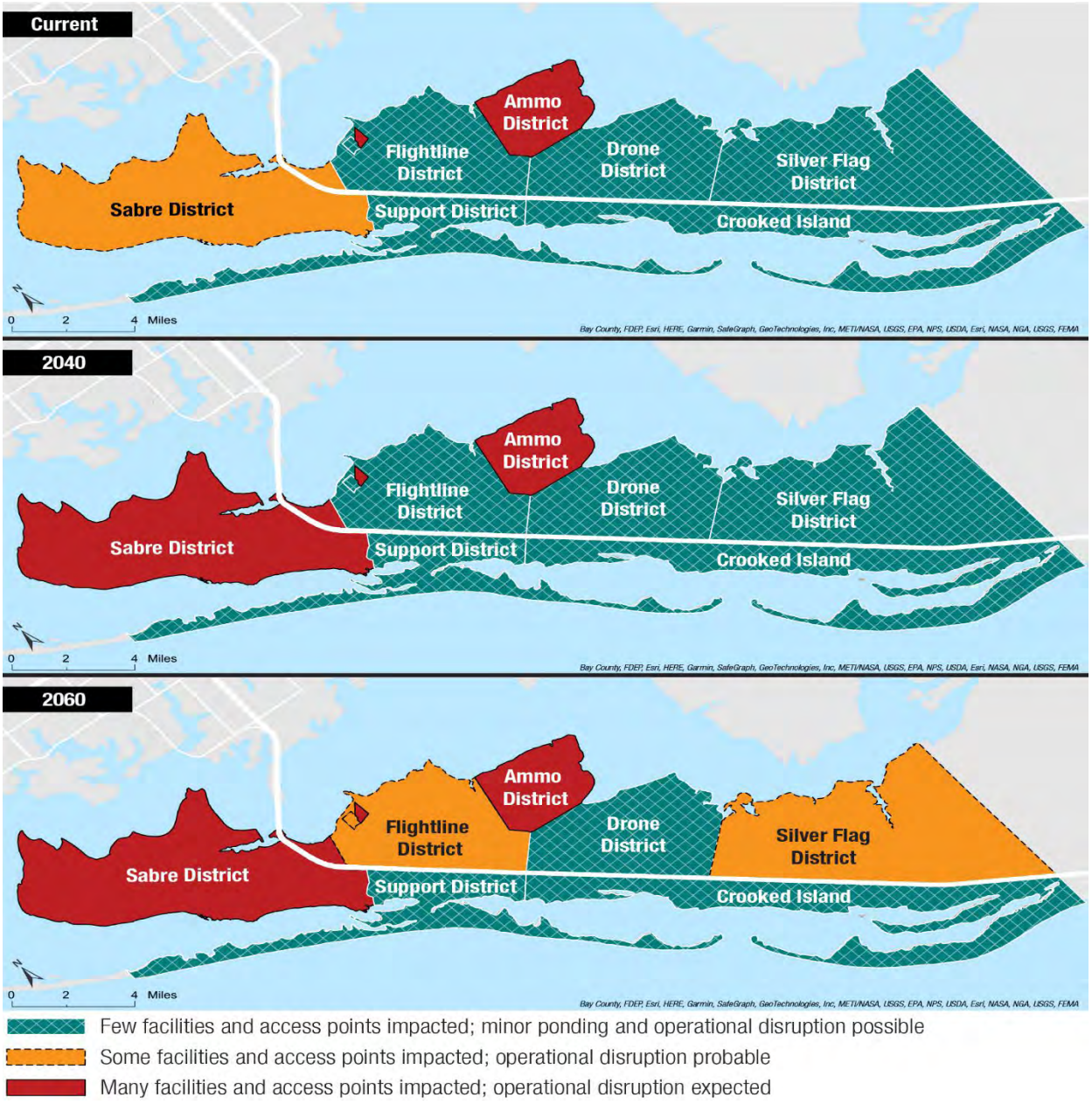
Long-term flooding impacts are evaluated in the CRIP for years 2040, 2060, 2080, and 2100. Future flood scenarios for the various districts of the base were developed based on the sea-level rise projection for 2100 published in the online Department of Defense Regional Sea Level database (DoD 2022) and the sea-level rise projections under the High sea-level rise scenario for 2040, 2060, and 2080 published in National Oceanic and Atmospheric Administration (NOAA) Technical Report NOS CO-OPS 083, *Global and Regional Sea Level Rise Scenarios for the United States* (NOAA 2017). The flood scenarios are modeled for the 100-year storm event, which is a storm that has a 1 percent chance of occurring (equaled or exceeded) in any given year. The future 100-year flood scenarios were built using the base flood elevation (BFE) and incorporating dynamic coastal flood modeling conducted by Jacobs. Figure 2-1 shows the predicted flood exposure of Tyndall AFB's seven districts in the current state, in 2040, and in 2060, in terms of facility and operational impacts. As shown, the North, Sabre, and Flightline Districts are currently prone to flooding impacts, and the Silver Flag District and other portions of the Flightline District are expected to be impacted by 2060.

The mitigation provided by the flood defense strategies recommended in the CRIP is referenced to the design flood elevation (DFE), which was established by the DAF for the redevelopment of Tyndall AFB following Hurricane Michael (DAF 2019). Two DFEs have been established for Tyndall AFB—one for the Gulf side of the base, south of U.S. Highway 98, and one for the East Bay side of the base, north of U.S. Highway 98. The DFE levels were derived by summing the BFE (100-year flood) and the locally adjusted, highest regionalized sea-level rise scenario for Year 2100, which is 7 feet for the Tyndall AFB area. The resulting DFEs that have been established for Tyndall AFB are 19 feet above mean sea level (msl) on the Gulf side and 14 feet above msl on the East Bay side.

The flood defense strategies recommended in the CRIP include a combination of structural options such as levees and floodwalls, nonstructural options such as elevating new facilities to the DFE, and NBS options such as creating and enhancing natural landforms (and habitats) that can reduce flooding and erosion potential (for example, oyster reefs). Collectively, the recommended strategies provide a multilayered, long-term approach to protect critical infrastructure at the base. Five general flood defense options are evaluated in the CRIP for each of Tyndall AFB's seven districts.

Figure 2-1. Flood Exposure Timeline by District

Source: DAF 2022



2.1.1.1 Option 1—Elevate New Facilities to the DFE as Part of Ongoing Rebuild Program

All new facilities at Tyndall AFB are required to be constructed to the DFEs established for the redevelopment of the base following Hurricane Michael unless an exception is granted by a waiver. Two DFEs have been established for Tyndall AFB—19 feet above msl for the Gulf side of the base, south of U.S. Highway 98, and 14 feet above msl for the East Bay side of the base, north of U.S. Highway 98 (DAF 2019). The DFE levels were derived by summing the BFE (100-year flood) and the locally adjusted, highest regionalized sea-level rise scenario for Year 2100, which is 7 feet for the Tyndall AFB area. A total of 171 new facilities are planned to be constructed at Tyndall AFB as part of the ongoing rebuild program; the vast majority of these facilities would be elevated to the applicable DFE established for the base.

2.1.1.2 Option 2—Relocate, Elevate, Floodproof, or Install Flood Barriers for Existing At-risk Facilities

Option 2 includes relocation, elevation, floodproofing, or flood barrier installation for existing at-risk facilities. These resilience strategies are facility centric and involve mostly nonstructural solutions in contrast to regional structural solutions that would involve constructing levees or floodwalls around multiple facilities under Option 3. The specific protection measures under Option 2 would be selected based on the facility's function, age, asset value, and other factors.

Relocation would entail moving operations or assets from an at-risk facility to another facility that has a lower risk of flooding. Following relocation, the existing facility could be demolished or protected by the other Option 2 measures as appropriate. Elevation would apply primarily to residential homes and small nonresidential facilities. Elevation is typically accomplished by lifting the building using hydraulic jacks and extending or replacing the foundation to the desired height. At a minimum, the lowest floor of the building would be raised to the DFE along with any electrical equipment or other utilities that could be damaged by floodwaters. Levees are proposed to protect the residential areas in the Sabre District by 2100; therefore, no residential buildings at Tyndall AFB are expected to be elevated under Option 2. In total, fewer than 10 nonresidential buildings at the base are expected to be elevated for flood protection.

The Federal Emergency Management Agency (FEMA) defines wet floodproofing as measures that prevent flood damage to a structure while allowing floodwaters to enter the structure. With wet floodproofing, floodwaters that enter a building do not cause major damage because (1) interior and exterior hydrostatic pressures are equalized, which reduces the potential for structural damage or wall failures, and (2) utilities and other flood-sensitive equipment are elevated higher than the anticipated flood elevation. Wet floodproofing is conducted using flood vents and flood damage–resistant building materials such as concrete and gypsum. Wet floodproofing may have several disadvantages such as the need for a drainage or pump system, extensive cleanup after a flood event, and regular maintenance requirements. In the Tyndall AFB CRIP, wet floodproofing is the nonstructural solution for facilities categorized as warehouse, storage, and hangar buildings. The CRIP identified a total of 20 buildings at Tyndall AFB as candidates to receive wet floodproofing. Most of the identified buildings are in the Flightline (7) and Crooked Island (4) Districts.

Dry floodproofing includes measures to prevent floodwater from entering a building by making the building watertight, including the doors, windows, vents, other wall openings, and associated utilities and equipment. Dry floodproofing methods include using waterproof sealants, shields, and wall membranes; sealing or eliminating wall openings below expected flood levels; and using sump pumps and backflow valves to address interior drainage. Such methods are most effective for relatively shallow flooding with floodwater levels less than 3 feet. Dry floodproofing is most appropriate for slab-on-grade buildings with concrete or masonry walls. In the Tyndall AFB CRIP, dry floodproofing is the nonstructural solution for all facilities categorized as training, operation, and community support buildings. Dry floodproofing is not permitted within coastal high hazard areas, shown as Zone V, V1-V30 and VE, on FEMA Flood Insurance Rate Maps, where buildings are subject to wave action. The CRIP identified a total of 118 buildings at Tyndall AFB as candidates to receive dry floodproofing. Most of the identified buildings are in the Flightline (43) and Support (27) Districts.

Flood barriers under this option include temporary or permanent barriers that could be installed around individual facilities. There are several commercially available flood barrier products, including barriers that deploy automatically as water rises. For manual barriers, consideration should be given to how quickly and easily the barrier can be installed in response to an expected flood event.

2.1.1.3 Option 3—Implement a Structural Solution, such as a Levee or Floodwall

Option 3 would involve constructing an earthen levee or concrete floodwall around multiple facilities. Regional structural solutions such as levees and floodwalls should be considered where a group of facilities built close to each other are exposed to flooding and where floodproofing individual facilities is less practicable than a regional approach or is not feasible based on the expected depth of inundation.

Earthen levees under Option 3 would be constructed of low-permeability material (clay) with the crown (top) of the levee set at 1 foot above the DFE. Each levee would have a crown width of 10 feet, side slopes of 3 to 1 horizontal to vertical, and a 10-foot clear zone on each side of the levee toe that would be maintained by mowing for access and inspection. To maintain the crown 1 foot above the DFE, the height of each levee would vary based on the existing ground elevation along the alignment. The varying height of each levee would result in varying base (bottom) widths and fill volumes.

Floodwalls serve the same purpose as levees but are concrete wall structures instead of earthen berms. Floodwalls are relatively narrow and lack side slopes; therefore, they have smaller footprints than most levees. Floodwalls under Option 3 would be pile-founded, reinforced concrete T-walls. They would consist of a vertical wall with an inverted-T base supported by pipe or H-piles driven to the required depth to support the loads of the T-wall and withstand the forces estimated for the design flood event. A sheet pile also would be driven beneath the T-wall base to control seepage. The above-grade vertical wall of each floodwall would be approximately 3 feet wide. The top of the floodwall would be set at 1 foot above the DFE; therefore, the floodwall would have varying height along the footprint depending on the ground elevation. The below-grade base width would be greater on the flood side of the structure. A typical T-wall base may be 8 feet wide on the flood side and 3 feet wide on the land site. A 15-foot clear zone would be maintained on both sides of the floodwall for access and inspection. A floodwall could be an alternative to a levee for a given site. Floodwalls also are required to be incorporated into ring levee systems where space constraints prohibit construction of an earthen levee or where a gap in the levee system is needed for an access road gate to provide ingress and egress for day-to-day operations.

Certain levees and floodwalls that enclose an operational area would require one or more access gates for ingress and egress. These road gates would remain open during normal conditions and closed during flood events. They would be roller gates or swing-type road closure gates integrated with T-walls. Elevated roads can be used to provide ingress and egress for certain levees and floodwalls instead of road gates. Levee and floodwall systems would also require gravity drainage structures and stormwater pump stations to remove accumulated rainfall within the protected area. Gravity drainage structures allow rainwater to drain out of the protected area through culverts incorporated into the levee or floodwall. A sluice gate housed within a concrete vault would be incorporated into the levee/wall and closed during surge conditions to prevent water from flowing into the protected area through the gravity drain. During heavy rainfall events, pump stations would transfer accumulated stormwater from the protected area to the flood side of the levee/wall. Unified Facilities Criteria (UFC) 3-201-01, Section 3-7, restricts the use of stormwater pump stations except with explicit authorization by the Government. During CRIP workshops, the 325th Civil Engineer Squadron at Tyndall AFB indicated that authorization for a stormwater pump would be provided at the base level if the pump system is determined to be necessary.

Regional structural solutions consisting of levees and floodwalls are recommended in the CRIP for the Sabre, North, Flightline, and Silver Flag Districts. Infrastructure in portions of these districts is the most susceptible to coastal flooding impacts based on the lower elevations that occur in these districts. One levee/floodwall is proposed for the North, Flightline, and Silver Flag Districts, and two levees/floodwalls are proposed for the Sabre District. Levees or floodwalls are not recommended for infrastructure in the Support, Drone, or Crooked Island Districts through 2100 based on higher elevations in these districts.

2.1.1.4 Option 4—Incorporate a Comprehensive Nature-based Solution to Accompany All Projects

Coastal landforms such as barrier islands, shorelines, and marshes have a mitigating effect on storm surge propagation. The loss of these natural features can increase the inland extent of storm surge and the associated potential for flood damage. NBS strategies maintain and enhance coastal landforms and have co-benefits such as providing habitat and recreational opportunities. Coastal flood scenarios indicate the potential loss of barrier islands on the Gulf side and marshes on the East Bay side of the Tyndall AFB peninsula by 2100. Under Option 4, NBS options are recommended to be implemented in all districts in combination with the other traditional options identified for prone infrastructure to provide multiple lines of defense. NBS options would help protect and enhance existing coastal landforms at Tyndall AFB and,

therefore, would minimize the gradual erosion of these features by sea-level rise, which would otherwise exacerbate storm surge impacts at the base.

Potential NBS strategies for Tyndall AFB include various approaches to protect the shoreline on the East Bay side of the base, including creation of living shorelines and oyster reefs and enhancement of existing marsh habitat. Potential NBS strategies for the Gulf side of the base include shoreline stabilization and seagrass restoration in St. Andrew Sound and dune restoration and enhancement on the barrier islands—for example, using sand fencing and vegetation planting. NBS options in general are recommended in the CRIP to be implemented in all the districts in combination with the other identified traditional options to provide a multilayered approach to enhance coastal resilience at Tyndall AFB. Further studies are needed to identify the specific NBS projects that would be most appropriate for each district. The findings and lessons learned from construction and monitoring of the four pilot projects analyzed in this EA would be used to inform the selection and design of future NBS in-water projects at Tyndall AFB.

2.1.1.5 Option 5—Floodproof to above the DFE (Use of Freeboard) to Mitigate Residual Flood Risk

Option 5 would involve floodproofing a given facility to elevations above the DFE to further reduce the potential for flooding impacts. This option would include one or more approaches described under Option 2. The additional floodproofing under Option 5 would lower the flood risk associated with less frequent, more severe storm events that exceed the flood protection provided by the current DFE. Floodproofing to above the current DFE is recommended for all facilities beyond 2080, particularly those facilities that are mission critical or floodproofed to the DFE or lower by 2080.

2.1.2 NBS Pilot Projects

Four NBS pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a submerged living shoreline breakwater, submerged oyster reef breakwater, and submerged shoreline stabilization breakwater, which are being funded by Readiness and Environmental Protection Integration funding through a National Fish and Wildlife Foundation award to The Nature Conservancy (TNC), and the enhancement of seagrass habitat, which is being funded by Revived Economies of the Gulf Coast States Act funding through Bay County. These in-water pilot projects are the first NBS projects proposed to be implemented under the Tyndall AFB CRIP. The proposed NBS breakwaters have been located to protect shorelines near critical base assets and are intended to attenuate wave energy and reduce the rate of coastal erosion from sea-level rise in the project areas over time. They would provide proof of concept and design precedents that could be scaled up and implemented in the future. Long-term monitoring of the NBS breakwaters would inform future project designs over the near term and as conditions evolve over time.

2.2 Selection Standards

Under NEPA and 32 CFR 989, this EA is required to analyze the potential environmental impacts of the Proposed Action, No Action Alternative, and reasonable alternatives. Reasonable alternatives are those that meet the underlying purpose of, and need for, the Proposed Action; are feasible from a technical and economic standpoint; and meet reasonable selection standards (screening criteria) that are suitable to a particular action. Selection standards may include requirements or constraints associated with operational, technical, environmental, budgetary, and time factors. Alternatives that are determined to not be reasonable can be eliminated from detailed analysis in this EA.

The primary selection standards used to screen alternatives for the CRIP flood defense projects and the NBS pilot projects are presented in Tables 2-1 and 2-2, respectively. Selection standards for the CRIP projects included (1) providing appropriate flood protection based on the risk level over time, (2) not impacting Tyndall AFB's mission, and (3) not resulting in significantly adverse impacts to natural or cultural resources (Table 2-1). The 325th Civil Engineer Squadron/Environmental Element (325 CES/CEIE) identified two alternatives that meet these selection standards: Alternative 1 and Alternative 2. Under Alternative 1, the preferred alternative, the flood defense strategies recommended

for each district of Tyndall AFB in the final CRIP would be implemented. Under Alternative 2, structural solutions that differ from the preferred structural solutions under Alternative 1 for certain districts would be implemented. Alternatives 1 and 2 for CRIP projects are described in detail in Sections 2.4.2 and 2.4.3, respectively.

Selection standards for the pilot projects included (1) protecting critical base assets, (2) not impacting Tyndall AFB's mission, (3) not increasing the bird/wildlife aircraft strike hazard (BASH) risk at the base, (4) having an overall beneficial impact on the environment, and (5) not impacting seagrass beds (Table 2-2). The 325 CES/CEIE identified two alternatives that meet these selection standards: Alternative 1 and Alternative 2. Under Alternative 1, the preferred alternative, the pilot projects would be constructed based on the preferred design for each project. Each preferred design was developed by the project design team with input from the project stakeholders, which included representatives from the 325 CES/CEIE; Tyndall AFB BASH program; AFCEC Natural Disaster Recovery, Tyndall Integration Branch; and members of the Tyndall AFB Coastal Resilience Stakeholder Group, which include representatives from Bay County, FWC, DEP, other state and local governmental entities, and private citizens. Under Alternative 2, the pilot projects would be constructed based on a design that differs from the preferred design under Alternative 1. Alternatives 1 and 2 for pilot projects are described in detail in Sections 2.4.2 and 2.4.3, respectively.

Table 2-1. Selection Standards for Alternatives for CRIP Projects

Selection Standards	Description
1 – Project must protect critical base assets based on the risk level over time.	Implementation of the CRIP project must provide appropriate flood protection to the facility or group of facilities based on the risk level over time.
2 – Project must not impact Tyndall AFB's mission.	Implementation of the CRIP project must have no permanent impact on Tyndall AFB's mission. Any disruptions must be temporary and minor (for example, during construction) and have an overall beneficial impact on the mission.
3 – Project must not result in significantly adverse impacts to natural or cultural resources.	Implementation of the CRIP project such as construction of a levee or floodwall must not have significant impacts to wetlands, protected species, or cultural resources.

Table 2-2. Selection Standards for Alternatives for Pilot Projects

Selection Standards	Description
1 – Project must protect critical base assets.	The pilot project must be located to protect shorelines near critical base assets.
2 – Project must not impact Tyndall AFB's mission.	Implementation of the pilot project must have no permanent impact on Tyndall AFB's mission. Any disruptions must be temporary and minor (for example, during construction) and have an overall beneficial impact on the mission.
3 – Project must not increase the BASH risk at the base.	The pilot project must not increase the BASH risk at the base by either increasing the bird population or increasing the number of birds around the airfield.
4 – Project must have an overall beneficial impact on the environment.	Implementation of the pilot project must have an overall beneficial impact on the environment through shoreline protection and habitat creation and enhancement. The project must not adversely alter existing natural landforms or habitats.
5 – Project must not impact seagrass beds.	Any structural component of the pilot project must be constructed outside of existing seagrass beds. Seagrass beds in the project vicinity must be mapped to ensure avoidance.

2.3 Alternatives Considered but Eliminated from Further Analysis

The DAF screened alternatives for the CRIP flood defense projects based on the selection standards presented in Table 2-1, which included (1) providing appropriate flood protection based on the risk level over time, (2) not impacting Tyndall AFB's mission, and (3) not resulting in significantly adverse impacts to natural or cultural resources (Section 2.2). The following alternative CRIP projects were initially considered but eliminated because they did not meet one or more of these selection standards:

Floodproof Buildings in 7000 Area and Fuel Depot Area: The DAF initially considered floodproofing the individual buildings in the 7000 area (North District) and fuel depot area (Flightline District) as an alternative to constructing levees/floodwalls around the 7000 area and fuel depot area as proposed under Alternative 1. The DAF determined that floodproofing individual buildings in these areas to the DFE may not fully protect them beyond the near term based on the level of inundation that could currently occur in these areas according to flood modeling. In addition, floodproofing individual buildings under this alternative would not protect other critical assets in these areas such as utilities, storage facilities, stationary equipment, and access roads. Based on this evaluation, the DAF determined that this alternative did not meet Selection Standards 1 and 2 in Table 2-1 and, therefore, eliminated it from further analysis.

Large Levee Alignments: The DAF initially considered constructing larger levees for the wastewater treatment plant (WWTP) (Sabre District) and Silver Flag District than those proposed under Alternative 1. The larger levees would protect a larger area and more operational assets such as utilities and access roads than the levees proposed under Alternative 1. However, the DAF determined that the larger levee alignments would result in considerably more impacts to wetlands and known archaeological sites. Given that wetland impacts require mitigation and most of the known archaeological sites that would be impacted have not been evaluated for their eligibility for listing in the National Register of Historic Places (NRHP), the DAF determined that this alternative did not meet Selection Standard 3 in Table 2-1 and, therefore, eliminated it from further analysis.

2.4 Alternatives Carried Forward for Analysis

2.4.1 No Action Alternative

The No Action Alternative is to maintain existing conditions. Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. The No Action Alternative does not meet the purpose of, or need for, the Proposed Action or the selection standards used to evaluate alternatives; however, it is analyzed in this EA as a benchmark against which the other alternatives can be compared, as required under CEQ regulations (40 CFR 1502.14). Under the No Action Alternative, none of the CRIP projects, NBS pilot projects, or strategies identified in the CRIP to reduce the coastal flood risk at Tyndall AFB would be implemented.

2.4.2 Alternative 1 (Preferred Alternative)

2.4.2.1 CRIP Projects

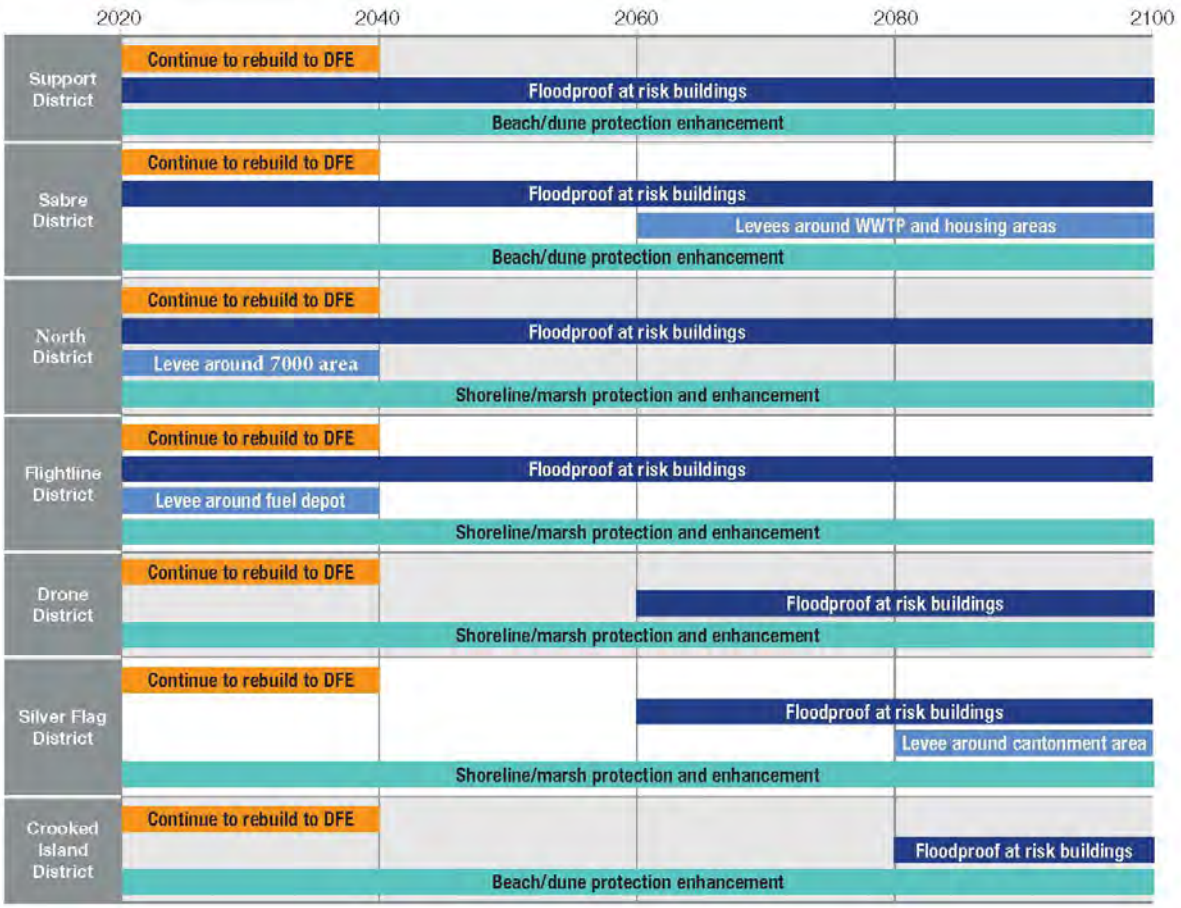
Under Alternative 1, the preferred alternative, the flood defense strategies recommended for each district of the base in the final CRIP would be implemented. Each of these CRIP projects would undergo subsequent environmental review prior to implementation. In this subsequent review, the DAF would use AF Form 813, *Request for Environmental Impact Analysis* (32 CFR 989.12), to document the environmental analysis required for proposed actions. This subsequent review can be tiered off the impact analyses in this Programmatic EA, as applicable. The specific projects identified in the final CRIP are the preferred flood defense options for the various districts of the base. These projects are collectively analyzed as the preferred suite of flood defense strategies under Alternative 1. Under Alternative 2, structural solutions that differ from the preferred structural solutions under Alternative 1 for certain districts would be implemented (further discussed in Section 2.4.3).

The flood defense strategies recommended in the final CRIP and analyzed under Alternative 1 are shown on Figure 2-2. Collectively, the recommended structural, nonstructural, and NBS options provide a multilayered, long-term approach to enhance coastal resilience at Tyndall AFB. As discussed in Section 2.1.1, the options were developed for each district of Tyndall AFB based on flood scenarios modeled for the 100-year storm event and the DFEs established for the Gulf and East Bay sides of the base, which are 19 and 14 feet above msl, respectively. These DFE levels consider the locally adjusted, highest regionalized sea-level rise scenario for Year 2100, which is 7 feet for the Tyndall AFB area.

As indicated on Figure 2-2, constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options are recommended for all seven districts of Tyndall AFB. Structural solutions such as constructing levees or floodwalls are recommended for the Sabre, North, Flightline, and Silver Flag Districts. These districts are the most susceptible to coastal flooding impacts, particularly the North and Flightline Districts, which are prone to being flooded from a current-day 100-year storm event. Based on their locations within more elevated portions of Tyndall AFB, no flood-control structures such as levees or floodwalls are recommended for infrastructure in the Support, Drone, or Crooked Island Districts through 2100. The specific CRIP projects for each district are described in the subsections that follow.

Figure 2-2. Flood Defense Strategies under Alternative 1

Source: DAF 2022



2.4.2.1.1 Support District

The Support District is at risk of flooding from the Gulf side of Tyndall AFB. Flood exposure of buildings in the near to mid-term is minimal, with minor increases in exposure expected in future decades (Figure 2-3). Floodproofing of existing at-risk buildings is the primary flood defense strategy recommended for current day to beyond 2060 (Table 2-3 and Figure 2-4). Constructing new buildings to the DFE and incorporating

NBS options such as sand fencing, beach renourishment, and vegetation planting along the Gulf side are also recommended for the district.

Table 2-3. Recommended CRIP Projects for the Support District under Alternative 1

Timeline	Recommended Projects
Current Day	Floodproof 10 buildings including the Oasis community center, pool, pavilions, and other recreational buildings.
By 2060	Floodproof 7 additional buildings, including the 325th Medical Center.
Beyond 2060	Floodproof 13 additional buildings.

Figure 2-3. Support District 100-year Flood Scenarios

Source: DAF 2022

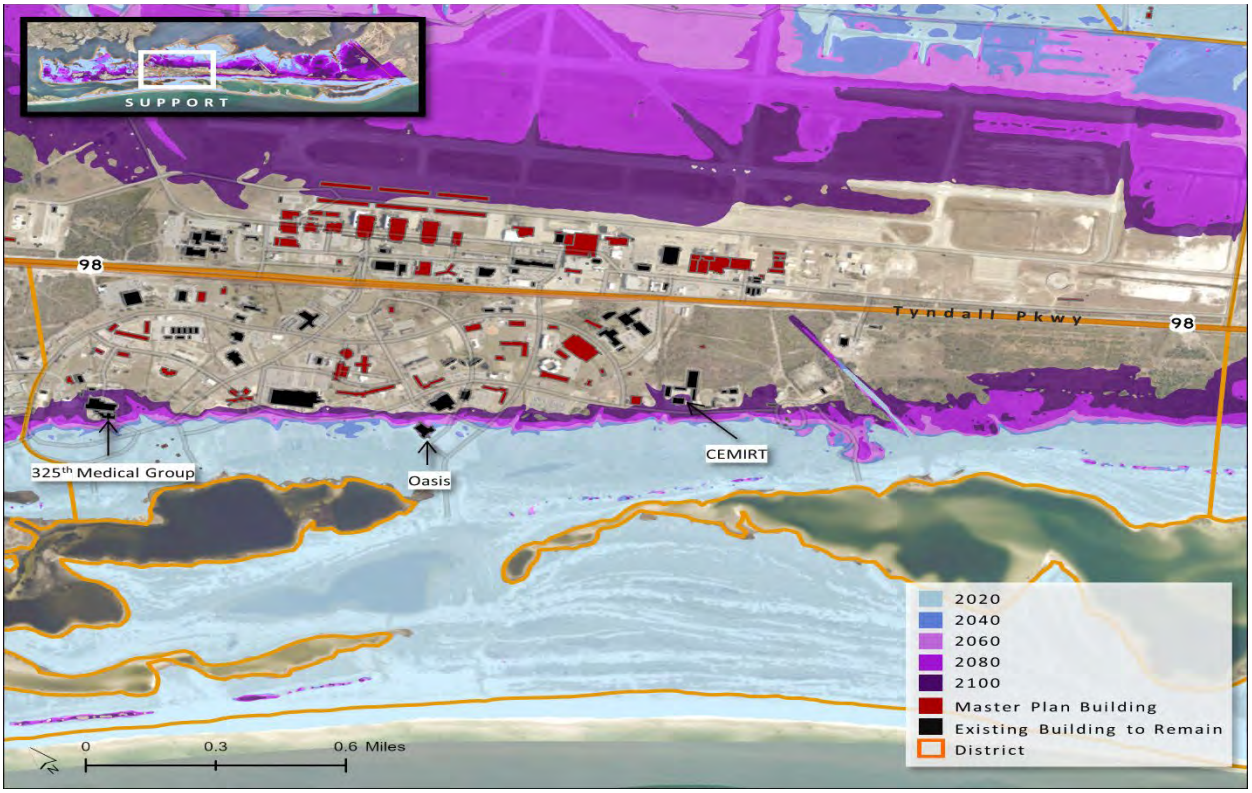
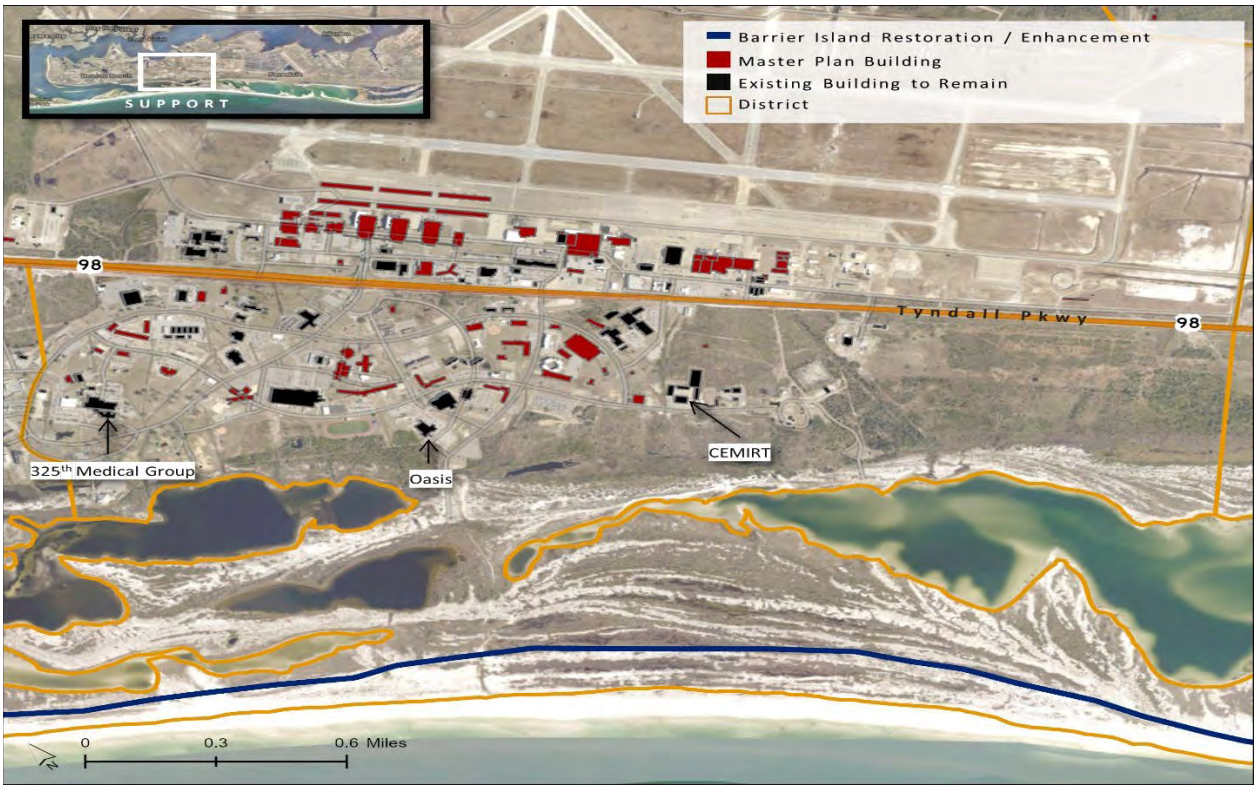


Figure 2-4. Support District CRIP Projects

Source: DAF 2022



2.4.2.1.2 Sabre District

The Sabre District is at risk of flooding from both the Gulf and East Bay sides of Tyndall AFB. Flood exposure of buildings in the near to mid-term is minimal, with moderate increases in exposure expected in future decades (Figure 2-5). Floodproofing existing at-risk buildings is recommended in the near term, and elevation/relocation of individual buildings and construction of levees around the Bay County WWTP and housing areas are recommended by 2060 (Table 2-4 and Figure 2-6). Detailed views of the proposed levee designs for the WWTP and two housing areas under Alternative 1 are shown on Figures 2-7 to 2-9. Constructing new buildings to the DFE and incorporating NBS options such as sand fencing, beach renourishment, and vegetation planting along the Gulf side and shoreline/marsh protection and enhancement on the East Bay side are also recommended for the district.

Table 2-4. Recommended CRIP Projects for the Sabre District under Alternative 1

Timeline	Recommended Projects
Current Day	Floodproof 10 ancillary maintenance/storage buildings.
By 2060	Floodproof 7 additional buildings, including some housing units. Structural solutions in this district include ring levees around portions of the housing areas and the Bay County Wastewater Treatment Plant.
Beyond 2060	Floodproof 4 additional buildings, including additional ancillary structures. Maintain levees as needed.

Figure 2-5. Sabre District 100-year Flood Scenarios
Source: DAF 2022

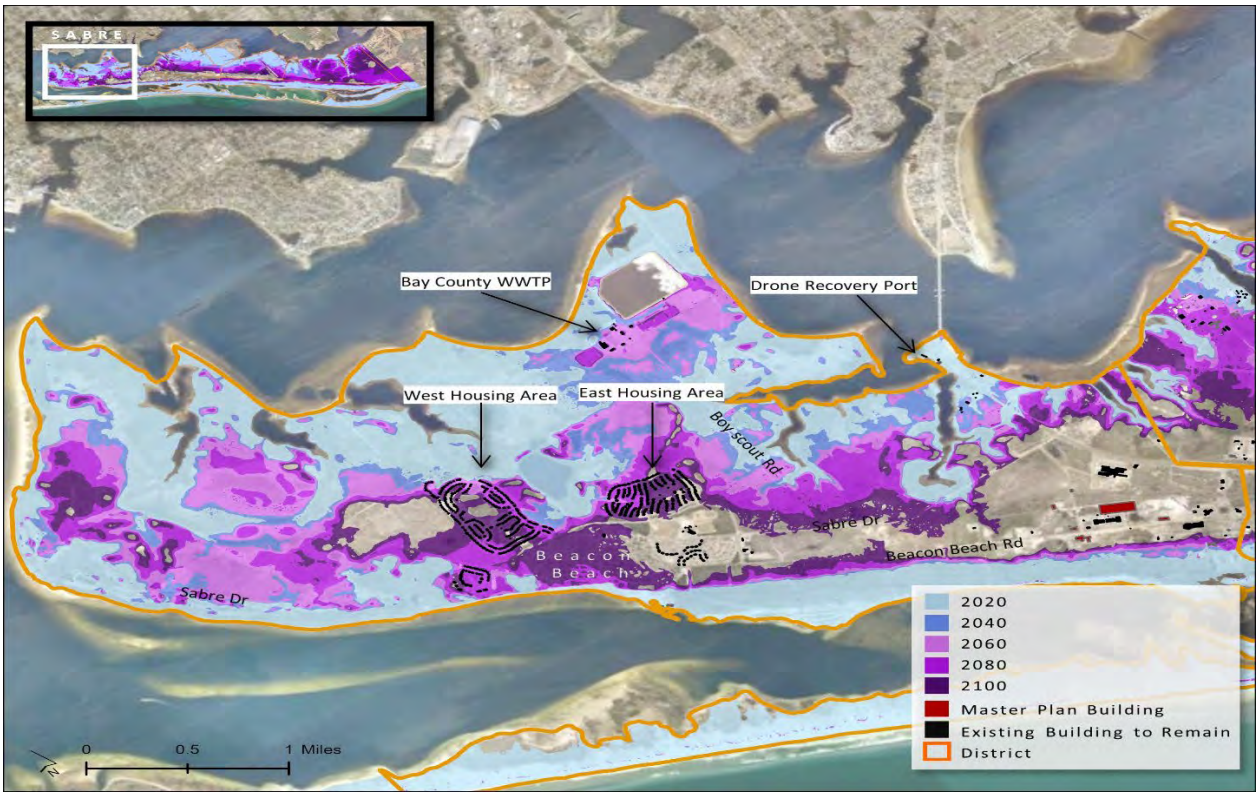


Figure 2-6. Sabre District CRIP Projects
Source: DAF 2022

Figure 2-7. Levee for Wastewater Treatment Plant under Alternative 1

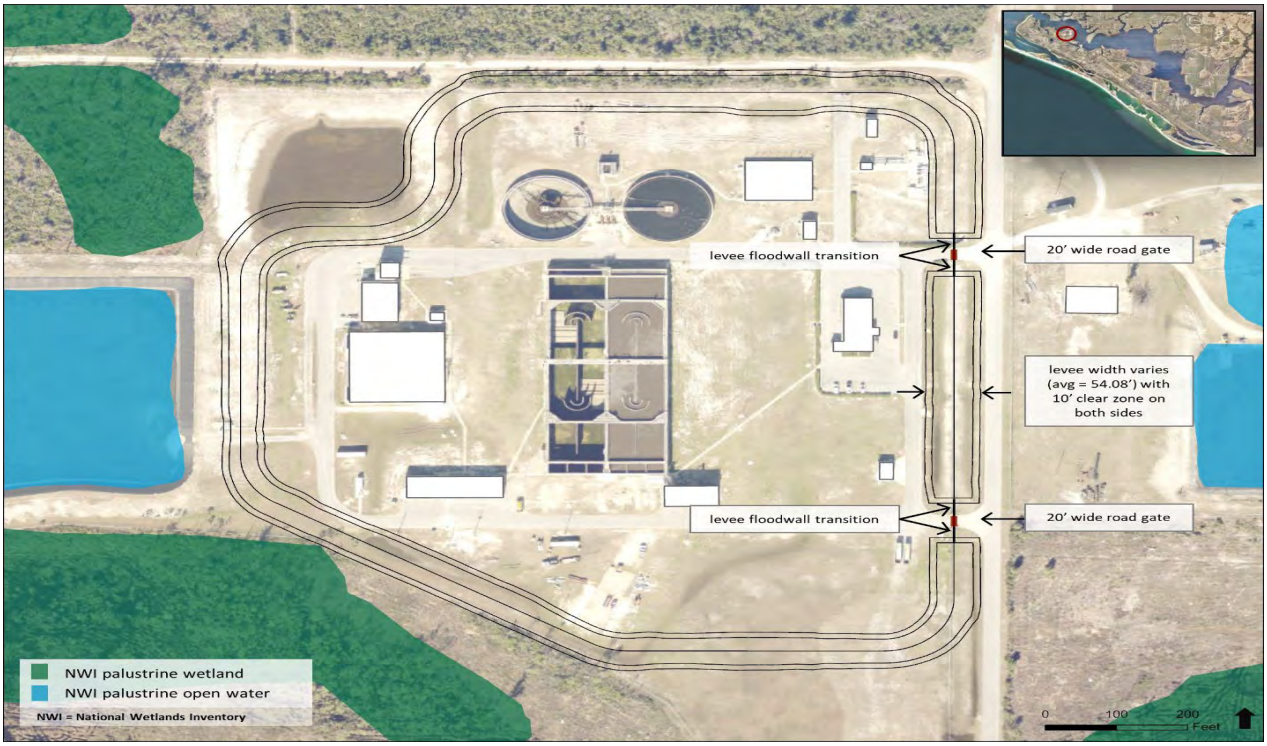


Figure 2-8. Levee for East Housing Area under Alternative 1

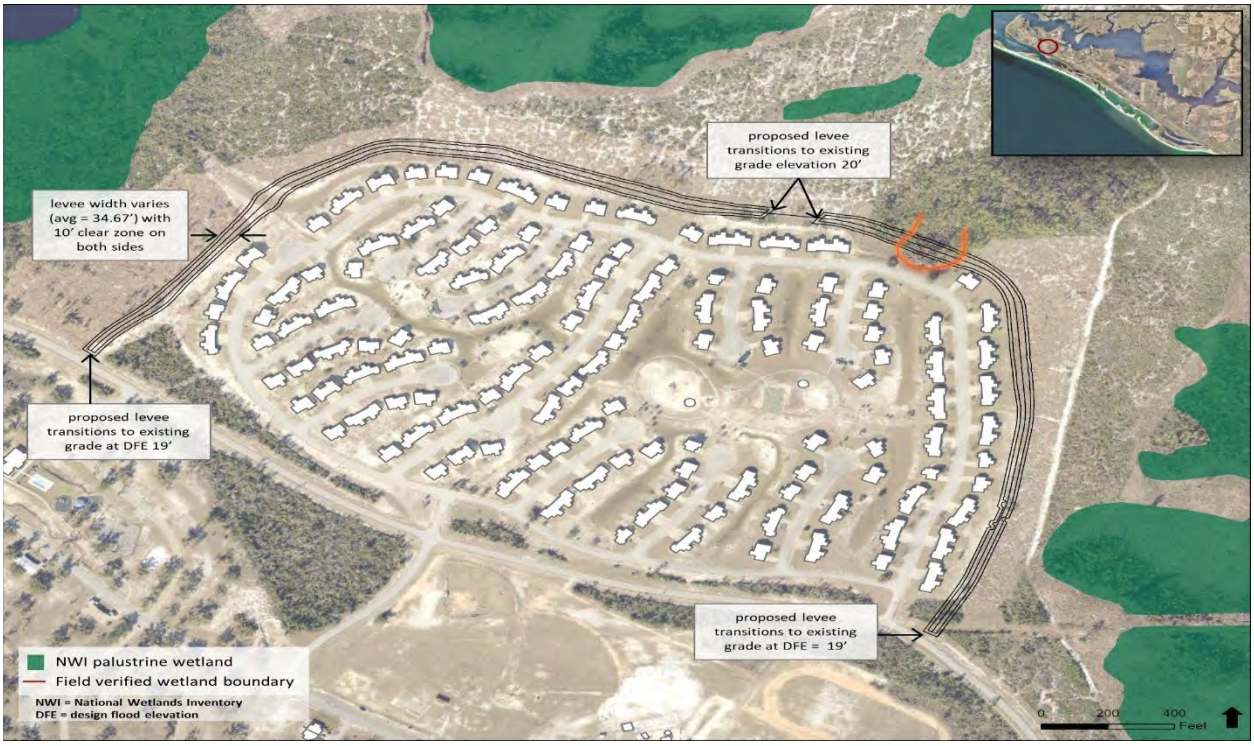


Figure 2-9. Levee for West Housing Area under Alternative 1

2.4.2.1.3 North District

The North District is at risk of flooding from the East Bay side of Tyndall AFB. Due to low elevations, flood exposure of buildings in the near term is extensive, with operational impacts currently occurring at the 7000 area, which is the primary asset in the district (Figure 2-10). Projects recommended for the current day include floodproofing five buildings and constructing a ring levee around the 7000 area (Table 2-5 and Figure 2-11). A detailed view of the proposed levee design for the 7000 area under Alternative 1 is shown on Figure 2-12. No new projects are recommended over the mid- to long term; the 7000 area levee/floodwall would be maintained as needed. Constructing new buildings to the DFE and incorporating NBS options such as shoreline/marsh protection and enhancement on the East Bay side are also recommended for the district.

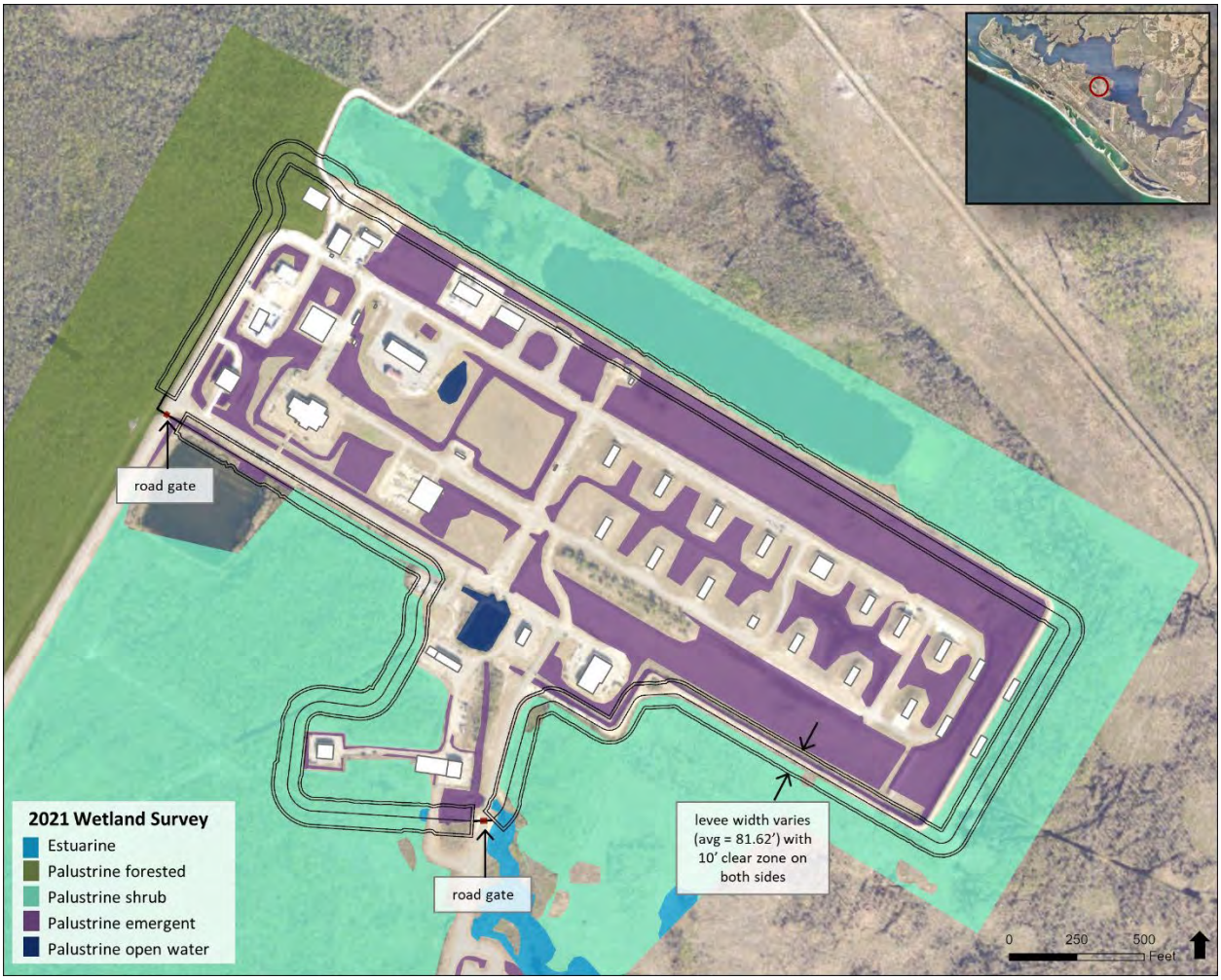
Table 2-5. Recommended CRIP Projects for the North District under Alternative 1

Timeline	Recommended Projects
Current Day	Floodproof 5 buildings. Construct a ring levee around the 7000 area.
By 2060	No new projects. Maintain 7000 area levee as needed.
Beyond 2060	No new projects. Maintain 7000 area levee as needed.

Figure 2-10. North District 100-year Flood Scenarios
Source: DAF 2022

Figure 2-11. North District CRIP Projects
Source: DAF 2022

Figure 2-12. Levee for 7000 Area under Alternative 1



2.4.2.1.4 Flightline District

The Flightline District is at risk of flooding from the East Bay side of Tyndall AFB. Due to low elevations, the fuel depot area within this district is currently prone to flooding from a 100-year storm event (Figure 2-13). Portions of the adjacent storage/maintenance yard are also prone. Projects recommended for the current day include floodproofing two buildings and constructing a ring levee/floodwall around the fuel depot area (Table 2-6 and Figure 2-14). A detailed view of the proposed levee design for the fuel depot area under Alternative 1 is shown on Figure 2-15. Future recommended projects primarily include floodproofing at-risk buildings; the fuel depot area levee/floodwall would be maintained as needed. Constructing new buildings to the DFE and incorporating NBS options such as shoreline/marsh protection and enhancement on the East Bay side are also recommended for the district.

Table 2-6. Recommended CRIP Projects for the Flightline District under Alternative 1

Timeline	Recommended Projects
Current Day	Floodproof 2 buildings, including the fire training facility. Construct a ring levee/floodwall around the fuel depot area. Relocate some equipment to maintain operations and minimize damage.
By 2060	Floodproof 15 additional buildings, including additional ancillary structures.
Beyond 2060	Floodproof 33 additional buildings.

Figure 2-13. Flightline District 100-year Flood Scenarios
Source: DAF 2022

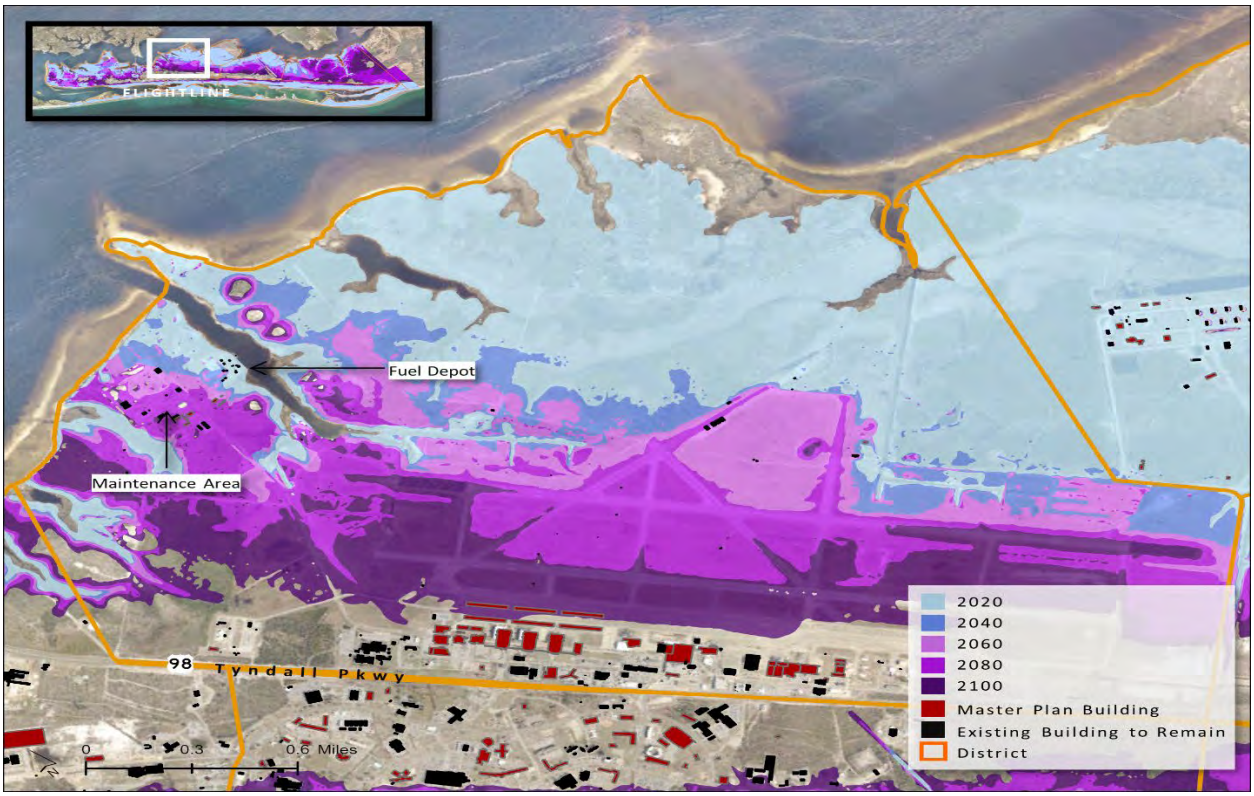
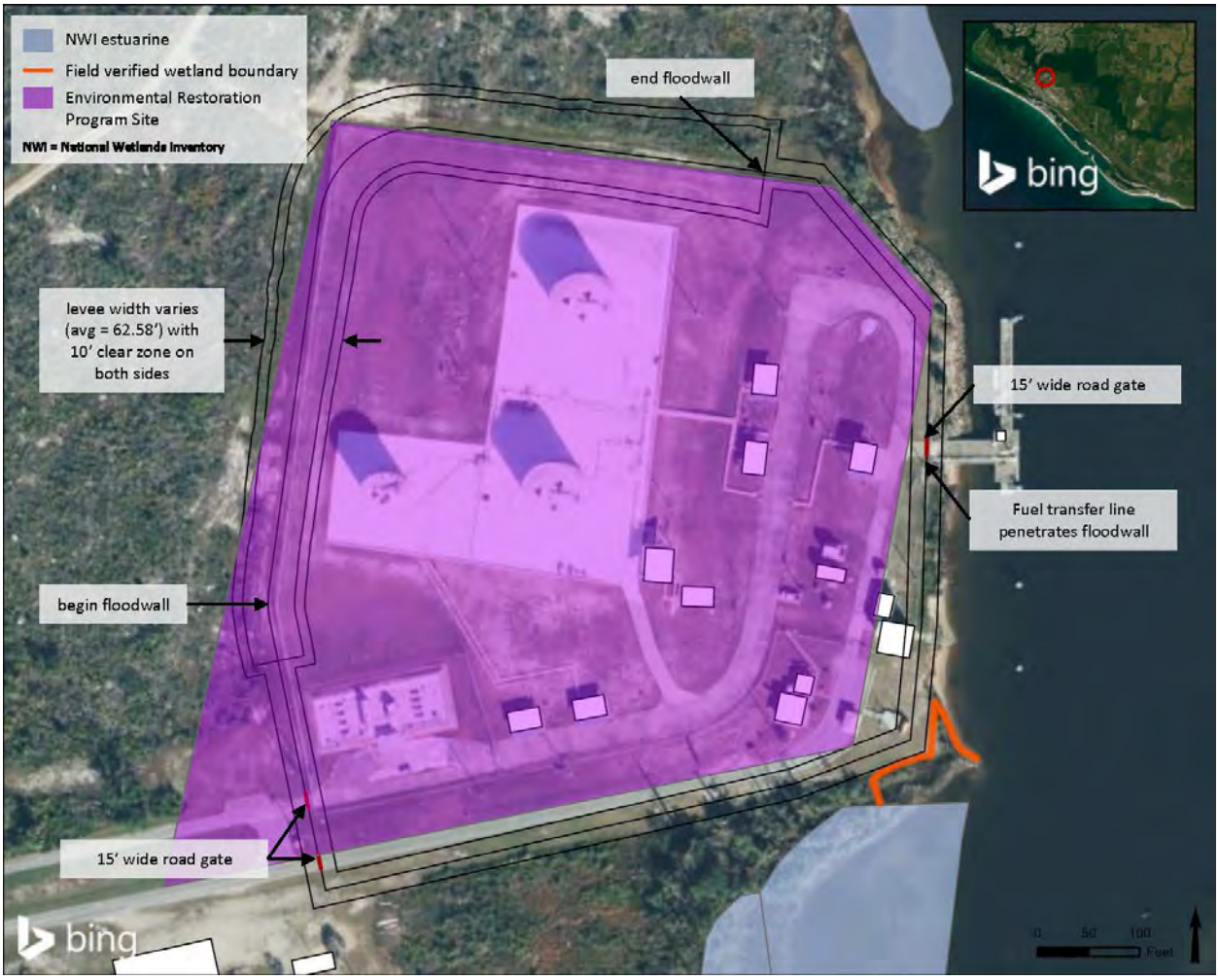


Figure 2-14. Flightline District CRIP Projects
Source: DAF 2022

Figure 2-15. Levee for Fuel Depot Area under Alternative 1



2.4.2.1.5 Drone District

The Drone District is at risk of flooding from the East Bay side of Tyndall AFB. Flood exposure of buildings in the near to mid-term is minimal, with minor increases in exposure expected up to 2100 (Figure 2-16). No specific flood defense projects are recommended for the district at the current day; future recommended projects primarily include floodproofing at-risk buildings (Table 2-7 and Figure 2-17). Constructing new buildings to the DFE and incorporating NBS options such as shoreline/marsh protection and enhancement on the East Bay side are also recommended for the district.

Table 2-7. Recommended CRIP Projects for the Drone District under Alternative 1

Timeline	Recommended Projects
Current Day	No new projects
By 2060	Floodproof 1 ancillary structure.
Beyond 2060	Floodproof 11 additional ancillary structures.

Figure 2-16. Drone District 100-year Flood Scenarios
Source: DAF 2022

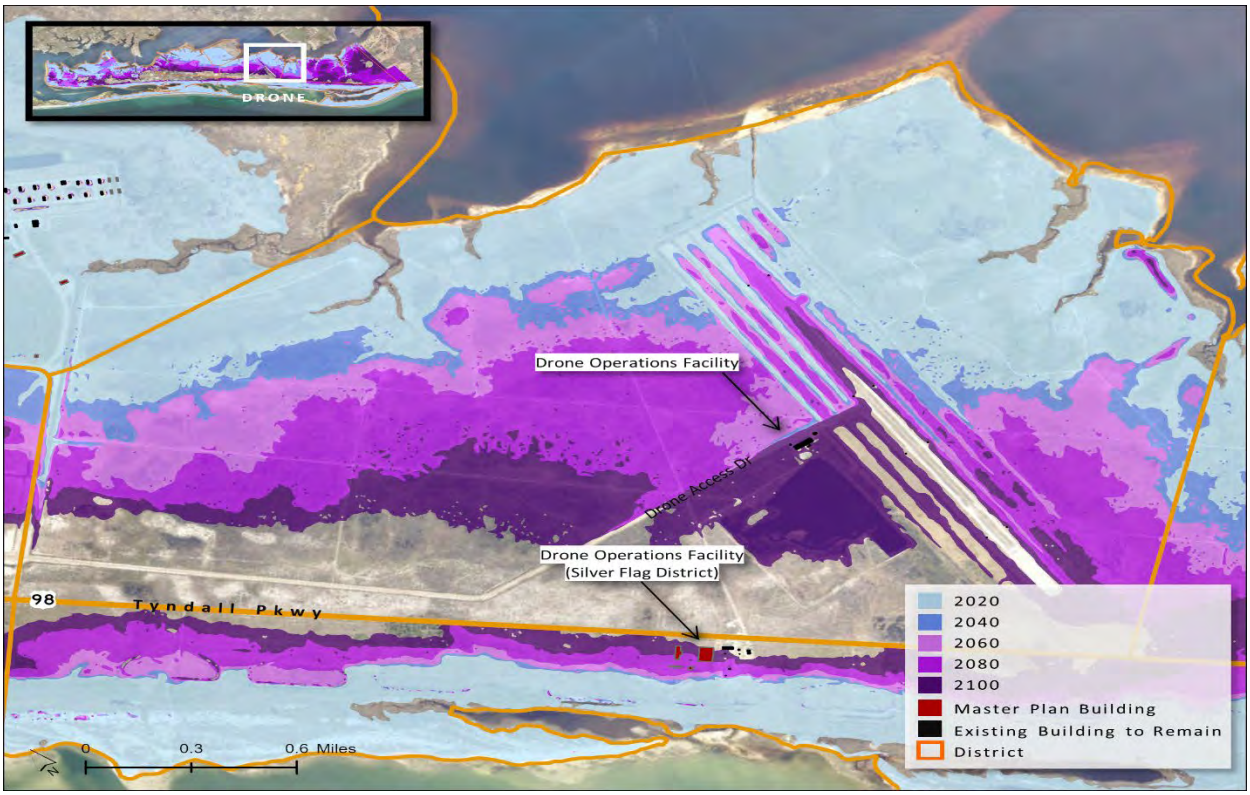
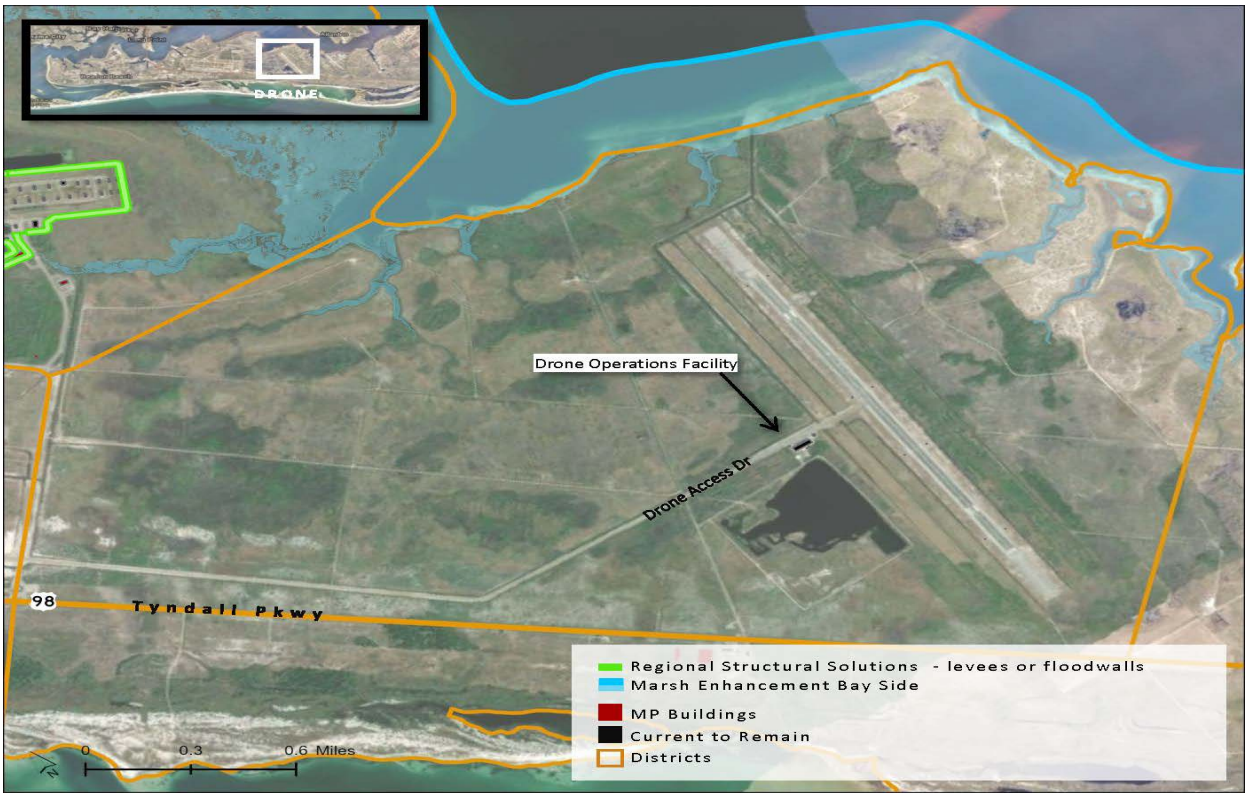


Figure 2-17. Drone District CRIP Projects
Source: DAF 2022



2.4.2.1.6 Silver Flag District

The Silver Flag District is at risk of flooding from the East Bay side of Tyndall AFB. Flood exposure of buildings in the near to mid-term is minimal; however, major increases in exposure are expected beyond 2080 (Figure 2-18). No specific flood defense projects are recommended for the district at the current day. Mid-term recommendations primarily include floodproofing at-risk buildings. By 2080, a regional levee is recommended to be constructed around the Silver Flag cantonment area (Table 2-8 and Figure 2-19). A detailed view of the proposed levee design for the Silver Flag cantonment area under Alternative 1 is shown on Figure 2-20. Constructing new buildings to the DFE and incorporating NBS options such as shoreline/marsh protection and enhancement on the East Bay side are also recommended for the district.

Table 2-8. Recommended CRIP Projects for the Silver Flag District under Alternative 1

Timeline	Recommended Projects
Current Day	No new projects
By 2060	Floodproof 1 building.
Beyond 2060	Floodproof 8 additional buildings. By 2080, construct a levee around the Silver Flag cantonment area.

Figure 2-18. Silver Flag District 100-year Flood Scenarios

Source: DAF 2022

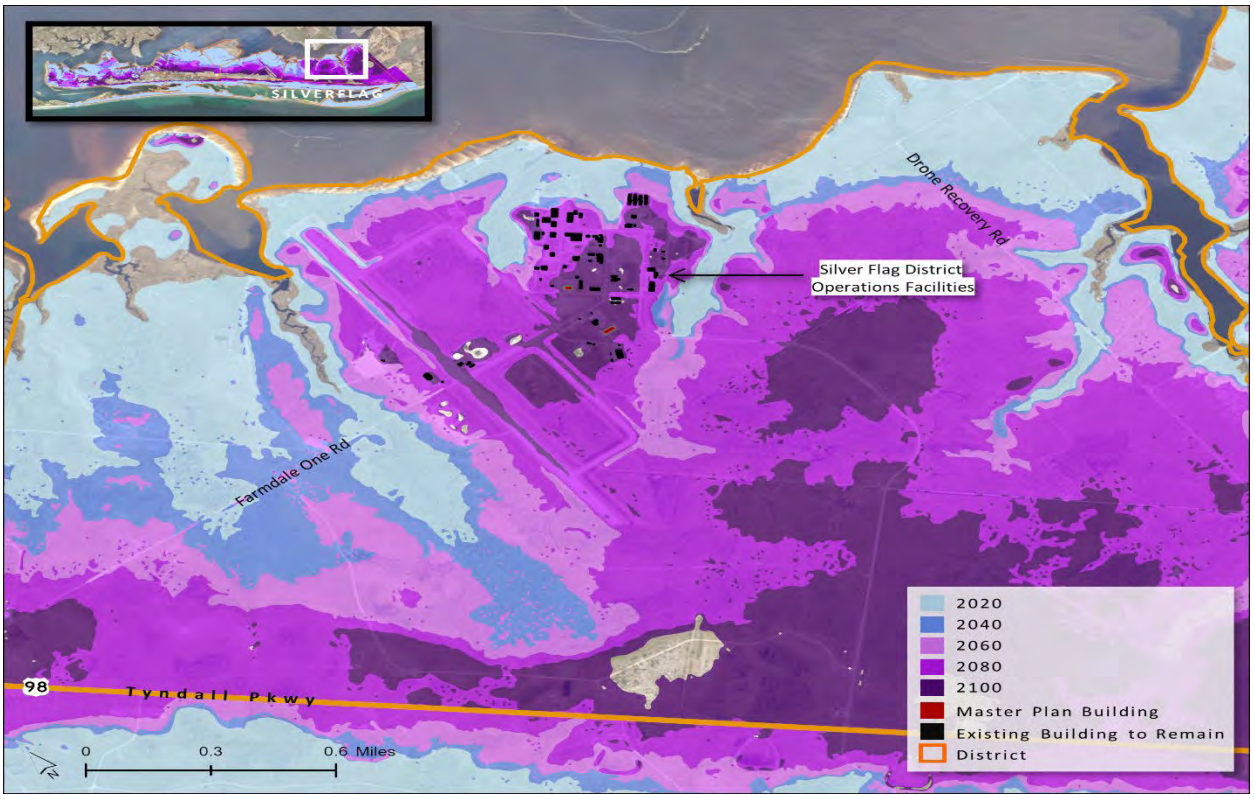


Figure 2-19. Silver Flag District CRIP Projects

Source: DAF 2022

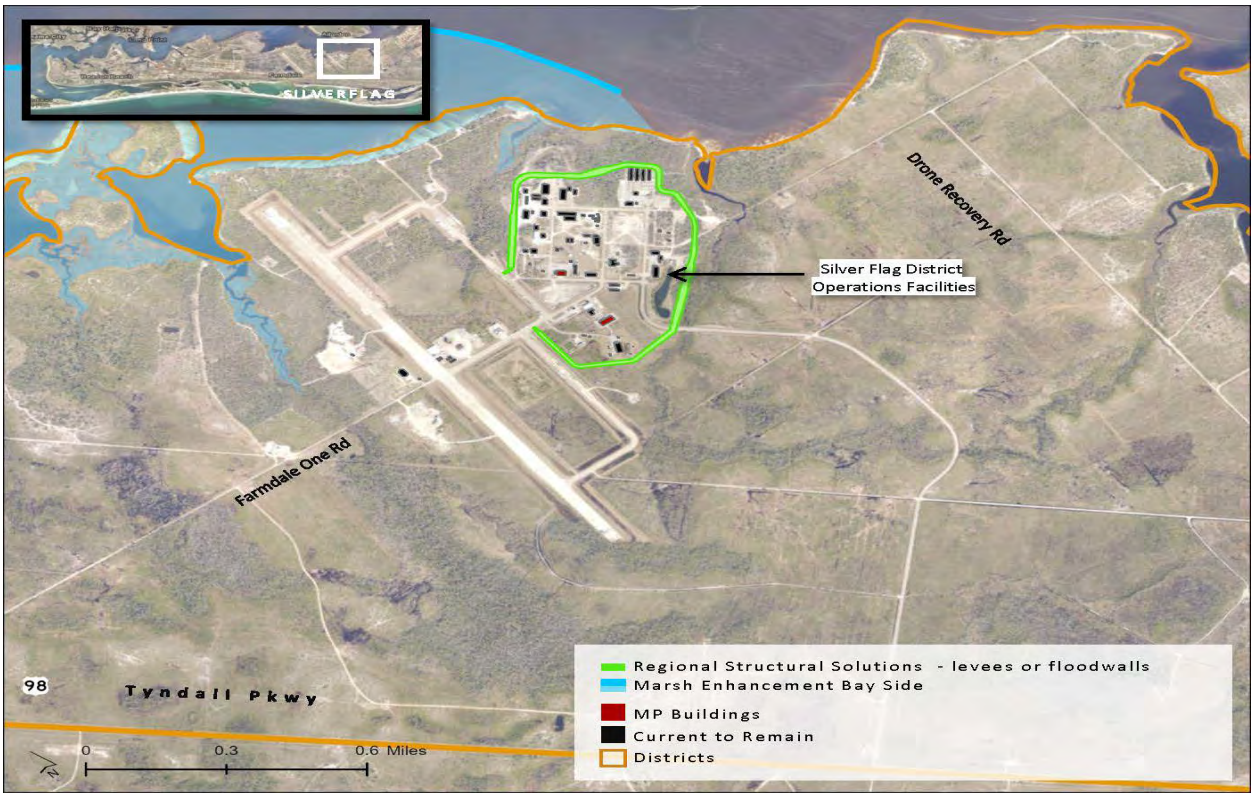
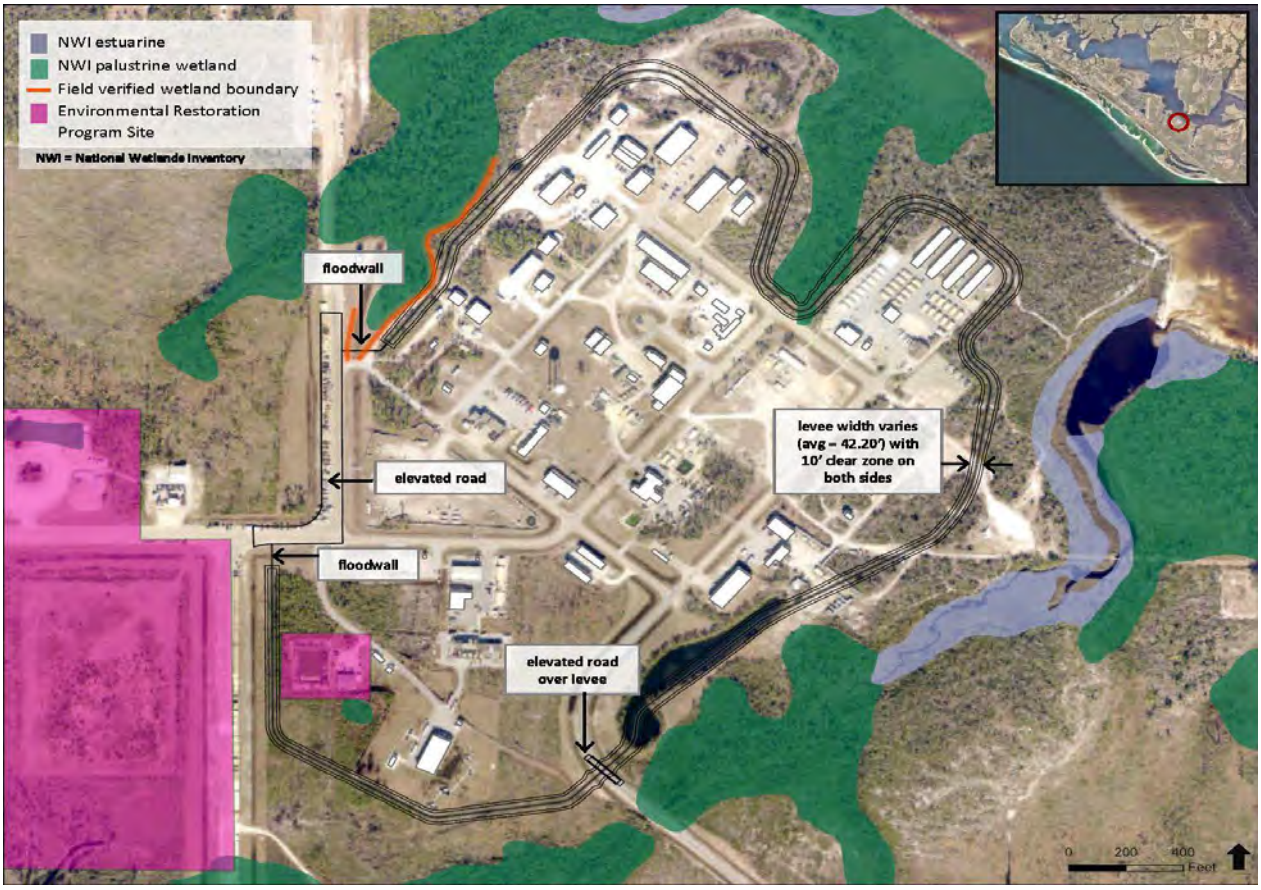


Figure 2-20. Levee for Silver Flag Cantonment Area under Alternative 1



2.4.2.1.7 Crooked Island District

The Crooked Island District is at risk of flooding from the Gulf side of Tyndall AFB. Flood exposure of buildings in the near to mid-term is minimal, with minor increases in exposure expected in future decades (Figure 2-21). No specific flood defense projects are recommended for the district over the near term. Recommendations for beyond 2060 include floodproofing 11 buildings associated with the subscale drone facility, which is the primary asset in the district (Table 2-9 and Figure 2-22). Constructing new buildings to the DFE and incorporating NBS options such as sand fencing, beach renourishment, and vegetation planting along the Gulf side are also recommended for the district.

Table 2-9. Recommended CRIP Projects for the Crooked Island District under Alternative 1

Timeline	Recommended Projects
Current Day	No new projects
By 2060	No new projects
Beyond 2060	Floodproof 11 buildings that are part of the subscale drone facility.

Figure 2-21. Crooked Island District 100-year Flood Scenarios
Source: DAF 2022

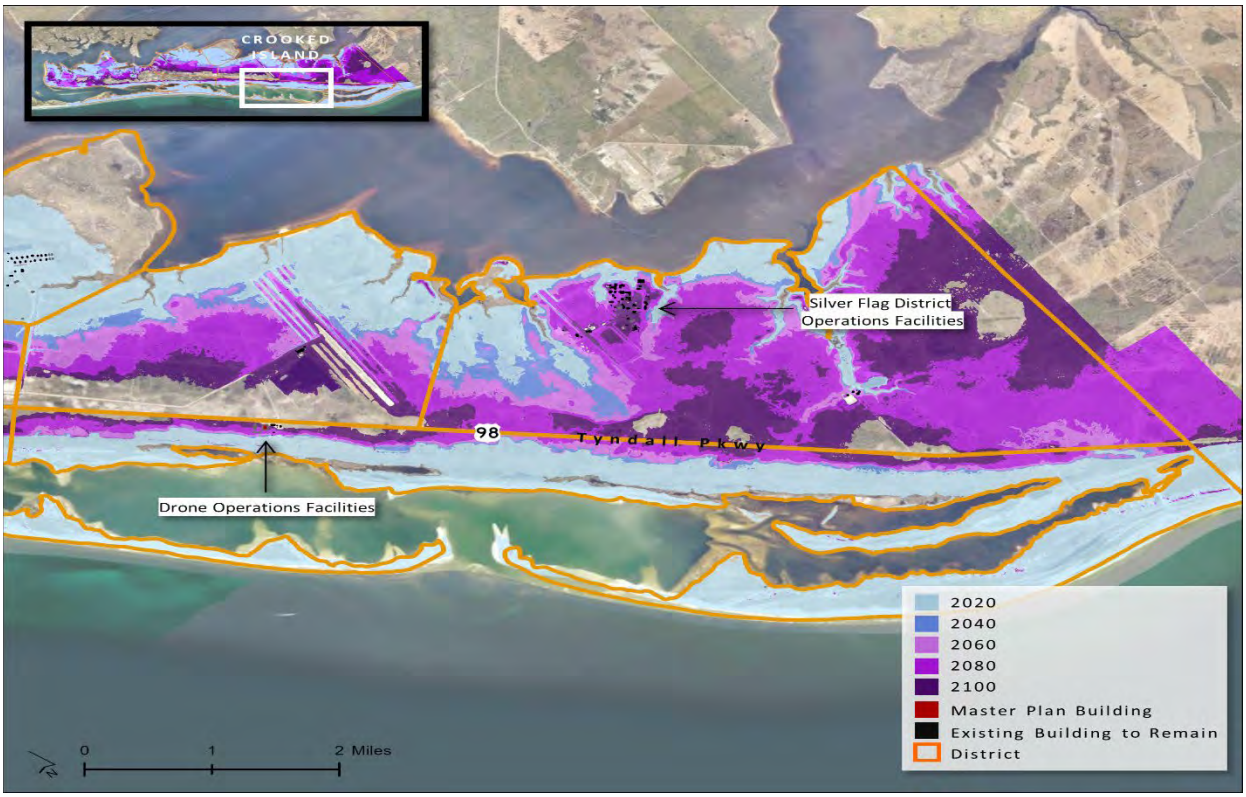
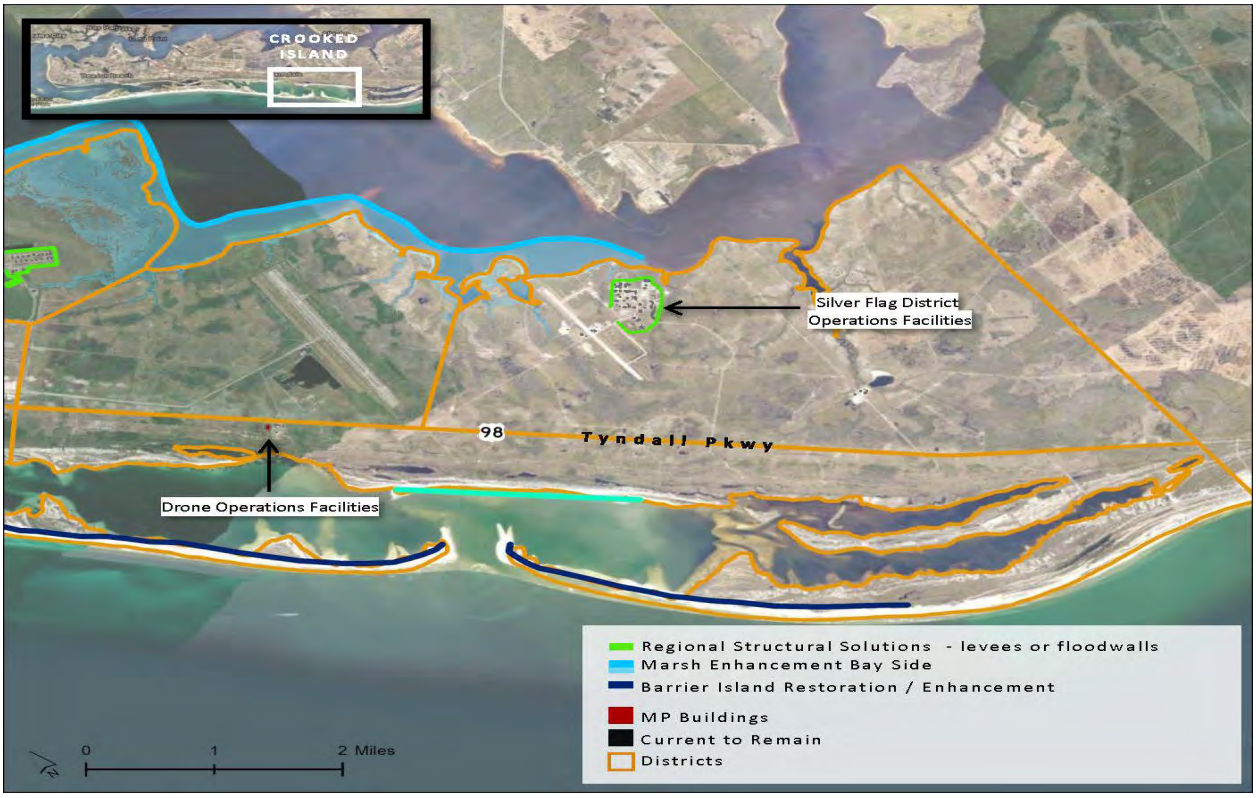


Figure 2-22. Crooked Island District CRIP Projects
Source: DAF 2022



2.4.2.2 NBS Pilot Projects

The four NBS pilot projects proposed in the nearshore waters of Tyndall AFB include the creation of a submerged living shoreline breakwater, submerged oyster reef breakwater, and submerged shoreline stabilization breakwater, and the enhancement of seagrass habitat (Figure 2-23). The breakwaters are proposed to be submerged to not increase the BASH risk at the base in accordance with screening criteria (Section 2.2). Under Alternative 1, the preferred alternative, the breakwaters would be constructed based on the preferred design for each breakwater, which was developed by the project design team with input from multiple project stakeholders (Section 2.2). Under Alternative 2, the breakwaters would be constructed based on a design that differs from the preferred design under Alternative 1 (further discussed in Section 2.4.3).

The proposed NBS breakwaters have been located to protect shorelines near critical base assets and are intended to attenuate wave energy and reduce the rate of coastal erosion from sea-level rise in the project areas over time. The breakwaters would also create structural habitat for oysters, fish, and other marine organisms, and enhance existing seagrass and marsh habitat in the project areas. The existence of dead trees (ghost forests) and eroding marshes along the shorelines of the project areas indicates that shoreline recession has occurred in the areas. Several types of studies were conducted to support the design of the pilot projects including bathymetric, geotechnical, submerged aquatic vegetation (SAV), and submerged archaeological surveys; wave and hydrodynamic numerical modeling; deployment of acoustic doppler instruments to collect data on water levels, currents, and waves; and structural materials and stability analyses. These studies were led by TNC with support from the University of Florida (UF), Jacobs, and the Naval Research Laboratory. The findings of these studies informed the designs developed for both Alternatives 1 and 2, and are discussed as applicable in this EA. The sea-level rise projections under the Intermediate High sea-level rise scenario published in NOAA Technical Report NOS CO-OPS 083, *Global and Regional Sea Level Rise Scenarios for the United States* (NOAA 2017), were used to evaluate the adaptability of the NBS breakwaters to future sea-level rise.

Avoidance of seagrass impacts was a primary consideration for the siting and design of the proposed NBS breakwaters. All of the breakwaters are proposed to be constructed approximately 25 feet or more seaward of existing seagrass beds, which were mapped as part of the SAV surveys conducted for the projects by the UF Center for Coastal Solutions during the peak seagrass growing season (June 1 to September 30) in 2022 and 2023. The breakwater designs under Alternative 1 are preliminary and are currently at the 60 percent design stage. The preferred designs for the breakwaters under Alternative 1 are described in the subsections that follow.

Figure 2-23. Locations of NBS Pilot Projects

2.4.2.2.1 Submerged Living Shoreline Breakwater

The living shoreline breakwater would be located in East Bay along the northwestern coastline of Tyndall AFB, just west of the fuel depot area near the mouth of Fred Bayou (Figure 2-24). Under Alternative 1, the living shoreline breakwater would consist of four 212-foot-long breakwaters separated by 140-foot-long gaps. The breakwaters would be installed just seaward of the historical extent of seagrass based on FWC 2010 seagrass mapping (Figure 2-24). Based on SAV surveys conducted by UF in 2022 and 2023 for this project, the current design footprint of the living shoreline breakwater is approximately 25 feet from the existing seagrass meadow in the area at its closest point. The constructed breakwater would be approximately 25 feet or more from the closest seagrass bed. The breakwaters would be approximately 564 to 943 feet from the mean high water (MHW) line on the shoreline in water depths of approximately 8 to 10 feet. The breakwaters would be submerged, with the top of each structure being 0.56 foot below the current mean lower low water (MLLW) level (0.32 North American Vertical Datum of 1988 [NAVD 88]) (Figure 2-25). Each breakwater would have a crest width of 10 feet and a base (footprint) width of 50 feet, which includes a layer of bedding stone that extends 2 feet from the entire base of the structure, and a

sublayer of geotextile material that extends an additional 2 feet from the structure. The seaward side of each structure would have a 3.2-foot-wide toe that extends from the base; the shoreward side would not have a toe. The breakwaters would be constructed of quarry limestone boulders and would have 2:1 side slopes. Each breakwater would have a footprint on the seafloor of 8,852 square feet (ft^2), or 0.20 acre, and the four breakwaters combined would have a total footprint of approximately 35,408 ft^2, or 0.81 acre.

Figure 2-24. Layout of Submerged Living Shoreline Breakwater under Alternative 1

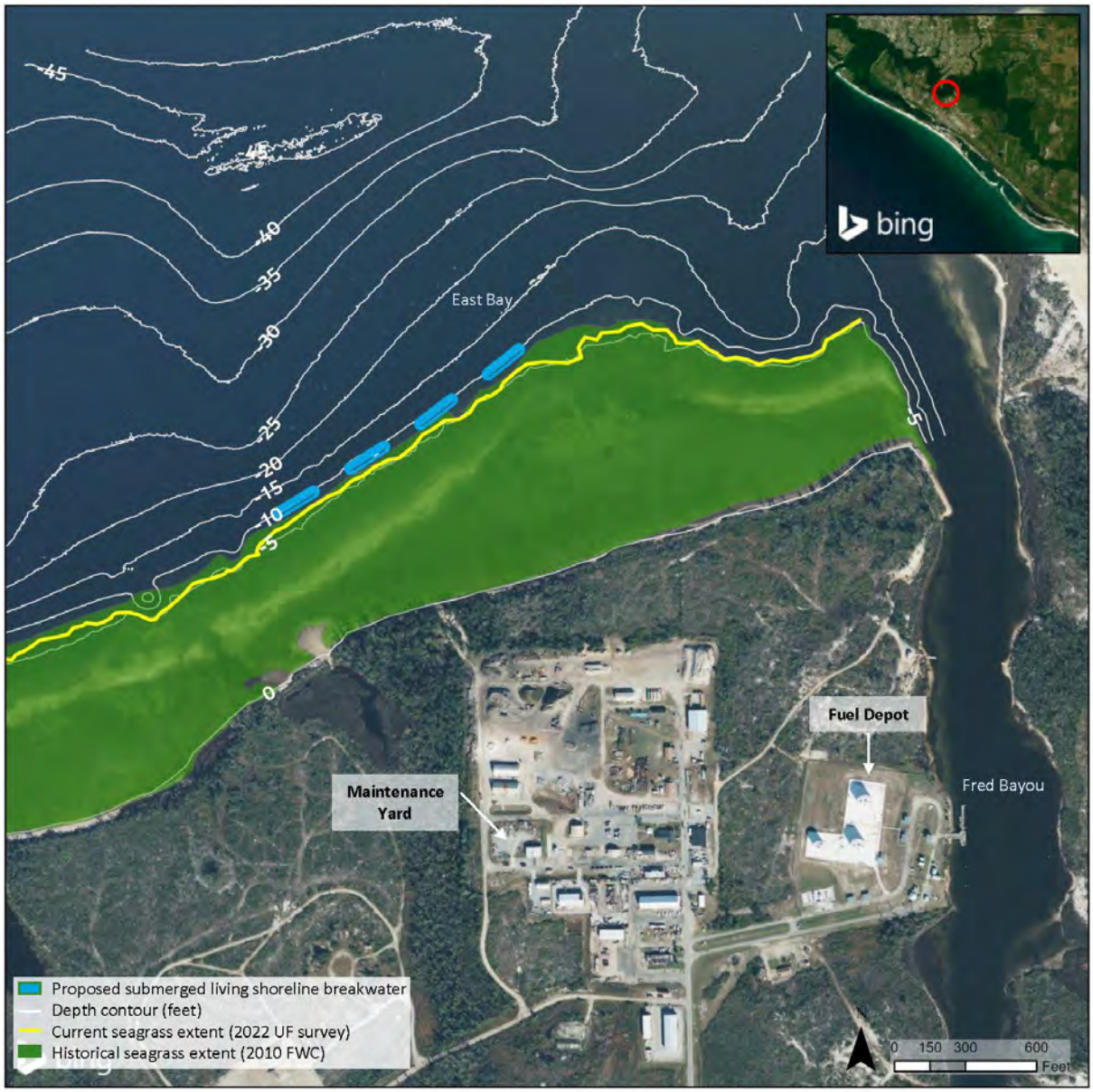
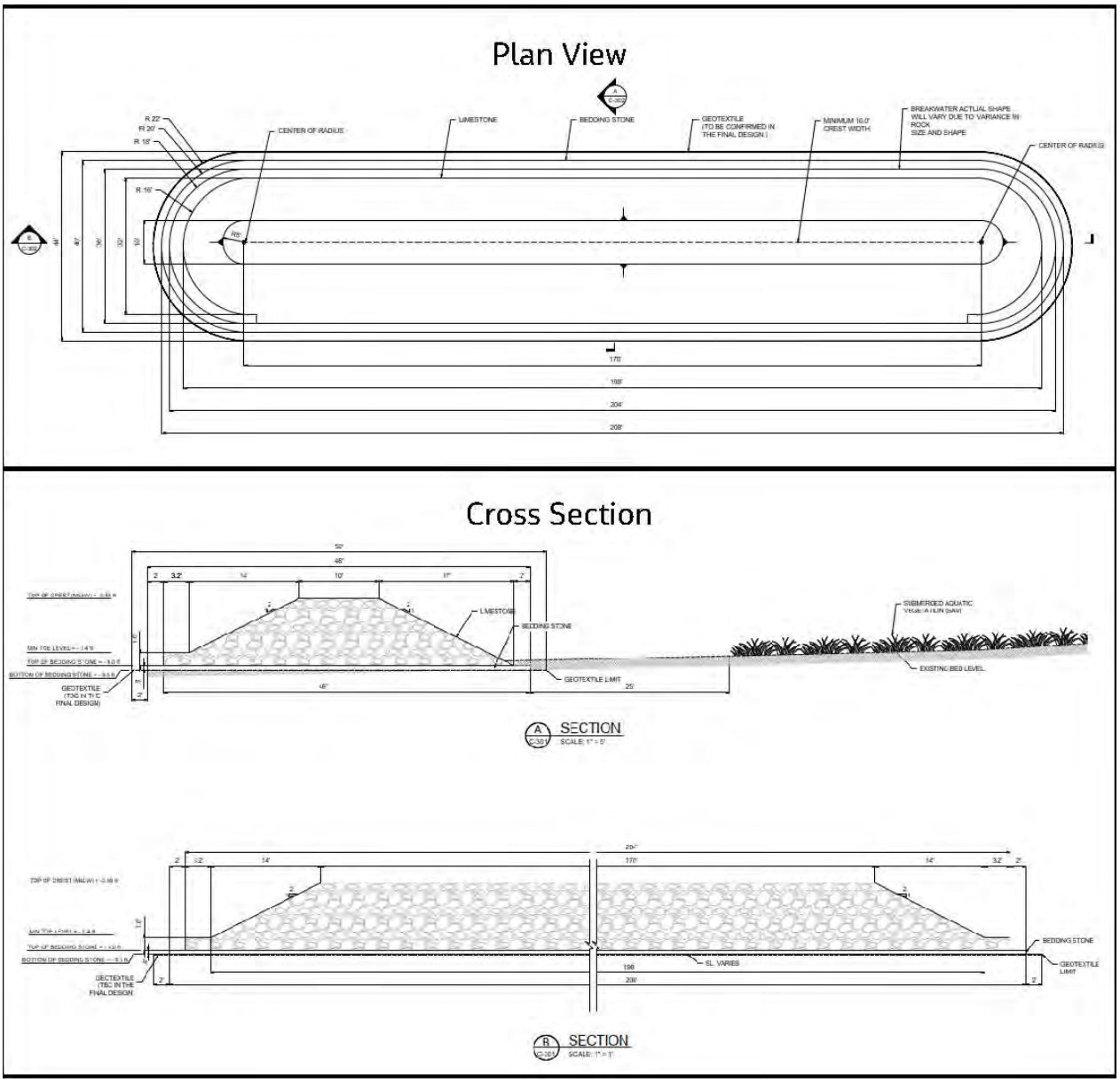


Figure 2-25. Plan View and Cross Section of Submerged Living Shoreline Breakwater under Alternative 1



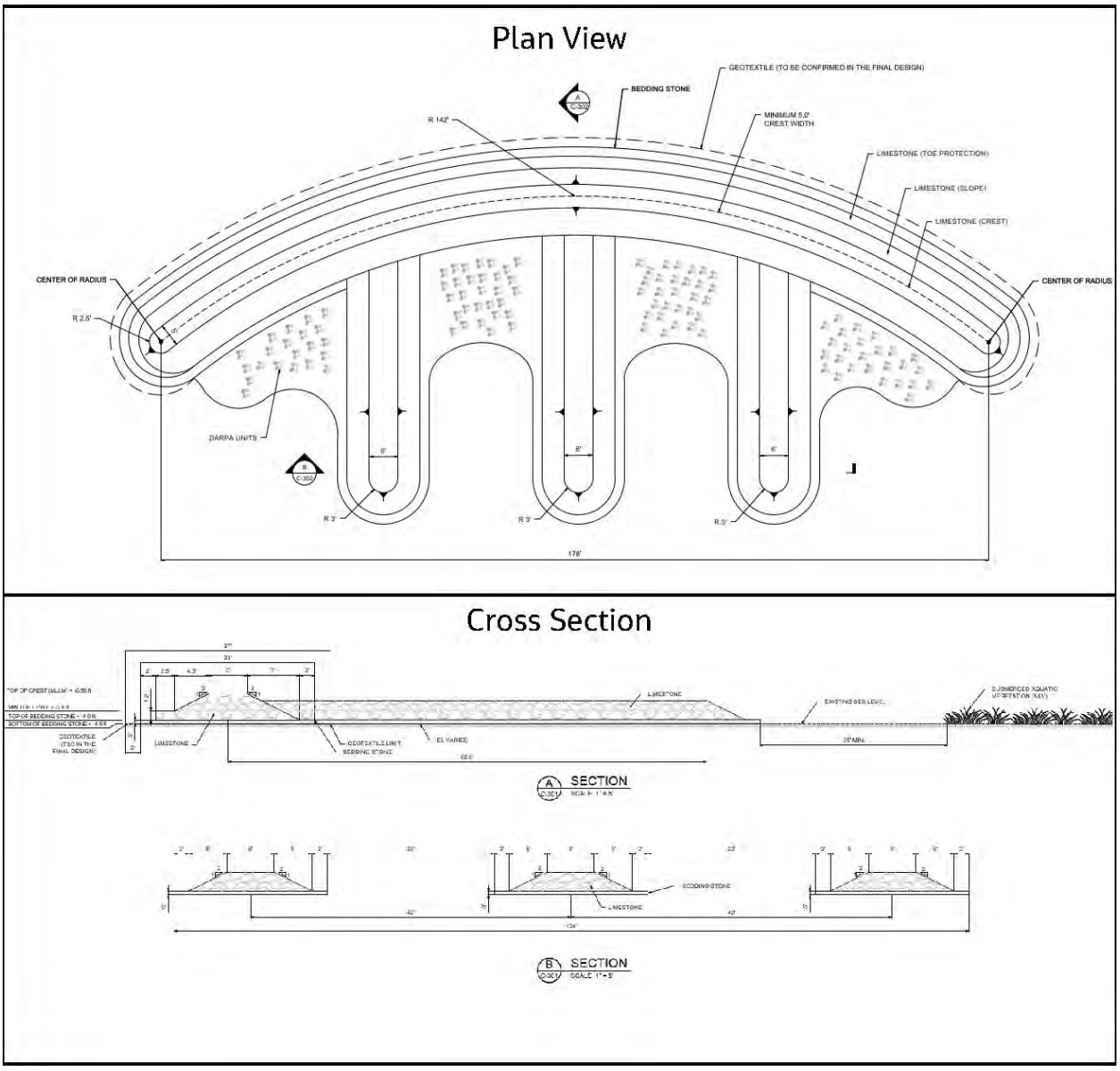
2.4.2.2.2 Submerged Oyster Reef Breakwater

The oyster reef breakwater would be located in East Bay along the northeastern coastline of Tyndall AFB, just north of the drone runway (Figure 2-26). Under Alternative 1, the oyster reef breakwater would consist of six 210-foot-long breakwaters separated by 158-foot-long gaps. The main portion of each breakwater would be curved and have rounded ends. Three finger reefs would extend from the landward side of each breakwater toward the shoreline. The breakwaters would be installed just seaward of the historical extent of seagrass based on FWC 2010 seagrass mapping (Figure 2-26). Based on SAV surveys conducted by UF in 2022 and 2023 for this project, the current design footprint of the oyster reef breakwater is approximately 24 feet from the existing seagrass meadow in the area at its closest point. The constructed breakwater would be approximately 25 feet or more from the closest seagrass bed. The breakwaters would be approximately 617 to 815 feet from the MHW line on the shoreline in water depths of approximately 4 to 5 feet. The breakwaters would be submerged, with the top of each structure being 0.56 foot below the current MLLW level (0.32 NAVD 88) (Figure 2-27). The main portion of each breakwater would have a crest width of 5 feet and a base (footprint) width of 27 feet, which includes a layer of bedding stone that extends 2 feet from the entire base of the structure, and a sublayer of

geotextile material that extends an additional 2 feet from the structure. The seaward side of the main portion would have a 2.5-foot-wide toe that extends from the base; the shoreward side would not have a toe. The finger reefs would have a crest width of 6 feet and a base width of 20 feet, including 2 feet of bedding stone (Figure 2-27). The main portion of the breakwater and the finger reefs would be constructed of quarry limestone boulders and would have 2:1 side slopes. Precast concrete units that promote oyster colonization and provide additional structure, substrate, and shelter for marine life would be added to the sides of the finger reefs (Figure 2-27). Each breakwater would have a footprint on the seafloor of 9,790 ft^2, or 0.22 acre, and the six breakwaters combined would have a total footprint of approximately 58,736 ft^2, or 1.35 acres.

Figure 2-26. Layout of Submerged Oyster Reef Breakwater under Alternative 1

Figure 2-27. Plan View and Cross Section of Submerged Oyster Reef Breakwater under Alternative 1



2.4.2.2.3 Submerged Shoreline Stabilization Breakwater and Seagrass Enhancement

The submerged shoreline stabilization breakwater and seagrass enhancement projects would be combined and located in St. Andrew Sound offshore of Buck Beach in the southwestern portion of Tyndall AFB (Figure 2-28). Under Alternative 1, the submerged shoreline stabilization breakwater would consist of twelve 206-foot-long breakwaters separated by 96-foot-long gaps. The breakwaters would be installed within the historical extent of seagrass based on FWC 2010 seagrass mapping (Figure 2-28). Based on SAV surveys conducted by UF in 2022 and 2023 for this project, the current design footprint of the shoreline stabilization breakwater is approximately 83 feet from the existing seagrass meadow in the area at its closest point. The constructed breakwater would be approximately 25 feet or more from the closest seagrass bed. The breakwaters would be approximately 216 to 816 feet from the MHW line on the shoreline in water depths of approximately 5 feet. The breakwaters would be submerged, with the top of each structure being 0.54 foot below the current MLLW level (0.34 NAVD 88) (Figure 2-29). Each breakwater would have a crest width of 22 feet and a base (footprint) width of 42 feet, which includes a layer of bedding stone that extends 2 feet from the entire base of the structure, and a sublayer of geotextile material that extends an additional 2 feet from the structure. These breakwaters would not have a toe on their seaward side like the other NBS breakwater structures. The breakwaters would be

constructed of quarry limestone boulders and would have 1.5:1 side slopes. Each breakwater would have a footprint on the seafloor of 7,868 ft^2, or 0.18 acre, and the 12 breakwaters combined would have a total footprint of approximately 94,418 ft^2, or 2.17 acres.

As indicated on Figure 2-28, there has been substantial loss of seagrass cover offshore of Buck Beach since 2010. The remaining seagrass beds are close to the shoreline and show evidence of ongoing erosion and grazing. The seagrass enhancement project at Buck Beach would involve installing bamboo stakes along the seaward edge of the existing seagrass meadow to deter grazing of the eroding edge by sea turtles. The bamboo stakes would also potentially help stabilize the sediments along the edge. Preventing seagrass grazing on the eroding edge of the meadow with a bamboo stockade is expected to allow the seagrass edge to grow and better resist sediment burial, with the goal of reducing further seagrass loss and promoting new seagrass growth in areas that historically contained seagrass. The bamboo stockade is being designed by UF and TNC to be 1 square meter wide and 400 meters long. It would be installed over a total length of 800 meters (Figure 2-28) as several stockade blocks separated by control plots to monitor effectiveness. The bamboo stakes would be spaced 10 to 15 centimeters apart within the stockade block. The proposed bamboo stockade is anticipated to last approximately 1 year. The bamboo stockade together with the submerged breakwater structure would provide an integrated approach for enhancing the existing seagrass beds and restoring lost seagrass cover in the project area. Seagrass transplantation and other seagrass enhancement techniques would be evaluated and potentially implemented at the site after installation of the breakwater.

Figure 2-28. Layout of Submerged Shoreline Stabilization Breakwater under Alternative 1

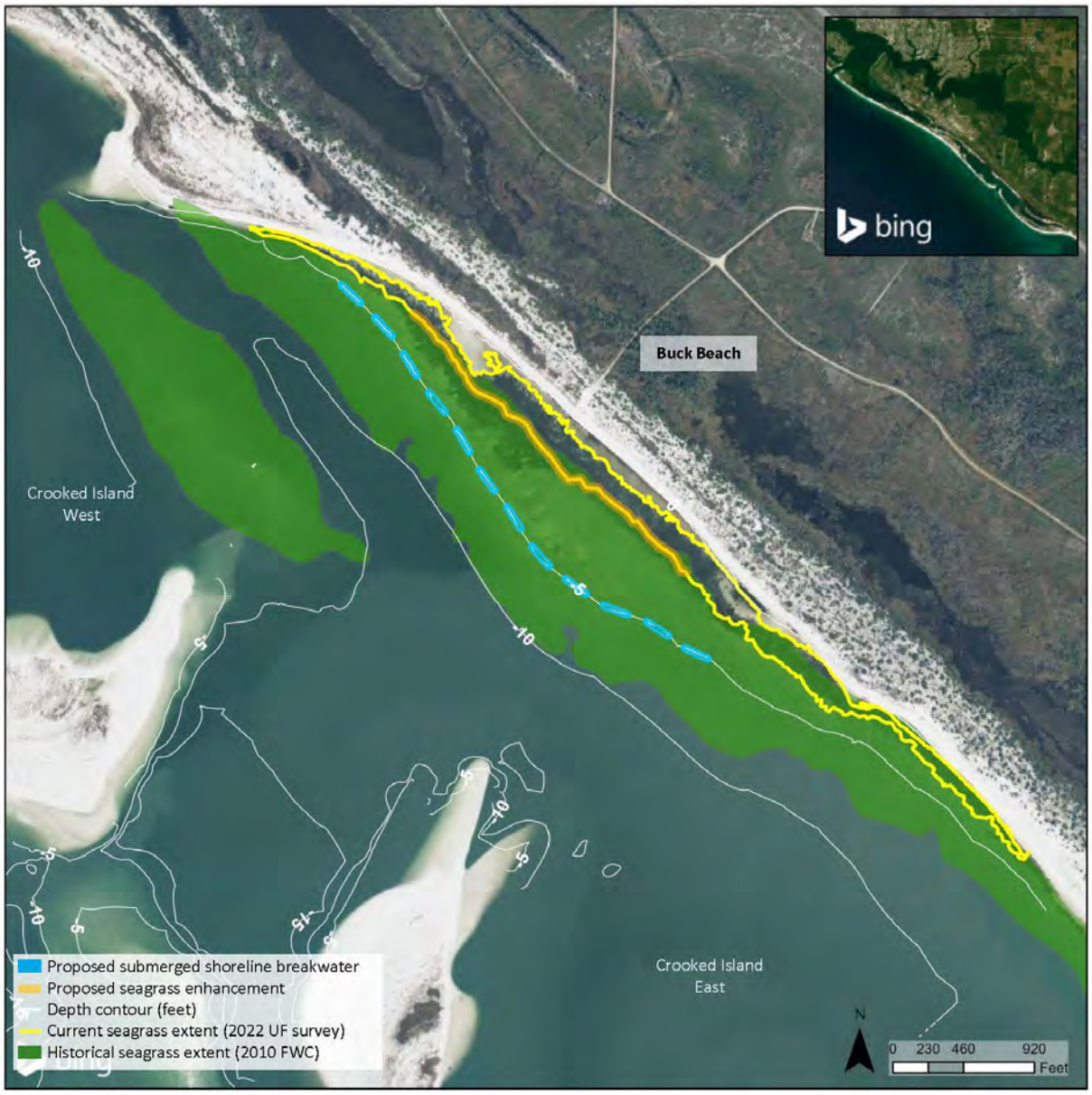
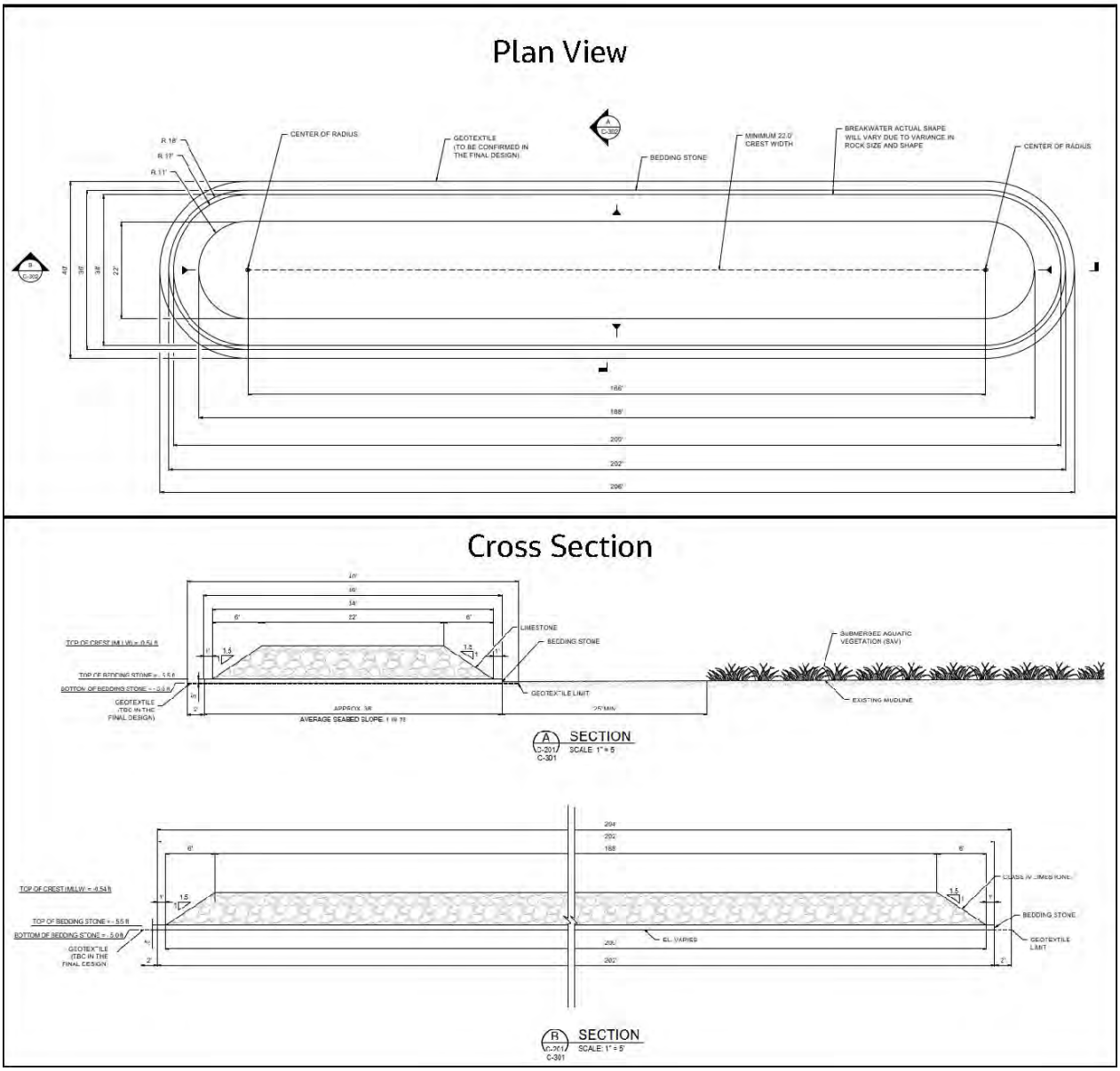


Figure 2-29. Plan View and Cross Section of Submerged Shoreline Stabilization Breakwater under Alternative 1



2.4.2.2.4 Monitoring

Monitoring of the proposed NBS breakwaters would include 1 year of pre-construction monitoring immediately prior to breakwater installation and 3 consecutive years of post-construction monitoring following installation. Some metrics would be evaluated using fixed monitoring transects such as transects to monitor oyster and invertebrate communities on the breakwaters, which would be oriented perpendicular to the crest of each breakwater. Transects to monitor adjacent seagrass beds and marsh habitats would be oriented parallel to the shoreline and span the bathymetric gradient from the shoreline to the installed structures. In addition to monitoring transects, some geospatial metrics would be collected via acoustics (subaqueous) or optical imagery (subaerial) using predefined survey strategies. These methods would result in partial or total coverage of the project areas and can be subsampled along the monitoring transects to provide spatially consistent reference points for comparison between data types and sampling dates.

Several metrics would be monitored for the breakwaters, including universal and restoration goal–based metrics defined in the defined in the *Oyster Habitat Restoration Monitoring and Assessment Handbook*

(Baggett et al. 2014). Metrics would include reef biodiversity metrics such as oyster density and percent cover of reef substrate by species; adjacent habitat metrics such as percent cover and areal extent of seagrass and marsh habitats; structure metrics such as breakwater areal dimension, height, and rugosity; water metrics such as wave height, tidal currents, and water quality; and shoreline dynamics metrics such as shoreline position and topo-bathymetric profile. The seagrass enhancement project would include 1 year of monitoring following installation of the bamboo stockade with several monitoring events conducted within the year to assess grazing deterrence, seagrass growth, and other metrics.

2.4.3 Alternative 2

2.4.3.1 CRIP Projects

Under Alternative 2, structural solutions that differ from the preferred structural solutions under Alternative 1 for certain districts would be implemented. Under Alternative 1, the preferred structural solution for the Sabre, North, and Silver Flag Districts are earthen levees and the preferred solution for the fuel depot area in the Flightline District is a combination levee/floodwall system. Under Alternative 2, concrete floodwalls instead of levees would be constructed to protect the targeted assets in these districts. Floodwalls would serve the same purpose as levees but would differ from levees in their construction footprint, potential impacts to natural and cultural resources, and overall cost. Alternative 2 would include the same nonstructural solutions as presented under Alternative 1 associated with constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options for all seven districts of the base.

Floodwalls are relatively narrow and lack side slopes; therefore, they generally have smaller footprints than levees. Under Alternative 2, the floodwall for each district would have a footprint of 33 feet, consisting of a 3-foot-wide floodwall structure and a 15-foot clear zone on each side of the floodwall for access and protection. As with the levees, the floodwall top elevations would be set at 1 foot above the DFE; therefore, the floodwalls, like the levees, would have varying height depending on the ground elevation. The alignments of the floodwalls under Alternative 2 match the alignments of the levees under Alternative 1. Portions of the original levee alignments presented in the final CRIP were modified by the CRIP design team for Alternative 1 in this EA to avoid wetland impacts to the greatest extent practicable. The same alignments are kept for the floodwalls under Alternative 2 so that potential wetland impacts are minimized to the extent practicable under both alternatives. The footprint dimensions of the structural solutions under Alternatives 1 and 2 for the Sabre, North, Flightline, and Silver Flag Districts are presented in Table 2-10. The floodwalls proposed under Alternative 2 for these districts are shown on Figures 2-30 to 2-35.

Table 2-10. Footprint Dimensions of Structural Solutions under Alternatives 1 and 2

Alternative	Structure Width[a]	Clear Zone Width	Footprint Width	Footprint Length	Total Footprint
Sabre District—WWTP					
Alternative 1 Levee	Varies; avg. 54.1 feet	10 feet both sides	74.1 feet	3,533 feet	6.10 acres
Alternative 2 Floodwall	3 feet	15 feet both sides	33 feet	3,920 feet	2.97 acres
Sabre District—East Housing Area					
Alternative 1 Levee	Varies; avg. 34.7 feet	10 feet both sides	54.7 feet	4,683 feet	5.74 acres
Alternative 2 Floodwall	3 feet	15 feet both sides	33 feet	4,542 feet	3.44 acres
Sabre District—West Housing Area					
Alternative 1 Levee	Varies; avg. 46.9 feet	10 feet both sides	66.9 feet	11,117 feet	16.32 acres
Alternative 2 Floodwall	3 feet	15 feet both sides	33 feet	10,953 feet	8.30 acres
North District—7000 Area					
Alternative 1 Levee	Varies; avg. 81.6 feet	10 feet both sides	101.6 feet	10,476 feet	24.64 acres
Alternative 2 Floodwall	3 feet	15 feet on both sides	33 feet	10,713 feet	8.12 acres
Flightline District—Fuel Depot Area					
Alternative 1 Levee Portion	Varies; avg. 62.7 feet	10 feet both sides	82.7 feet	921 feet	2.78 acres
Alternative 1 Floodwall Portion	3 feet	15 feet both sides	33 feet	1,515 feet	1.15 acres
Alternative 2 Floodwall	3 feet	15 feet on both sides	33 feet	2,426 feet	1.84 acres
Silver Flag District—Cantonment Area					
Alternative 1 Levee	Varies; avg. 42.2 feet	10 feet both sides	62.2 feet	8,440 feet	12.10 acres
Alternative 2 Floodwall	3 feet	15 feet on both sides	33 feet	8,946 feet	6.77 acres

[a] Width of above-grade structure

avg. = average; WWTP = Wastewater Treatment Plant

Figure 2-30. Floodwall for Wastewater Treatment Plant under Alternative 2

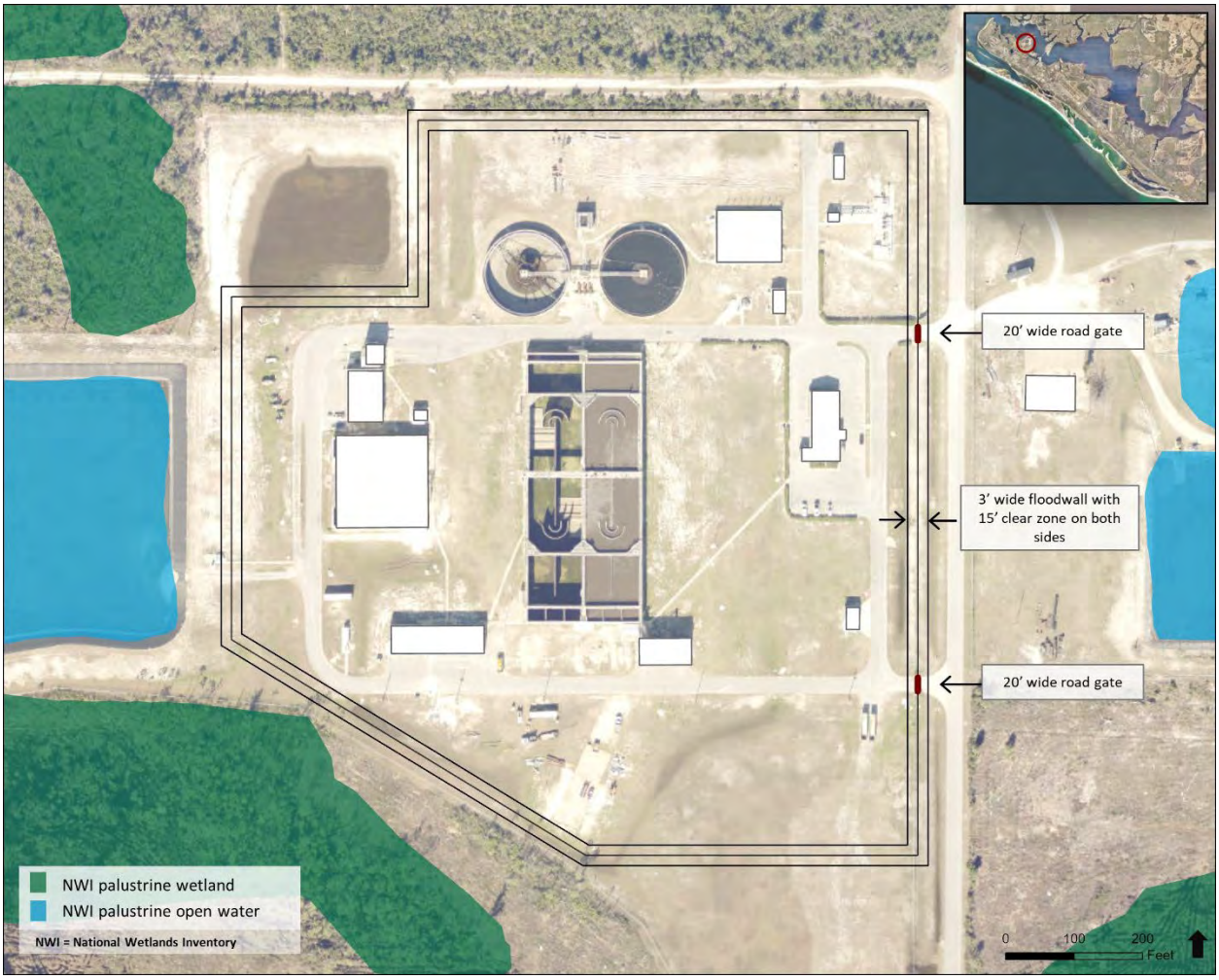


Figure 2-31. Floodwall for East Housing Area under Alternative 2

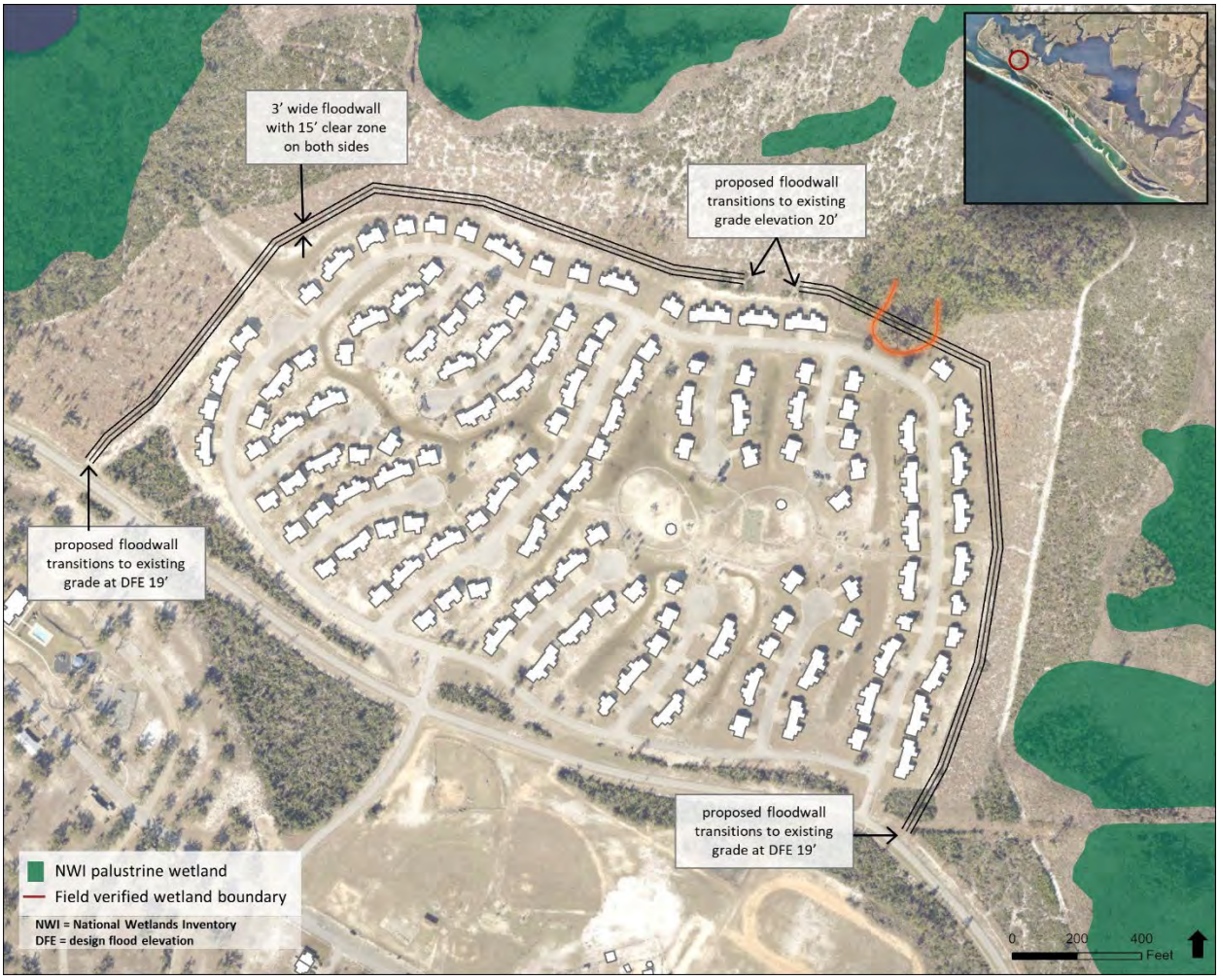


Figure 2-32. Floodwall for West Housing Area under Alternative 2

Figure 2-33. Floodwall for 7000 Area under Alternative 2

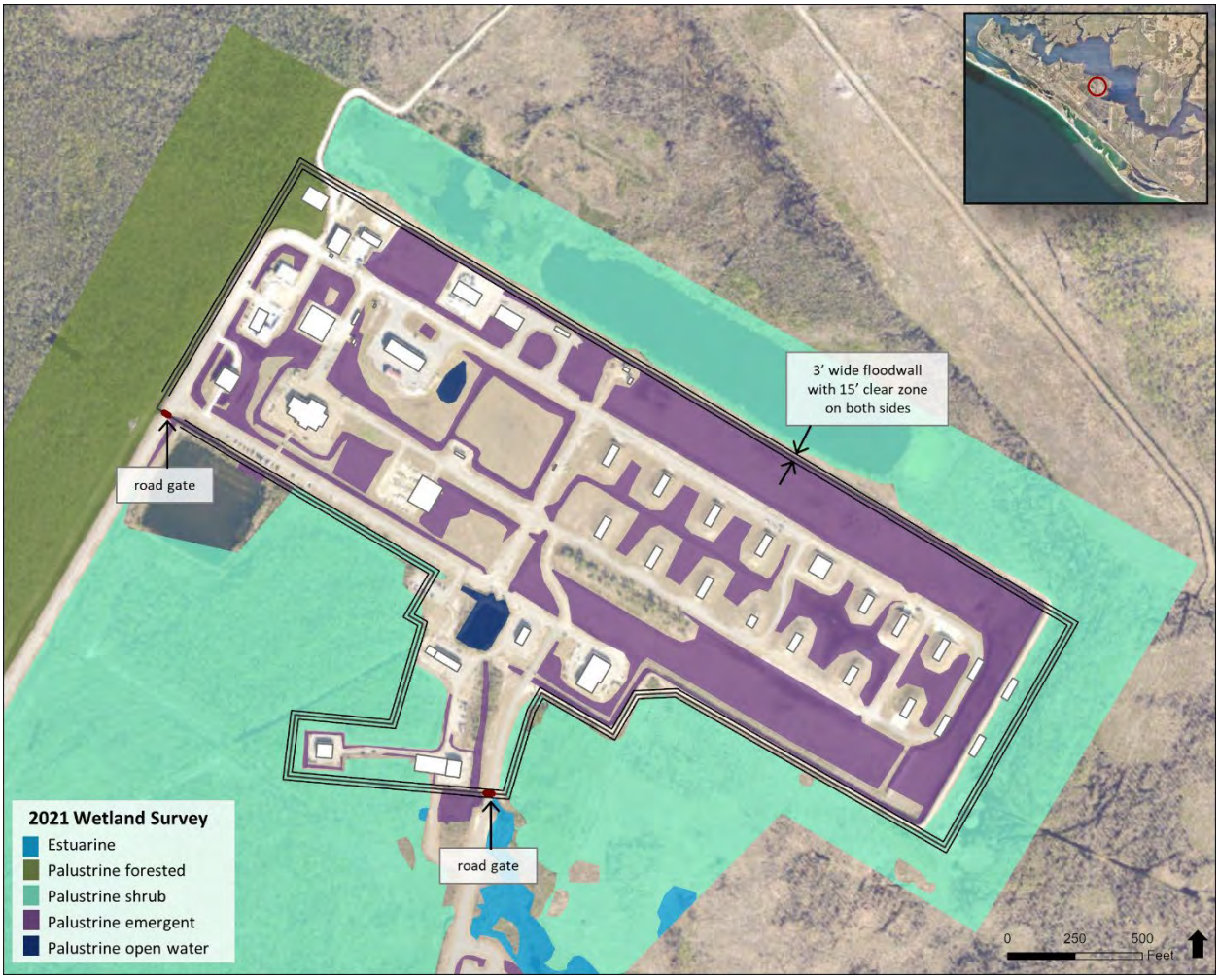
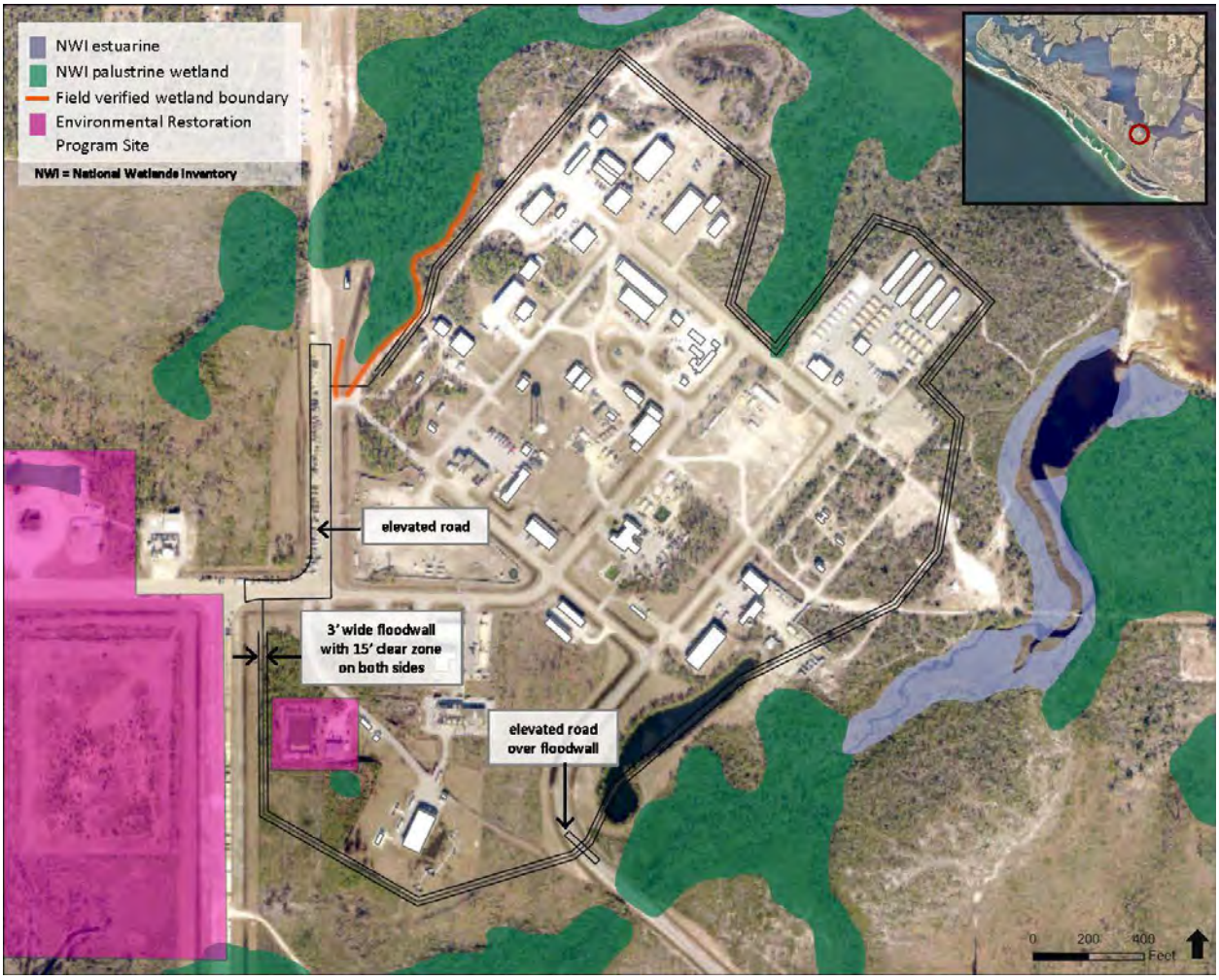


Figure 2-34. Floodwall for Fuel Depot Area under Alternative 2

Figure 2-35. Floodwall for Silver Flag Cantonment Area under Alternative 2



2.4.3.2 NBS Pilot Projects

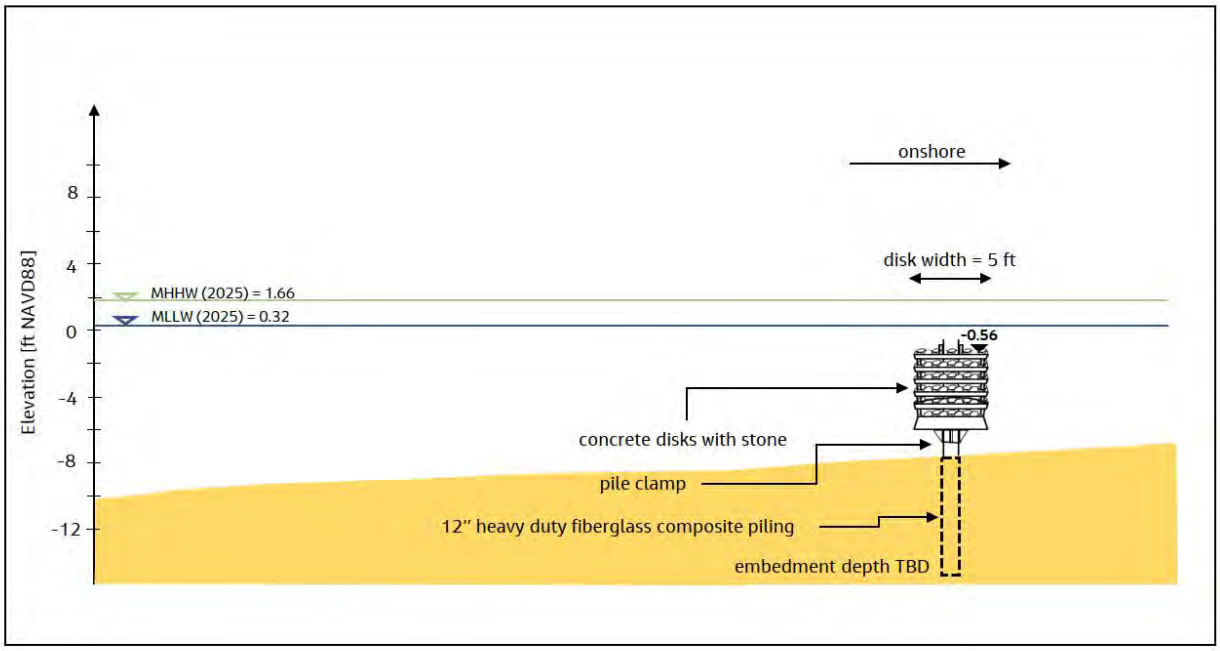
Under Alternative 2, the NBS breakwaters would be constructed based on a design that differs from the preferred design under Alternative 1. Under Alternative 1, the preferred design for the living shoreline, oyster reef, and shoreline stabilization breakwaters is a submerged quarry stone breakwater. Under Alternative 2, a submerged pile-mounted concrete disk breakwater would be installed for the living shoreline and oyster reef breakwater projects instead of a submerged quarry stone breakwater. For the shoreline stabilization breakwater project, a submerged geotube breakwater would be installed under Alternative 2 instead of a submerged quarry stone breakwater. The designs under Alternative 2 would serve the same purpose as the quarry stone breakwater design under Alternative 1 but would differ in construction footprint, effectiveness, cost, and other factors. The Alternative 2 breakwaters would be constructed within the same footprints as the Alternative 1 breakwaters.

2.4.3.2.1 Living Shoreline Breakwater

Under Alternative 2, a submerged pile-mounted concrete disk breakwater would be constructed for the living shoreline breakwater project instead of a submerged quarry stone breakwater as proposed under Alternative 1 (Figure 2-36). Each unit would contain stacked concrete disks with stone and a piling that would be anchored into the seafloor. The disks would be 5 feet wide, and the piling of each unit would be 12 inches in diameter. The top of the breakwater would be 0.56 foot below the current MLLW level (0.32 NAVD 88). The units may be installed side by side or in a grid pattern. For the purpose of analysis, it is assumed that 50 disks would be installed within each of the four 212-foot segments shown for Alternative 1. Each disk unit would have a 12-inch-diameter footprint on the seafloor. The 50 disks within each 212-

foot segment would have a total footprint on the seafloor of 39 ft^2, and the 200 disks within the entire four-segment layout would have a total footprint of 157 ft^2. The Alternative 2 breakwater would be generally the same distance from shore and from existing seagrass beds as the Alternative 1 breakwater.

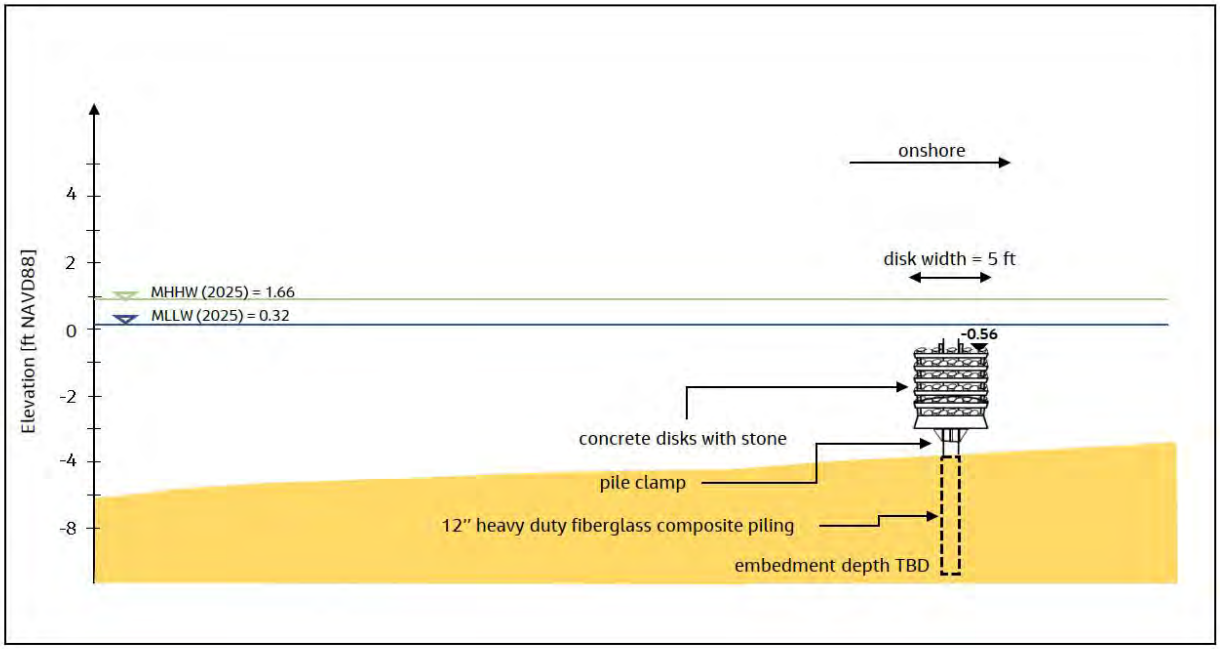
Figure 2-36. Cross Section of Living Shoreline Breakwater under Alternative 2



2.4.3.2.2 Oyster Reef Breakwater

Under Alternative 2, a submerged pile-mounted concrete disk breakwater would be constructed for the oyster reef breakwater pilot project instead of a submerged quarry stone breakwater as proposed under Alternative 1 (Figure 2-37). The disk units would be the same as those described for the living shoreline breakwater. The top of the breakwater would be 0.56 foot below the current MLLW level (0.32 NAVD 88). For the purpose of analysis, it is assumed that 50 disks would be installed within each of the six 210-foot segments shown for Alternative 1. The 50 disks within each 210-foot segment would have a total footprint on the seafloor of 39 ft^2, and the 300 disks within the entire six-segment layout would have a total footprint of 236 ft^2. The Alternative 2 breakwater would be generally the same distance from shore and from existing seagrass beds as the Alternative 1 breakwater.

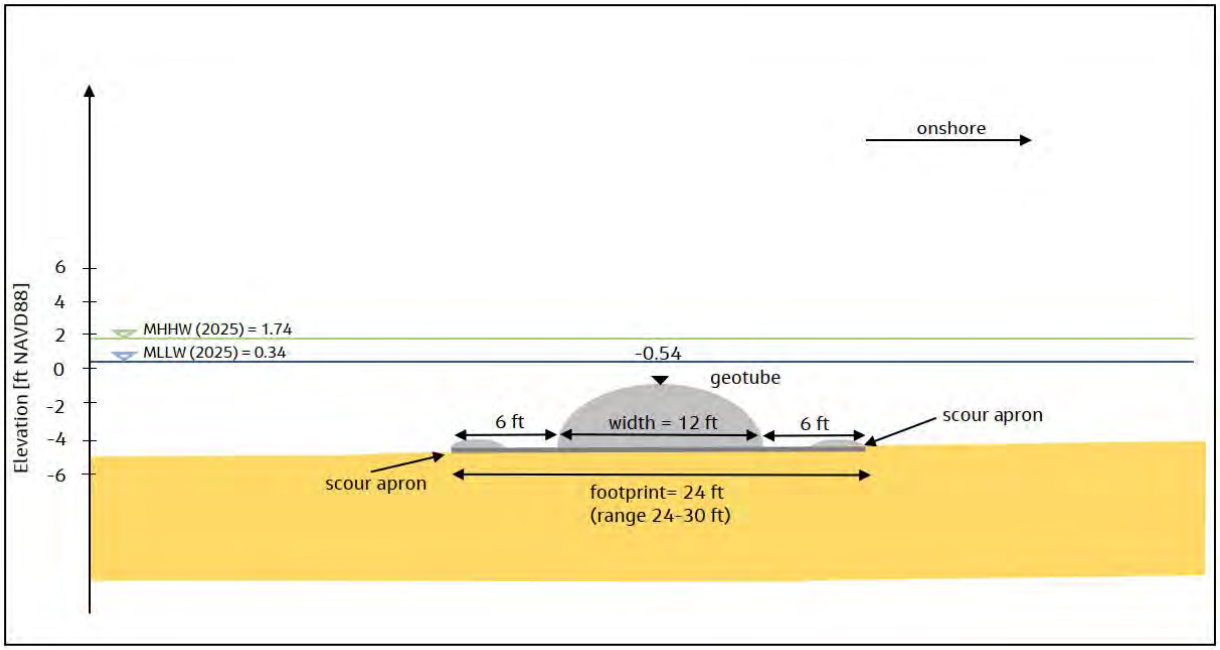
Figure 2-37. Cross Section of Oyster Reef Breakwater under Alternative 2



2.4.3.2.3 Submerged Shoreline Stabilization Breakwater and Seagrass Enhancement

Under Alternative 2, a submerged geotube breakwater would be constructed for the submerged shoreline stabilization breakwater project instead of a submerged quarry stone breakwater as proposed under Alternative 1 (Figure 2-38). Geotube breakwaters are typically constructed of high-strength polyester or a combination of an inner polypropylene tube and an outer polyester tube that are filled with sand or dredged material. They are commonly used as breakwaters for beaches. The submerged geotube breakwater under Alternative 2 would be approximately 3,500 feet in length and would be generally the same distance from shore and from existing seagrass beds as the Alternative 1 breakwater. The geotube breakwater would be 12 feet wide at the base and would have 6-foot-wide scour aprons on both sides. The footprint width, including the scour aprons, would be 24 feet. The top of the geotube would be 0.54 foot below the current MLLW level (0.34 NAVD 88). The geotube breakwater under Alternative 2 would have a total footprint on the seafloor of approximately 84,000 ft^2, or 1.9 acres. The seagrass enhancement techniques that would be implemented at the site under Alternative 2 would be the same as those proposed under Alternative 1.

Figure 2-38. Cross Section of Shoreline Stabilization Breakwater under Alternative 2



2.5 Summary of Alternatives and Resources

2.5.1 Alternatives Analyzed

The Proposed Action is to implement the Tyndall AFB CRIP, including four NBS pilot projects planned in association with the CRIP, including three NBS breakwaters and seagrass enhancement. Under Alternative 1, the preferred alternative, the flood defense strategies recommended for each district of the base in the final CRIP would be implemented. Constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options are recommended for all seven districts of Tyndall AFB. Structural solutions such as constructing levees or floodwalls are recommended for the Sabre, North, Flightline, and Silver Flag Districts. These districts are the most susceptible to coastal flooding impacts, particularly the North and Flightline Districts. The flood defense projects recommended for each district of the base in the CRIP are conceptual and analyzed on a programmatic level in this EA. In contrast, this EA provides a detailed analysis of the four proposed pilot projects, which would be the first NBS projects implemented under the CRIP. These projects have defined locations, layouts, and materials and, therefore, are analyzed in detail in this EA. All the other traditional and NBS options under the CRIP that are analyzed programmatically in this EA would undergo a separate environmental review that follows AF Form 813, *Request for Environmental Impact Analysis* (32 CFR 989.12), prior to implementation; this review can be tiered off the programmatic impact analyses in this EA, as applicable.

Under Alternative 2, structural solutions that differ from the preferred structural solutions under Alternative 1 for certain districts would be implemented. Under Alternative 1, the preferred structural solution for the Sabre, North, and Silver Flag Districts are earthen levees and the preferred solution for the fuel depot area in the Flightline District is a combination levee/floodwall system. Under Alternative 2, concrete floodwalls instead of levees would be constructed to protect the targeted assets in these districts. Floodwalls would serve the same purpose as levees but would differ from levees in their construction footprint, potential impacts to natural and cultural resources, and overall cost. Alternative 2 would include the same nonstructural solutions as presented under Alternative 1 associated with constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options for all seven districts of the base.

Under Alternative 1, the NBS breakwaters would be constructed based on the preferred design for each breakwater, which is a submerged breakwater constructed of quarry stones. Under Alternative 2, a submerged pile-mounted concrete disk breakwater would be installed for the living shoreline and oyster reef breakwater projects instead of a submerged quarry stone breakwater. For the shoreline stabilization breakwater, a submerged geotube breakwater would be installed under Alternative 2 instead of a submerged quarry stone breakwater. The designs under Alternative 2 would serve the same purpose as the quarry stone breakwater design under Alternative 1 but would differ in construction footprint, effectiveness, cost, and other factors. The Alternative 2 breakwaters would be constructed within the same footprints as the Alternative 1 breakwaters.

The No Action Alternative is to maintain existing conditions. Under the No Action Alternative, none of the CRIP projects, NBS pilot projects, or strategies identified in the CRIP to reduce the coastal flood risk at Tyndall AFB would be implemented.

2.5.2 Resources Analyzed

This EA analyzes the potential impacts of each alternative in detail on the following resource areas:

- Air Quality
- Water Resources
- Geological Resources
- Cultural Resources
- Biological Resources
- Noise
- Infrastructure
- Land Use
- Public Health and Safety
- Hazardous Materials and Wastes
- Socioeconomics
- Environmental Justice and Protection of Children

Section 3 presents the regulatory setting, affected environment, and environmental consequences of the alternatives for each resource analyzed.

2.5.3 Resources Eliminated from Detailed Analysis

Resources determined to have no potential to be impacted by the Proposed Action can be eliminated from detailed analysis in this EA. Airspace use and management was determined to have no potential to be impacted by the Proposed Action and, therefore, was eliminated from detailed analysis in this EA.

Airspace Use and Management

Airspace is the four-dimensional area (space and time) that overlies and falls under the jurisdiction of a nation. The Federal Aviation Administration is responsible for the safe and efficient use of U.S. navigable airspace. The use and management of airspace by the DAF is defined in Department of the Air Force Manual 13-201, *Airspace Management*, and AFMAN 11-214, *Air Operations Rules and Procedures*. Implementation of the Tyndall AFB CRIP and the four associated NBS pilot projects under the Proposed Action would have no effect on the classification, dimensions, or other parameters of any existing airspace. The Proposed Action would also have no potential to result in airspace restrictions or congestion, or otherwise impact air traffic control or military or non-military use of any airspace. For these reasons, the Proposed Action would have no effect on airspace use and management. The potential effects of the four NBS pilot projects on the BASH program of Tyndall AFB are analyzed in Section 3.5.

3. Affected Environment and Environmental Consequences

3.1 Air Quality and Climate Change

Pursuant to the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS have been established for the following air pollutants, which are called criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide, ozone, sulfur dioxide (SO_2), and respirable particulate matter defined as particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). An area (county or air basin) that meets the air quality standard for the criteria pollutants is designated as being in attainment. An area that does not meet the air quality standard for one of the criteria pollutants is designated as being in nonattainment for that standard and is subject to planning requirements to attain the standard. An area that currently meets the air quality standard but previously was classified as being in nonattainment is in maintenance for that standard.

Climate change refers to the variation in the Earth's climate over time. Climate change is known to be caused by natural processes such as variations in ocean currents and solar energy and by human emissions of greenhouse gases (GHGs), which are gases that trap heat in the Earth's atmosphere. GHGs are emitted by both natural processes and human activities and primarily include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Much of the CO_2 that humans release into the atmosphere is a by-product of energy use, such as the burning of fossil fuels. To compare GHGs with each other, each GHG quantity is translated into a common unit called the carbon dioxide equivalent (CO_2e).

3.1.1 Affected Environment

3.1.1.1 Emissions Sources

Bay County, Florida, is defined as the region of influence (ROI) for the analysis of air quality in this EA. State, U.S., and global GHG emissions are also evaluated to provide additional perspective on the action's potential impact on climate change in relation to regional and global GHG emissions. Bay County is currently classified as being in attainment for all criteria pollutants stipulated under the NAAQS. Estimated annual emissions of criteria air pollutants and GHGs generated in Bay County are published in EPA's National Emissions Inventory (NEI) every 3 years. These estimates include emissions from various point sources, which are tracked stationary sources such as factories and power plants; nonpoint sources, which are individually too small to report as point sources, such as residential heating; on-road mobile sources such as cars and trucks; and non-road mobile sources such as construction equipment. Some non-road mobile sources, such as aircraft emissions during landing and takeoff, are included in the point source category, whereas others such as marine vessels are included in the nonpoint source category. The NEI also includes emissions from major fire sources, including wildfires, prescribed fires, and agricultural fires. Starting with the 2020 NEI, major sources of fire are included in the nonpoint source category.

Air emissions in Bay County originate primarily from various sources in Panama City and other cities and unincorporated areas in the county including Tyndall AFB. Countywide emissions primarily include those from burning of fossil fuels (for example, coal, oil, and natural gas), industrial and commercial facilities, vehicular traffic, military air operations, non-military flight activity, construction activity, and prescribed burning. Tyndall AFB is identified as a minor source of air emissions based on air permitting regulations and currently operates under Minor Source Air Operation Permit No. 0050024-019-AF issued by the DEP. The following stationary sources of air emissions at Tyndall AFB are regulated under the base's air permit: paint booths (seven units); fuel fill stands (three stands used to transfer fuel between tank trucks and storage tanks); jet engine testing (Building 325); fuel tanks (eight storage tanks); external combustion

equipment (boilers and paint booth reheat burners); Reciprocating Internal Combustion Engines (RICEs) constructed before June 12, 2006; and RICEs constructed after June 12, 2006.

3.1.1.2 Criteria Pollutant Emissions

Table 3-1 presents estimated annual emissions of criteria air pollutants and volatile organic compounds (VOCs) for Bay County published in the 2020 NEI (EPA 2024a). These emission data are the most recent available and represent the latest inventoried air emissions in the ROI. VOCs are not a criteria pollutant but are ozone precursors because ozone is created when VOCs combine with nitrogen oxides (NO_x) in the presence of sunlight.

Table 3-1. 2020 NEI Estimates of Annual Air Emissions (in tons/year) of Criteria Pollutants and VOCs for Bay County, Florida

NO_x	CO	SO_2	Lead	PM_{10}	$PM_{2.5}$	VOCs
3,180	35,156	160	< 0.1	3,570	2,013	20,663

Source: EPA 2024a

3.1.1.3 GHG Emissions

Table 3-2 presents estimated Bay County, state of Florida, U.S., and global GHG emissions. The CO_2e emissions are calculated as the sum of CO_2, CH_4, and N_2O after each is multiplied by its global warming potential multiplier, which for CO_2 is 1, for CH_4 is 25, and for N_2O is 298.

Table 3-2. Estimated GHG Emissions

Source	CO_2	CH_4	N_2O	CO_2e
Bay County[a]	1,447,085	17,884	4,632	1,469,601
Florida[b]	227,404,647	552,428	58,049	228,015,124
United States[b]	5,136,454,179	25,626,912	1,500,708	5,163,581,798
Global[c]	38,331,747,604	191,245,612	1,119,9313	38,534,192,522

[a] 2020 NEI (EPA 2024a)

[b] ACAM-generated estimate for 2026 emissions

[c] Based on the assumption that U.S. GHG emissions are 13.4 percent of global GHG emissions (CCES 2018)

ACAM = Air Conformity Applicability Model

3.1.1.4 Climate Change

Global temperatures have increased since the beginning of the 20th century, and the rate of temperature increase has increased since 1970. Each of the past three decades has been successively warmer than any of the previous decades, and 2010 to 2019 has been the warmest decade on record. The average global surface temperature is estimated to be 1.09 degrees Celsius higher during the period from 2011 to 2020 than during the period from 1850 to 1900 (IPCC 2023). It is internationally recognized that human activities that emit GHGs are unequivocally contributing to global warming (IPCC 2023).

Temperatures in Florida have risen more than 2 degrees Fahrenheit since the beginning of the 20th century (NOAA NCEI 2022). The southern portion of Florida has warmed more than the rest of the state (EPA 2016). Annual total rainfall in Florida has varied widely from year to year since 1895. The data do not show an obvious trend of increasing rainfall in the state over time; however, the state has experienced near- or above-average numbers of 4-inch extreme precipitation events since 1995 (NOAA NCEI 2022). An increase in such extreme precipitation events would increase inland flooding and exacerbate coastal flooding along with sea-level rise. Sea-level rise is caused primarily by two factors related to global warming: the water added by melting land ice and the expansion of seawater as it warms. Global mean sea levels have increased by 0.2 meter (7.9 inches) from 1901 to 2018. Satellite data

indicate that from 1993 to 2023, global sea levels have risen by approximately 99.8 millimeters (3.9 inches) (NASA 2023). For most purposes, Florida sea-level rise can be considered similar to global sea-level rise throughout the state's coastal areas (Merrifield et al. 2009).

On January 9, 2023, CEQ published its "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change" (88 *Federal Register* 1196). This is currently interim guidance to assist agencies in analyzing GHG and climate change effects of their proposed actions under NEPA while CEQ seeks public comment on the guidance. This guidance requires that additional context on GHG emissions be provided by estimating the social costs (SC) of the GHG emissions, expressed as SC GHG, in U.S. dollars per metric ton. Table 3-3 presents the annual SC GHG per metric ton for each GHG type, and Table 3-4 presents estimated state of Florida and U.S. SC GHG in 2020 U.S. dollars.

Table 3-3. Annual SC GHG per Metric Ton

Year	CO_2	CH_4	N_2O
2026	$84.00	$2,300.00	$30,000.00

Table 3-4. Estimated SC GHG in 2020 U.S. Dollars (in thousands)

Source	CO_2	CH_4	N_2O	CO_2e
Florida[a]	$19,101,990.35	$1,270,583.74	$1,741,465.95	$22,114,040.04
United States[a]	$431,462,151.04	$58,941,896.86	$45,021,229.08	$535,425,276.98

[a] ACAM-generated estimate for 2026

3.1.2 Environmental Consequences

Under the General Conformity rule established under the Clean Air Act, federal agencies must ensure that their actions conform to the state implementation plan in a nonattainment or maintenance area. The Proposed Action is within an attainment area; therefore, it is exempt from the General Conformity rule and does not require an associated air quality conformity analysis. There are established insignificance thresholds for use in General Conformity for nonattainment and maintenance areas; however, there are no established significance thresholds for attainment areas. In accordance with DAF air quality Environmental Impact Analysis Process guidance (AFCEC 2023a), the Prevention of Significant Deterioration (PSD) threshold of 250 tons per year (tpy) for criteria pollutants (except for lead, which is 25 tpy) can be used as an indicator of potentially significant air quality impacts under NEPA for attainment areas. The DAF quantifies emissions of criteria pollutants for NEPA assessments using its Air Conformity Applicability Model (ACAM).

All air quality NEPA assessments conducted by the DAF are required to assess GHGs in accordance with *DAF Greenhouse Gas (GHG) & Climate Change Assessment Guide* (AFCEC 2023b). Based on this guidance, a GHG emissions evaluation should be conducted to quantify the GHG emissions from the proposed action and determine whether the action's emissions are insignificant. The GHG emissions evaluation is automated in ACAM.

The DAF has adopted the PSD threshold for GHG of 75,000 tpy, or 68,039 metric tons per year (mtpy), as an indicator or threshold of insignificance for air quality impacts in all areas under NEPA (AFCEC 2023b). This indicator does not define a significant impact; however, it identifies actions that are insignificant. The DAF considers proposed actions (or alternatives) with a net change in GHG (CO_2e) emissions below 75,000 tpy as being too insignificant to warrant further consideration beyond the ACAM analysis. Actions with a net change in GHG emissions above 75,000 tpy, or 68,039 mtpy, are considered only potentially significant and require further analysis to determine whether they would have a significant impact.

In accordance with DAF air quality guidance, the threshold level for a significant impact on air quality from the Proposed Action is defined in this EA as an exceedance of any of the following: the PSD threshold of

250 tpy for criteria pollutants except for lead, the PSD threshold of 25 tpy for lead, or the PSD threshold of 75,000 tpy for GHGs.

The 2023 DAF GHG guidance (AFCEC 2023b) recommends that the proposed action's annual GHG emissions be compared to the annual GHG emissions of the state where the action is proposed and to U.S. and global annual GHG emissions to provide additional perspective on the action's potential impact on climate change in relation to regional and global GHG emissions. State and U.S. emission estimates are based on 5-year averages of individual state-reported emissions, and global emissions are based on the assumption that U.S. GHG emissions are 13.4 percent of global GHG emissions. The relative significance assessment is automatically performed in ACAM. In addition, the SC GHG, in U.S. dollars per metric ton, should be estimated and compared to U.S. and global SC GHG values. The SC GHG is a theoretical estimate of the long-term monetary damage (based on 2020 U.S. dollars) that may result from the GHG emissions and can be used to provide additional context on the overall impact of the action on climate change. The SC GHG assessment is automatically performed in ACAM. The SC GHG estimates are derived using the methodology and discount factors in *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*, issued by the Interagency Working Group on Social Cost of Greenhouse Gases in February 2021 (IWGSCGHG 2021).

Lastly, as part of the climate change evaluation, the potential impacts of climate change on the proposed action and its environment should be qualitatively assessed. This assessment may inform the design and long-term use and maintenance of the project. The level of this assessment should be proportional to the proposed action's expected potential to affect climate change and vice versa.

3.1.2.1 CRIP Implementation

3.1.2.1.1 Air Quality

Of the flood defense strategies identified in the CRIP, the construction of levees and floodwalls would generate the most air emissions. The various stages of construction for constructing levees under Alternative 1 or floodwalls under Alternative 2 would generate construction equipment emissions, vehicle haul emissions, and fugitive dust emissions. For each levee or floodwall, these air emissions would vary daily, depending on the level and type of work conducted, and would be short term, lasting only for the duration of the construction period. Pollutants that would be emitted from the internal combustion engines of construction equipment and vehicles include certain criteria pollutants, VOCs, and certain GHGs (CO_2, CH_4, and N_2O).

Fugitive dust would be generated primarily by construction vehicle and equipment operation on dirt surfaces and by wind action on stockpiled materials. Generated fugitive dust would consist primarily of nontoxic particulate matter and would be controlled at the site by measures that include, but are not limited to, minimizing surface disturbance and construction traffic to the extent practicable, watering exposed surfaces, stabilizing exposed soils by seeding or mulching, applying gravel or other stabilizing material to dirt roads, enclosing or covering stockpiled material, and covering open-top haul trucks during transit.

The levees recommended for certain districts under Alternative 1 would have larger footprints and generate more construction equipment and vehicle haul emissions than the floodwalls proposed under Alternative 2 for the same districts. Of the levees recommended in the CRIP, the levee for the 7000 area in the North District would have the largest footprint, volume, and associated construction emissions. Construction of this levee represents the upper bound of air emissions that would be associated with implementation of the CRIP.

The DAF's ACAM, Version 5.0.23a, and the *Air Emissions Guide for Air Force Mobile Sources* (AFCEC 2023c) were used to estimate the construction equipment, vehicle, and fugitive dust emissions that would be generated from construction of the levee for the 7000 area. These estimated emissions are based on the conceptual layout and design for the levee and represent the upper bound of emissions for all flood defense strategies in the CRIP. This levee and all other flood defense strategies in the CRIP are conceptual and analyzed on a programmatic level in this EA. Based on its conceptual design, the 7000 area levee

would have a total footprint of approximately 24.6 acres (Table 2-10). For the ACAM model, construction of the 7000 area levee is assumed to last 12 months and occur entirely in 2026. The actual construction air emissions for this levee and all other levees, floodwalls, and other CRIP projects would be estimated based on their actual designs if and when they are proposed to be implemented in the future. The vehicle haul emissions were estimated based on the number of truck haul trips that would be required to transport the fill material needed for the 7000 area levee. The fill source is assumed to be 30 miles from Tyndall AFB and the levee is estimated to require 217,989 cubic yards of fill.

Table 3-5 presents the annual construction emissions of criteria pollutants and VOCs estimated by ACAM for the 7000 area levee under Alternative 1, the indicator of potential significance for each pollutant, and the ROI emissions from the 2020 NEI (EPA 2024a). The detailed ACAM reports are provided as Appendix D.

Table 3-5. Estimated 2026 Air Emissions (in tons/year) of Criteria Pollutants and VOCs for 7000 Area Levee under Alternative 1

Source	NO_x	CO	SO_2	Lead	PM_{10}	$PM_{2.5}$	VOCs
Construction of 7000 Area Levee	1.72	1.63	0.003	0.000	32.1	0.036	0.116
Indicator of Potential Significance[a]	250	250	250	25	250	250	250
ROI[b]	3,180	35,156	160	< 0.1	3,570	2,013	20,663

[a] PSD thresholds (AFCEC 2023a)

[b] 2020 NEI emissions for Bay County, Florida (EPA 2024a)

The estimated air emissions for the construction of the 7000 area levee in Table 3-5 represent the net change (increase) in air emissions relative to the No Action Alternative. As indicated, the estimated net change in emissions of criteria pollutants and VOCs is well below the respective indicators of potential significance for the emissions. The emissions generated by construction of the levee would be a small fraction of the total emissions generated annually in the ROI. This comparison is made to provide additional perspective on the degree of the air quality impact. With respect to the established PSD indicators of potential significance and ROI emissions, the increase in emissions of criteria pollutants and VOCs from the construction of the 7000 area levee would be minor and not significant.

Peak fugitive dust emissions from construction activities are estimated to be 32.1 tons of PM_{10}; these emissions are part of the total PM_{10} emissions identified in Table 3-5. Generated fugitive dust would be controlled at the site as previously discussed, and no adverse impacts from fugitive dust emissions such as reduced visibility are expected.

3.1.2.1.2 GHGs and Climate Change

Table 3-6 presents the annual construction emissions of GHGs estimated by ACAM for the 7000 area levee under Alternative 1. The detailed ACAM reports are provided as Appendix D. As indicated, the annual total GHG (CO_2e) emissions for the 7000 area levee would be well below the indicator of insignificance for GHG emissions, which is 68,039 mtpy (AFCEC 2023b). The DAF considers actions with a net change in GHG emissions below this amount as being too insignificant to warrant further consideration beyond the ACAM analysis. Table 3-6 also compares the 7000 area levee GHG emissions under Alternative 1 to state of Florida, U.S., and global GHG emissions. This relative comparison assessment is automatically performed in ACAM and provides additional context on the relative amounts of GHG emissions that would be generated.

Table 3-6. Estimated Annual Air Emissions (in metric tons/year) of GHGs for 7000 Area Levee under Alternative 1 and Relative Comparison Assessment

Source	CO_2	CH_4	N_2O	CO_2e
Construction of 7000 Area Levee	704	0.013	0.080	729
Insignificance Threshold[a]				68,039
Percent of Florida Totals[b]	0.00000310%	0.0000000235%	0.00000138%	0.00000320%
Percent of U.S. Totals[b]	0.000000137%	0.000000000507%	0.0000000533%	0.000000141%
Percent of Global Totals[b]	NA	NA	NA	0.0000000189%

[a] Based on PSD threshold for CO_2e (AFCEC 2023b)

[b] ACAM-generated estimate

% = percent; NA = not available

Table 3-7 presents the annual SC GHG for the 7000 area levee under Alternative 1. These costs are automatically calculated in ACAM and are derived by multiplying the annual GHG emissions for a given year by the annual SC GHG per metric ton for the corresponding GHGs in Table 3-3. Table 3-7 also compares the 7000 area levee SC GHG under Alternative 1 to state of Florida, U.S., and global SC GHG. The relative comparison of SC GHG is automatically performed in ACAM and provides additional perspective on the potential monetary impact of the action's GHG emissions.

Table 3-7. Annual SC GHG for 7000 Area Levee under Alternative 1 and Relative Comparison Assessment

Source	CO_2	CH_4	N_2O	CO_2e
Construction of 7000 Area Levee	$59.17	$0.03	$2.41	$61.61
Percent of Florida Totals[a]	0.00000310%	0.0000000236%	0.00000138%	0.00000279%
Percent of U.S. Totals[a]	0.000000137%	0.000000000509%	0.0000000535%	0.000000115%
Percent of Global Totals[a]	NA	NA	NA	0.0000000154%

[a] ACAM-generated estimate

[b] Based on PSD threshold for CO_2e (AFCEC 2023b)

% = percent; NA = not available

In summary, the estimated quantities of GHGs that would be generated by the construction of the 7000 area levee under Alternative 1 would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. A comparison of the GHG emissions and SC GHG of the 7000 area levee to regional and global values indicates that construction emissions associated with implementation of the CRIP would have a less-than-significant impact on climate change. The flood defense strategies in the CRIP have been developed specifically to address coastal flooding associated with sea-level rise and, therefore, once constructed would have only beneficial effects associated with climate change.

Climate changes over the past century are discussed in Section 3.1.1.4. Global temperatures and sea levels are predicted to continue to rise in response to GHG emissions over the foreseeable future (IPCC 2023). Extreme precipitation events are also expected to increase in certain areas, including Florida. If these predictions hold true, Tyndall AFB would become more prone to flooding from storm surges and rainfall over time, especially during the wet season. Other climatic changes that could potentially affect the base include more frequent and intense heat waves and storm events. The levees recommended by the CRIP for

the flood-prone districts of the base under Alternative 1 and the alternative floodwalls under Alternative 2 have been conceptually designed based on the future flood scenarios developed for the districts for the CRIP. These flood scenarios are based on published sea-level rise projections and coastal flood modeling conducted for the CRIP. The mitigation provided by the CRIP against sea-level rise is referenced to the DFE, which was established by the DAF for the redevelopment of the base following Hurricane Michael in 2018, based on the locally adjusted, highest regionalized sea-level rise scenario for Year 2100, which is 7 feet for the Tyndall AFB area. The levees under Alternative 1 and floodwalls under Alternative 2 are, therefore, conceptually designed to mitigate the anticipated increases in sea-level rise and associated coastal flooding impacts associated with climate change over time.

3.1.2.1.3 Conclusion

Based on the quantities of criteria pollutants, VOCs, GHGs, and fugitive dust estimated to be generated, construction of the 7000 area levee under Alternative 1 would have a less-than-significant impact on air quality and climate change. Construction of this levee represents the upper bound of air emissions that would be associated with implementation of the CRIP; therefore, construction of all other levees under Alternative 1, floodwalls under Alternative 2, and nonstructural solutions under both alternatives would have a less-than-significant impact on air quality and climate change. The actual air emissions of all CRIP projects proposed to be implemented in the future would be reviewed by the DAF through the AF Form 813 process when they are proposed. There would be no appreciable effect on air quality from the operation of any levees, floodwalls, or nonstructural flood defense strategies implemented under the CRIP. Implementation of the CRIP would not affect permitted stationary sources of air emissions at Tyndall AFB.

3.1.2.2 NBS Pilot Projects

3.1.2.2.1 Air Quality

Of the four proposed NBS projects, construction emissions would be associated only with the three breakwaters; the seagrass enhancement project would have no construction emissions. Construction of the NBS breakwaters under Alternative 1 would involve transporting large amounts of rock by vessel and, therefore, would have greater overall construction emissions than the breakwaters under Alternative 2. Construction emissions under Alternative 1 would include the emissions generated by operating the long-reach excavator on a barge to install rock and by the tugboats that would tow the rock transport barges to and from the quarry. For either alternative, the air emissions would be short term, lasting only for the duration of the construction period.

Fugitive dust would be generated under Alternative 1 primarily when rock is handled by the excavator either to transfer rock between barges or install rock within the footprints of the breakwaters, and by wind action on stockpiled rock on the barges. Generated fugitive dust would consist primarily of nontoxic particulate matter and would be controlled on the barges by measures that include, but are not limited to, watering exposed surfaces and enclosing or covering stockpiled material.

The DAF's ACAM, Version 5.0.23a, and the *Air Emissions Guide for Air Force Mobile Sources* (AFCEC 2023c) were used to estimate the construction equipment and fugitive dust emissions that would be generated from construction of the three NBS breakwaters under Alternative 1. EPA's SmartWay module was used to estimate vessel emissions (EPA 2024b). For the ACAM model, construction of the three breakwaters is assumed to last 12 months and occur entirely in 2026. The vessel emissions were estimated based on the number of barge/tugboat trips that would be required to transport the limestone and bedding stone for the breakwaters from the quarry to the project sites. The rock source is assumed to be a quarry in Kentucky that was used to supply rocks for the oyster reef breakwaters constructed for the Pensacola East Bay oyster habitat restoration project in 2020. Four rock transport barges, each having 1,300-ton capacity, would be used. The emissions would be generated by the tugboats that tow the barges. Based on the total limestone (40,443 tons) and bedding stone (6,717 tons) estimated to be required for the breakwaters, each of the four rock transport barges and tugboats would make eight trips from the quarry to the project sites.

Table 3-8 presents the annual construction emissions of criteria pollutants and VOCs estimated by ACAM for the three NBS breakwaters under Alternative 1, the indicator of potential significance for each pollutant, and the ROI emissions from the 2020 NEI (EPA 2024a). The detailed ACAM reports are provided as Appendix D.

Table 3-8. Estimated 2026 Air Emissions (in tons/year) of Criteria Pollutants and VOCs for NBS Breakwaters under Alternative 1

Source	NO_x	CO	SO_2	Lead	PM_{10}	$PM_{2.5}$	VOCs
Construction of NBS Breakwaters	4.18	0.130	0.000	0.000	20.6	0.002	0.011
Indicator of Potential Significance[a]	250	250	250	25	250	250	250
ROI[b]	3,180	35,156	160	< 0.1	3,570	2,013	20,663

[a] PSD thresholds (AFCEC 2023a)

[b] 2020 NEI emissions for Bay County, Florida (EPA 2024a)

The estimated air emissions for the construction of the NBS breakwaters in Table 3-8 represent the net change (increase) in air emissions relative to the No Action Alternative. As indicated, the estimated net change in emissions of criteria pollutants and VOCs is well below the respective indicators of potential significance for the emissions. The emissions generated by construction of the breakwaters would be a small fraction of the total emissions generated annually in the ROI. This comparison is made to provide additional perspective on the degree of the air quality impact. With respect to the established PSD indicators of potential significance and ROI emissions, the increase in emissions of criteria pollutants and VOCs from the construction of the NBS breakwaters under Alternative 1 would be minor and not significant.

Peak fugitive dust emissions from construction activities are estimated to be 20.6 tons of PM_{10}; these emissions are part of the total PM_{10} emissions identified in Table 3-8. Generated fugitive dust would be controlled on the barges as previously discussed, and no adverse impacts from fugitive dust emissions such as reduced visibility are expected.

3.1.2.2.2 GHGs and Climate Change

Table 3-9 presents the annual construction emissions of GHGs estimated by ACAM for the NBS breakwaters under Alternative 1. The detailed ACAM reports are provided as Appendix D. As indicated, the annual total GHG (CO_2e) emissions for the breakwaters would be well below the indicator of insignificance for GHG emissions, which is 68,039 mtpy (AFCEC 2023b). The DAF considers actions with a net change in GHG emissions below this amount as being too insignificant to warrant further consideration beyond the ACAM analysis. Table 3-9 also compares the breakwater GHG emissions under Alternative 1 to state of Florida, U.S., and global GHG emissions. This relative comparison assessment is automatically performed in ACAM and provides additional context on the relative amounts of GHG emissions that would be generated.

Table 3-9. Estimated Annual Air Emissions (in metric tons/year) of GHGs for NBS Breakwaters under Alternative 1 and Relative Comparison Assessment

Source	CO_2	CH_4	N_2O	CO_2e
Construction of NBS Breakwaters	145	0.000595	0.000141	159
Insignificance Threshold[a]				68,039
Percent of Florida Totals[b]	0.0000638%	0.000000108%	0.000000243%	0.0000697%
Percent of U.S. Totals[b]	0.00000282%	0.00000000232%	0.00000000939%	0.00000308%
Percent of Global Totals[b]	NA	NA	NA	0.00000000412%

[a] Based on PSD threshold for CO_2e (AFCEC 2023b)

[b] ACAM-generated estimate

% = percent; NA = not available

Table 3-10 presents the annual SC GHG for the NBS breakwaters under Alternative 1. These costs are automatically calculated in ACAM and are derived by multiplying the annual GHG emissions for a given year by the annual SC GHG per metric ton for the corresponding GHGs in Table 3-3. Table 3-10 also compares the breakwater SC GHG under Alternative 1 to state of Florida, U.S., and global SC GHG. The relative comparison of SC GHG is automatically performed in ACAM and provides additional perspective on the potential monetary impact of the action's GHG emissions.

Table 3-10. Annual SC GHG for NBS Breakwaters under Alternative 1 and Relative Comparison Assessment

Source	CO_2	CH_4	N_2O	CO_2e
Construction of NBS Breakwaters	$12.18	$0.00	$0.00	$12.19
Percent of Florida Totals[a]	0.0000638%	0.000000108%	0.00000000939%	0.0000551%
Percent of U.S. Totals[a]	0.00000282%	0.00000000232%	0.00000000939%	0.00000228%
Percent of Global Totals[a]	NA	NA	NA	0.00000000305%

[a] ACAM-generated estimate

% = percent; NA = not available

In summary, the estimated quantities of GHGs that would be generated by the construction of the three NBS breakwaters under Alternative 1 would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. A comparison of the GHG emissions and SC GHG of the breakwaters to regional and global values indicate that the breakwater construction emissions would have a less-than-significant impact on climate change. The NBS breakwaters have been located and designed specifically to address coastal erosion associated with sea-level rise and, therefore, once constructed would have only beneficial effects associated with climate change.

Climate changes over the past century are discussed in Section 3.1.1.4. The NBS breakwaters under Alternatives 1 and 2 have been designed to be submerged to not increase the BASH risk at the base. Based on projections of sea-level rise, the effectiveness of the breakwaters would decrease over time as water depths at the breakwater increase. At some point in the future, additional rock could be added to the breakwaters to elevate them so they remain effective in the deeper water depths. The breakwaters would remain effective in reducing the rate of coastal erosion in the project areas over the near term.

3.1.2.2.3 Conclusion

Based on the quantities of criteria pollutants, VOCs, GHGs, and fugitive dust estimated to be generated, construction of the NBS breakwaters under Alternative 1 would have a less-than-significant impact on air quality and climate change. The Alternative 1 breakwaters would have greater construction emissions than the Alternative 2 breakwaters; therefore, construction of the breakwaters under Alternative 2 would also have a less-than-significant impact on air quality and climate change. Construction of the NBS breakwaters under either alternative would not affect permitted stationary sources of air emissions at Tyndall AFB.

3.1.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. There would be no change in air emissions associated with construction or any other new activity; therefore, the No Action Alternative would have no effect on air quality or climate change. Without implementing the flood defense strategies in the CRIP, continuing sea-level rise and other changes in climatic conditions over time are expected to increase the potential for Tyndall AFB to be adversely impacted by coastal flooding.

3.2 Water Resources

Water resources in this EA refer primarily to wetlands, surface water, floodplains, and groundwater. According to EPA, "wetlands generally include swamps, marshes, bogs, and similar areas" (EPA 2023a). Wetlands are considered to be surface waters, which also include streams, lakes, and other bodies of water above ground. Wetlands and other surface water bodies in Florida are under the regulatory jurisdiction of the federal Clean Water Act (CWA) Section 404 program and State of Florida Environmental Resource Permit (ERP) program, unless they qualify to be exempted. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States (WOTUS), including wetlands. Section 10 of the Rivers and Harbors Act of 1899 regulates construction in or over any navigable water of the U.S. Proposed impacts under Section 404 or Section 10 require a Department of the Army Permit issued by the U.S. Army Corps of Engineers (USACE). The issuance of a Department of Army Permit requires a water quality certification from the applicable state authority under Section 401 of the CWA.

The State of Florida ERP program regulates dredging and filling in wetlands as well as activities in uplands that alter surface water flows. Point-source stormwater discharges in Florida are regulated by DEP under the National Pollutant Discharge Elimination System (NPDES) stormwater program. Under this program, a project that would disturb 1 acre or more of land is required to obtain an *NPDES Generic Permit for Stormwater Discharges from Large and Small Construction Activities* (DEP Form 62-621.300(4)(a)), which is issued by DEP. This permit is often referred to as a Construction Generic Permit or stormwater construction permit. As part of this permit, the proponent of the project is required to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP), which outlines the best management practices (BMPs) and engineering controls to be used to prevent and minimize erosion, sedimentation, and pollution during construction.

3.2.1 Affected Environment

Tyndall AFB is located within the St. Andrew Bay Watershed. The Tyndall AFB peninsula is surrounded by St. Andrew Bay, East Bay, St. Andrew Sound, and the Gulf of Mexico (Figure 1-1). Approximately 40 percent of Tyndall AFB is estimated to be wetland based on National Wetlands Inventory (NWI) mapping (DAF 2020a). In general, stormwater at the base drains northward in areas north of U.S. Highway 98 and southward in areas south of U.S. Highway 98 (DAF 2020a). The base stormwater system consists primarily of drainage ditches in undeveloped areas and underground piping in developed areas.

Tyndall AFB's southern coastline and barrier islands and portions of its northern coastline are mapped as 100-year floodplain, which is the area covered by water in the event of a 100-year flood, which is a flood that has a 1 percent chance of being equaled or exceeded in magnitude in any given year. Within the interior portions of the base, 100-year floodplains are associated with streams and wetlands. Tyndall AFB

is underlain by the following three groundwater aquifers (from shallowest to deepest): surficial aquifer, Intermediate Confining Unit, and Floridan Aquifer (DAF 2020a).

3.2.1.1 CRIP Implementation

The wetlands and other surface waters within and near the footprints of the levees proposed under Alternative 1 and floodwalls proposed under Alternative 2 were field surveyed and mapped via photointerpretation with ground truthing for this EA. These planning-level delineations covered the accessible portions of the levee/floodwall footprints, except for the 7000 area, which was previously surveyed by others, and were based on the criteria and indicators for defining wetland boundaries outlined in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987), *2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)* (USACE 2010), and the Florida unified wetland delineation methodology detailed in Chapter 62-340, *Florida Administrative Code*. Identified wetland boundaries were marked on aerials and exported to geographic information system (GIS) software to create the wetland mapping and estimate wetland impacts. For the portions of the levee/floodwall footprints that were not accessible, wetland estimates were based on NWI mapping. Wetland mapping and impact estimates for the 7000 area are based on wetland surveys conducted for the 7000 area by others in 2021 (DAF 2021). The wetlands within and near the footprints of the levees under Alternative 1 are shown on Figures 3-1 to 3-6. Figures that show the wetland area within the Alternative 2 floodwalls are not included for brevity. Table 3-11 identifies the wetland areas within the footprints of both levees and floodwalls. Floodplains within and near the levees/floodwalls were assessed based on FEMA floodplain mapping for Tyndall AFB. The 100-year floodplain within and near the levees are shown on Figures 3-1 to 3-6. The floodplain areas within the footprints of both levees and floodwalls are identified in Table 3-11.

Table 3-11. Wetlands and Floodplains within Alternative 1 Levees and Alternative 2 Floodwalls

Site	Wetland Area within Footprint	Wetland Types[a] within Footprint	Floodplain Area[b] within Footprint
Wastewater Treatment Plant			
Alternative 1 Levee	0	N/A	0.68
Alternative 2 Floodwall	0	N/A	0.26
West Housing Area			
Alternative 1 Levee	1.34	PFO	1.80
Alternative 2 Floodwall	0.29	PFO	0.64
East Housing Area			
Alternative 1 Levee	0.28	PFO	0.46
Alternative 2 Floodwall	0.13	PFO	0.22
7000 Area			
Alternative 1 Levee	16.7	PFO, PSS, PEM	20.50
Alternative 2 Floodwall	4.8	PFO, PSS, PEM	5.93
Fuel Depot Area			
Alternative 1 Levee	0	N/A	0.59
Alternative 2 Floodwall	0	N/A	0.51

Site	Wetland Area within Footprint	Wetland Types[a] within Footprint	Floodplain Area[b] within Footprint
Silver Flag Area			
Alternative 1 Levee	0.49	PFO	0.93
Alternative 2 Floodwall	0.19	PFO	0.43

[a] Wetland types based on NWI classification (FGDC 2013)

[b] Floodplain area refers to the 100-year floodplain

N/A = not applicable; PEM = Palustrine Emergent; PFO = Palustrine Forested; PSS = Palustrine Scrub Shrub

Figure 3-1. Water Resources – WWTP Levee under Alternative 1

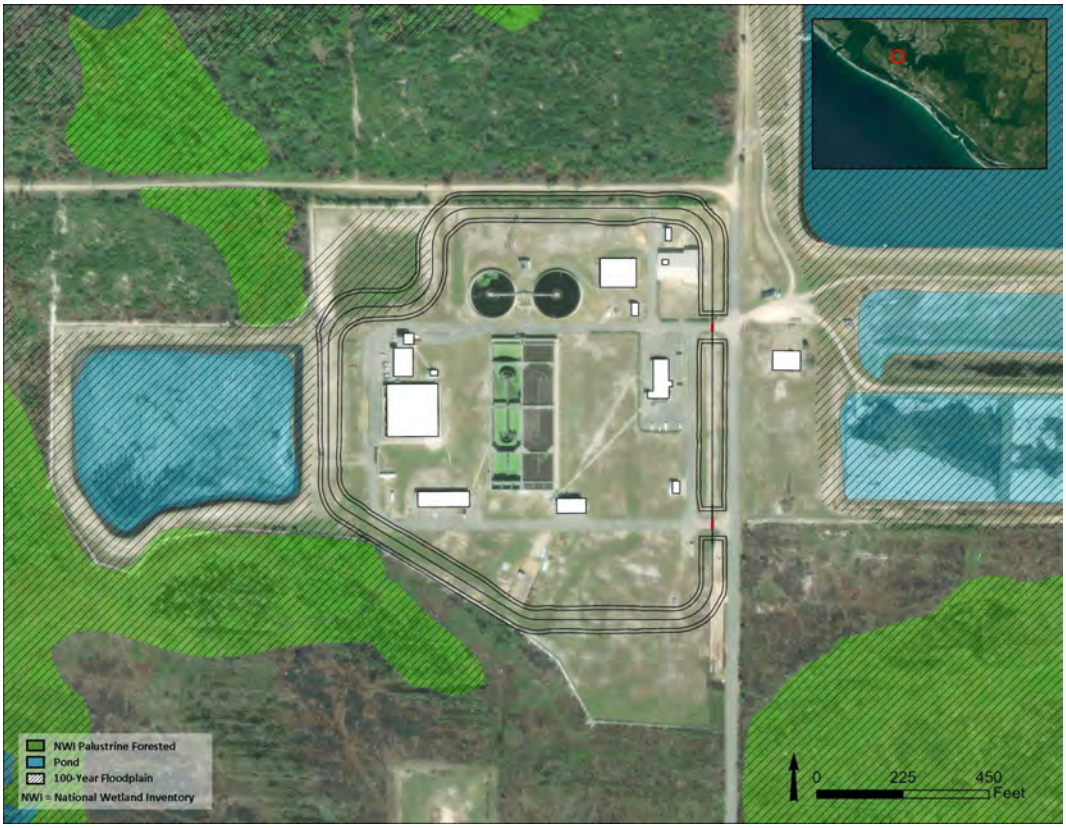


Figure 3-2. Water Resources – West Housing Area Levee under Alternative 1

Figure 3-3. Water Resources – East Housing Area Levee under Alternative 1

Figure 3-4. Water Resources – 7000 Area Levee under Alternative 1

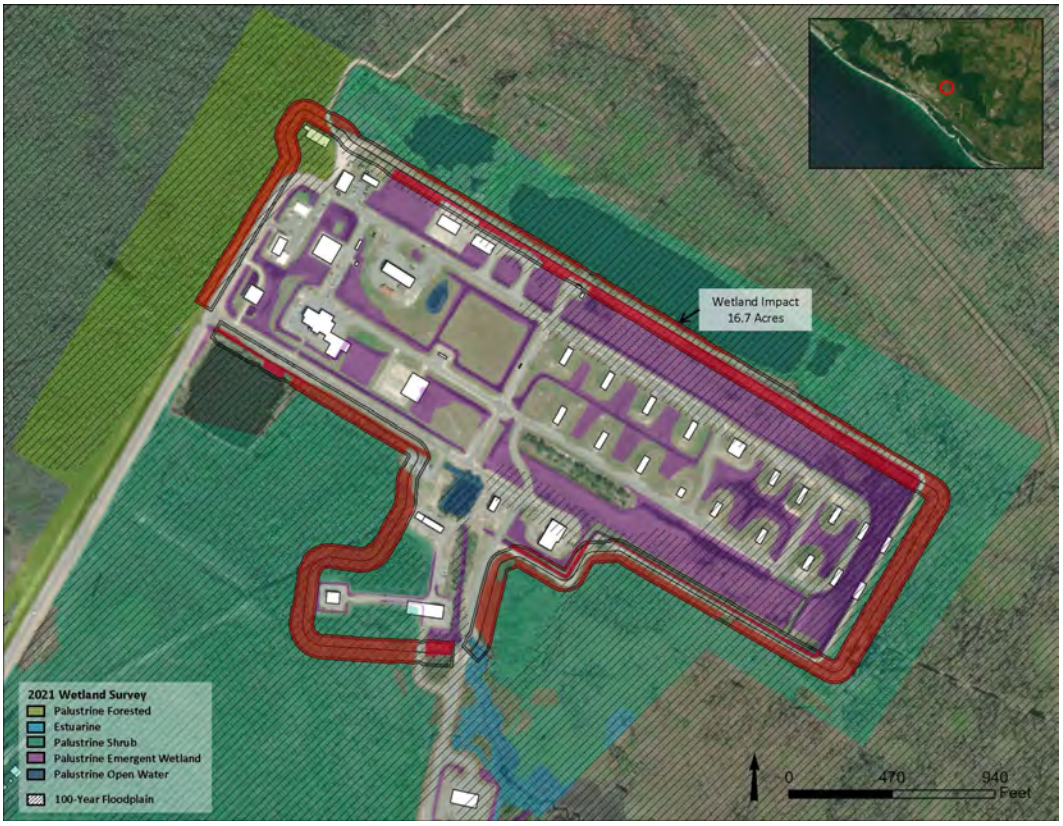


Figure 3-5. Water Resources – Fuel Depot Levee under Alternative 1

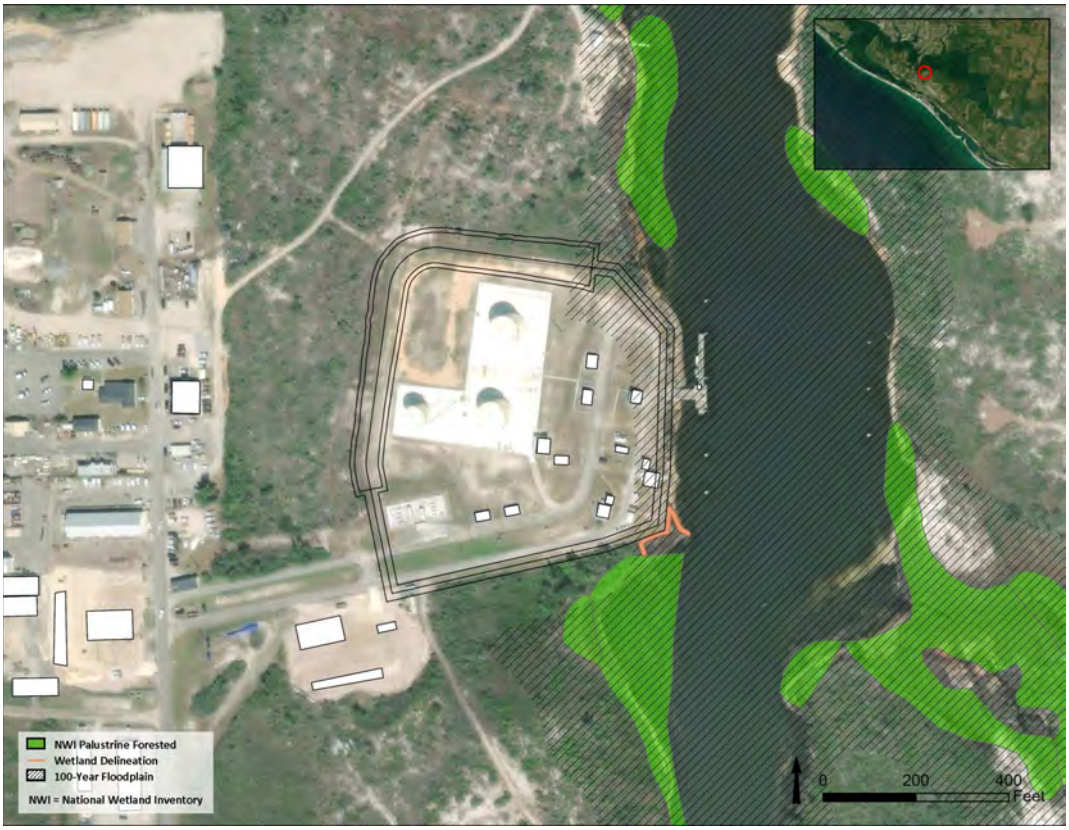
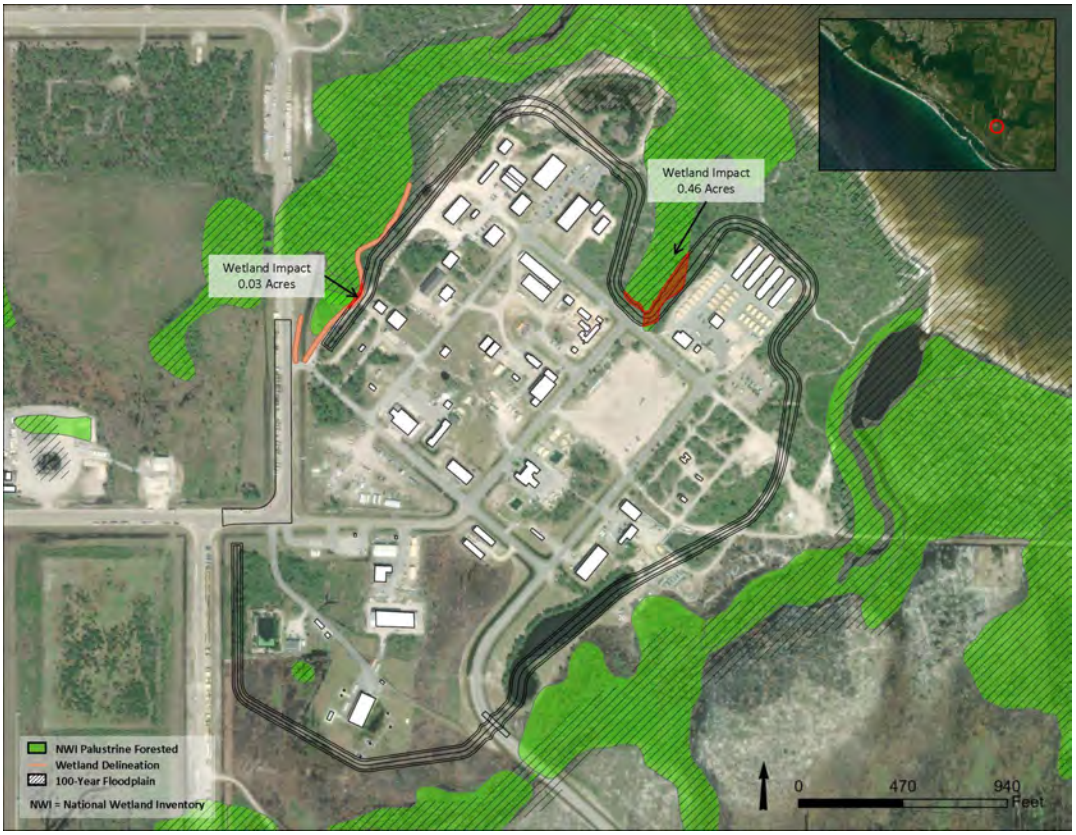


Figure 3-6. Water Resources – Silver Flag Levee under Alternative 1



As indicated in Table 3-11, the footprints of the Alternative 1 levees have more wetland area than the footprints of the Alternative 2 floodwalls. The 7000 area levee would have the greatest amount of wetland and floodplain area among the levees and the 7000 area floodwall would have the greatest amount of wetland and floodplain area among the floodwalls. The levee and floodwall footprints for the WWTP and fuel depot area do not contain wetlands, but they do contain floodplains. The levee/floodwall footprints for the west housing area, east housing area, and Silver Flag area contain only palustrine forested (PFO) wetlands. The levee and floodwall footprints for the 7000 area contain PFO, palustrine scrub shrub (PSS), and palustrine emergent (PEM) wetlands. Based on the wetland surveys conducted for this EA, the PFO wetlands in the project areas are dominated by slash pine (*Pinus elliottii*), sweet bay (*Magnolia virginiana*), buckwheat tree (*Cliftonia monophylla*), wax myrtle (*Morella cerifera*), and fetterbush (*Lyonia lucida*). Some of the wetlands, particularly those in the housing areas, contain non-native invasive plant species including Chinese tallow (*Triadica sebifera*) and Peruvian primrose-willow (*Ludwigia peruviana*). The footprints of the levee/floodwall for the west housing area also contain stormwater ponds that do not qualify as WOTUS. Most of the wetlands within the levee/floodwall footprints have been impacted by wildfire suppression, which has degraded their plant community characteristics and overall wildlife habitat quality.

3.2.1.2 NBS Pilot Projects

The proposed NBS projects would all be located in the nearshore waters of Tyndall AFB. The living shoreline and oyster reef breakwater projects would be located in East Bay and the shoreline stabilization breakwater and seagrass enhancement projects would be located in St. Andrew Sound (Figure 2-23). The waters of East Bay and St. Andrew Sound are WOTUS and state waters, which extend 9 nautical miles offshore on the west coast of Florida. The State of Florida owns the land lying under these waters and all other navigable waters in the state, which is known as sovereign submerged land. The distance from shore, water depths, and total footprints of the projects are identified in Table 3-12.

Table 3-12. Water Resources Information for NBS Pilot Projects

NBS Project	Waterbody	Distance from Shore	Water Depth
Submerged Living Shoreline Breakwater	East Bay	564 to 943 feet	8 to 10 feet
Submerged Oyster Reef Breakwater	East Bay	617 to 815 feet	4 to 5 feet
Submerged Shoreline Stabilization Breakwater	St. Andrew Sound	216 to 816 feet	5 feet
Seagrass Enhancement	St. Andrew Sound	201 to 232 feet	2 to 4 feet

As indicated in Table 3-12, the living shoreline and oyster reef breakwaters would be comparable in their distance from shore and would be farther offshore overall than the shoreline stabilization breakwater. Water depths for the living shoreline and shoreline stabilization breakwaters would be comparable (approximately 5 feet) and shallower than the water depths for the oyster reef breakwater (8 to 10 feet). Of the three breakwaters, the shoreline stabilization breakwater would have the largest footprint on the seafloor (2.17 acres) and the living shoreline breakwater would have the smallest (0.81 acre). The seagrass enhancement work would be conducted along the seaward edge of the existing seagrass meadow in St. Andrew Sound, which ranges from approximately 201 to 232 feet from the shoreline in water depths of 2 to 4 feet. The bamboo stockade that would be installed along the meadow edge would have a total footprint of 0.09 acre. This footprint represents the total area within which bamboo stakes would be installed. The stakes would be spaced 10 to 15 centimeters apart within the footprint. The stakes would last approximately 1 year; therefore, the footprint would be temporary. SAV cover and benthic fauna within and near the project footprints are discussed in Section 3.5.

3.2.2 Environmental Consequences

The threshold level for a significant impact on water resources from the Proposed Action is defined in this EA as including any of the following: an unpermitted dredge or fill activity within the boundary of a jurisdictional wetland or other surface water body; a violation of the requirements of an issued federal or state permit regulating WOTUS or state jurisdictional waters; a release of contamination into groundwater that exceeds regulatory standards; or an excessive loss of floodplain area with an associated increase in flooding potential.

3.2.2.1 CRIP Implementation

Regional structural solutions such as levees and floodwalls would be the primary flood defense strategies under the Tyndall AFB CRIP that would impact water resources. The CRIP also recommends NBS strategies to be implemented in all the districts in combination with traditional options to provide a multilayered approach to improve coastal resilience at the base. Certain types of NBS strategies such as the three proposed NBS breakwaters analyzed in detail in this EA would have impacts on WOTUS; however, they would have an overall net benefit to the environment with respect to the shoreline protection and structural habitat they would provide. The other types of nonstructural CRIP solutions under both Alternative 1 and Alternative 2, including elevating or floodproofing at-risk buildings, using flood barriers, and relocating operations or assets to lower risk areas would not have appreciable impacts on water resources.

3.2.2.1.1 Wetlands

The wetland areas presented in Table 3-11 provide a planning-level estimate of the amount of wetland impact that would result from the construction of the Alternative 1 levees and Alternative 2 floodwalls. Portions of the original levee alignments presented in the final CRIP were modified by the CRIP design team for Alternative 1 in this EA to avoid wetland impacts to the greatest extent practicable. The same

alignments are kept for the floodwalls under Alternative 2 so that potential wetland impacts are minimized to the extent practicable under both alternatives. The wetland impacts of the levees under Alternative 1 are shown on Figures 3-1 to 3-6. Figures that show the wetland impacts of the floodwalls are not included for brevity. As indicated in Table 3-11, wetland impacts among the levees range from 0 acres for the WWTP and fuel depot levees up to 16.7 acres for the 7000 area levee. Wetland impacts for the floodwalls range from 0 acres up to 4.8 acres for the same sites. Except for the 7000 area levee, the levees under Alternative 1 would each impact relatively few acres of wetland (0 to 1.34 acres). The 7000 area is surrounded by wetlands and much of the interior portion of the compound has been mapped as PEM wetlands (Figure 3-4). The 7000 area levee would impact PFO, PSS, and PEM wetlands with PSS wetlands being impacted the most. Much of the area that has been mapped as PSS wetlands has been disturbed from development of the 7000 area and the eastern portion has been a pine plantation and undergone extensive disturbance by silviculture practices. The PEM wetlands within the interior of the 7000 area consist mostly of turfgrass that is regularly mowed and drainage ditches; these wetlands/waters are not WOTUS, but some may be state jurisdictional and subject to state ERP program regulations. The disturbed portions of the 7000 area wetlands have lower quality and functionality, which reduces the amount of compensatory mitigation that would be required for this site.

The presented wetland impact estimates are based on the current conceptual design for the levees and floodwalls. Actual wetland impacts for some levees and floodwalls would differ based on the actual layout and design, which could result in less or more wetland impacts. Impacts to WOTUS from the construction of levees or floodwalls would require a Department of the Army Permit issued by USACE and ERP permit issued by DEP. Impacts to wetlands that do not qualify as WOTUS but are state jurisdictional would be permitted through the ERP program. Levees or floodwalls that would impact WOTUS and require a Department of the Army Permit would require a water quality certification from DEP under Section 401 of the CWA.

There are no practicable alternatives to constructing in wetlands under Alternatives 1 or 2. The 7000 area, the site with the most wetland impacts, is surrounded by wetlands and no layout or design could avoid wetland impacts at this site. The portions of the original levee alignments have been modified to avoid wetland impacts to the extent practicable while still allowing the levees to encompass all the assets within the protected area. Opportunities to further reduce and potentially eliminate wetland impacts at some of the sites would be assessed during future actual design.

Under Section 404(b)(1) of the CWA, permit applicants are required to show that they have, to the extent practicable, taken steps to avoid impacts to WOTUS, minimize potential impacts to WOTUS once they have avoided impacts, and provide compensatory mitigation for any remaining unavoidable impacts. Under 33 CFR 332, compensatory mitigation means restoration, creation, enhancement, and/or preservation of wetlands. Mitigation is accomplished by purchasing credits from a mitigation bank, using an in-lieu fee programs, or performing permittee-responsible mitigation. Tyndall AFB has purchased wetland mitigation credits and successfully performed permittee-responsibility mitigation to offset wetland impacts in the past.

The mitigation plan developed in this EA to offset wetland impacts from the construction of the Alternative 1 levees or Alternative 2 floodwalls involves purchasing wetland mitigation credits from the Horseshoe Creek Mitigation Bank (HCMB). The HCMB encompasses 2,907 acres in Gulf County, Florida, and currently is the only wetland mitigation bank that has a service area that includes Tyndall AFB. Tyndall AFB has purchased wetland mitigation credits from the HCMB in the past and is currently using the bank to offset wetland impacts from a number of development projects.

Credit needs at the HCMB are determined using the Uniform Mitigation Assessment Method (UMAM). UMAM is used in Florida to determine the mitigation required to offset proposed impacts to wetlands and other waters of the U.S. A UMAM analysis is performed on the wetland proposed to be impacted to determine how many bank credits must be purchased for its mitigation. In the UMAM analysis, the current condition and post (with impact) condition of the wetland to be impacted are scored from 1 to 10, based on various ecological parameters. The difference between the current and post conditions (delta) is

multiplied by the wetland area to calculate the functional loss (FL). Under UMAM, the total number of mitigation bank credits required is equal to the calculated FL.

UMAM analyses were completed for the wetlands that would be impacted under each alternative based on the field information collected on the quality and functionality of the wetlands during the wetland surveys conducted for this EA. The UMAM analysis for the 7000 area wetlands was based on the UMAM scores and other information about the wetlands presented by others in 2021 (DAF 2021). The UMAM analyses completed for Alternatives 1 and 2 are presented in Tables 3-13 and 3-14, respectively.

Table 3-13. UMAM Analysis for Alternative 1

Wetland	Impact Acres	Location and Landscape Support		Water Environment		Community Structure		Total Score		Delta	FL
		Current	With	Current	With	Current	With	Current	With		
West Housing PFO-1	0.89	6	0	6	0	7	0	0.633	0	0.63	0.56
West Housing PFO-2	0.45	6	0	6	0	7	0	0.633	0	0.63	0.28
East Housing PFO	0.28	5	0	5	0	5	0	0.50	0	0.50	0.14
7000 Area PFO/PSS	12.6	7	0	8	0	8	0	0.766	0	0.766	9.65
7000 Area PEM	4.1	4	0	4	0	4	0	0.40	0	0.40	1.64
Silver Flag PFO-1	0.03	6	0	7	0	7	0	0.666	0	0.666	0.02
Silver Flag PFO-2	0.45	6	0	6	0	7	0	0.633	0	0.633	0.28

Note:
"Current" refers to existing conditions. "With" refers to proposed conditions (post-construction).

FL = Functional Loss; PEM = Palustrine Emergent; PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; UMAM = Uniform Mitigation Assessment Method

Table 3-14. UMAM Analysis for Alternative 2

Wetland	Impact Acres	Location and Landscape Support		Water Environment		Community Structure		Total Score		Delta	FL
		Current	With	Current	With	Current	With	Current	With		
West Housing PFO-1	0.17	6	0	6	0	7	0	0.63	0	0.63	0.11
West Housing PFO-2	0.14	6	0	6	0	7	0	0.63	0	0.63	0.09
West Housing PFO-3	0.11	6	0	6	0	7	0	0.63	0	0.63	0.07
East Housing PFO	0.13	5	0	5	0	5	0	0.50	0	0.50	0.06
7000 Area PFO/PSS	3.3	7	0	8	0	8	0	0.77	0	0.77	2.53
7000 Area PEM	1.5	4	0	4	0	4	0	0.40	0	0.40	0.6
Silver Flag PFO-1	0.19	6	0	7	0	7	0	0.67	0	0.67	0.13

Note:
"Current" refers to existing conditions. "With" refers to proposed conditions (post-construction).

FL = Functional Loss; PEM = Palustrine Emergent; PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; UMAM = Uniform Mitigation Assessment Method

Three types of wetland mitigation credits are available for sale at the HCMB: PFO, PEM, and estuarine intertidal emergent. The PFO credits also cover impacts to PSS wetlands. Based on the HCMB credit ledger, there are 64 PFO credits and 119 PEM credits currently available for sale and 278 PFO credits and 373 PEM credits potentially available for sale at the bank. Based on the UMAM analyses, construction of all the levees under Alternative 1 would require 10.93 PFO credits and 1.64 PEM credits, and construction of all the floodwalls under Alternative 2 would require 2.99 PFO credits and 0.6 PEM credit (Tables 3-13 and 3-14). As indicated, the current and projected number of wetland credits at the HCMB would satisfy the estimated mitigation requirements of all the Alternative 1 levees and Alternative 2 floodwalls combined. Constructing levees under Alternative 1 at all the sites would require the most mitigation credits, which are estimated to be 10.93 PFO credits and 1.64 PEM credits. This is the estimated maximum number of credits needed to offset the wetland impacts from implementing the CRIP under the Proposed Action, under Alternative 1, Alternative 2, or a combination of levees and floodwalls under both alternatives. Tyndall AFB commits to purchasing this estimated maximum number of mitigation credits, or the actual number if different, to offset the wetland impacts from implementing the CRIP under the Proposed Action.

Table 3-15 presents the current costs of the HCMB credits required for all Alternative 1 levees and Alternative 2 floodwalls. Based on information provided by the HCMB manager, the prices of 1 PFO credit and 1 PEM credit at the HCMB are currently $85,000 and $75,000, respectively. Based on these credit prices, the credits required for all the levees under Alternative 1 would cost a total of $1,052,050, and the credits required for all the floodwalls under Alternative 2 would cost a total of $299,150 (Table 3-15).

Table 3-15. HCMB Credit Costs for Alternatives 1 and 2

Alternative	Credit Type	Credit Quantity	Credit Price	Cost	Total Cost
1	PFO[a]	10.93	$85,000	$929,050	$1,052,050
	PEM	1.64	$75,000	$123,000	
2	PFO[a]	2.99	$85,000	$254,150	$299,150
	PEM	0.6	$75,000	$45,000	

[a] PFO credits also cover impacts to palustrine scrub-shrub wetlands.

PEM = Palustrine Emergent; PFO = Palustrine Forested

3.2.2.1.2 Groundwater

Construction associated with the CRIP would not involve withdrawals from groundwater. Groundwater within the surficial aquifer may be encountered during certain types of construction activities such as excavation. Any dewatering necessary during such construction activities would be conducted using standard methods and would have no effect on groundwater quality or flow. Dewatering of uncontaminated groundwater during construction of an Alternative 1 levee or Alternative 2 floodwall would be authorized by the DEP NPDES stormwater construction permit that would be obtained for the project. This permit authorizes the discharge of only uncontaminated groundwater from dewatering operations and requires the implementation of BMPs during dewatering operations to prevent violations of water quality standards. Appropriate BMPs for dewatering are identified in the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual* (State Erosion and Sediment Control Task Force 2013) and include sediment traps and basins, weir and dewatering tanks, filters, and chemical treatment. Any dewatering of contaminated groundwater (for example, for levees or floodwall footprints that contain contaminated sites [Section 3.10]) would be conducted in coordination with DEP and authorized through a generic dewatering permit or individual wastewater permit. Dewatering of groundwater within or in proximity to a contaminated site may require special testing, handling, and disposal procedures depending on the nature of the site contamination. Hazardous materials used and hazardous waste generated during construction would be managed in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans, thereby minimizing the potential for releases into groundwater.

3.2.2.1.3 Floodplains

As indicated in Table 3-11, the amount of floodplain area within the footprints of the Alternative 1 levees ranges from 0.46 acre for the fuel depot levee up to 20.5 acres for the 7000 area levee. The amount of floodplain area within the footprints of the Alternative 2 floodwalls ranges from 0.22 acre for the east housing area floodwall up to 5.93 acres for the 7000 area floodwall. There are no practicable alternatives to constructing in floodplains under Alternatives 1 or 2. The entire area that encompasses the 7000 area and adjacent areas are within the floodplain; therefore, no layout or design could avoid construction in floodplains at this site. Opportunities to further reduce and potentially eliminate floodplain displacement at some of the sites would be assessed during future actual design. Loss of floodplain function would be offset as needed through the site drainage design, which would be authorized through the ERP permitting process.

3.2.2.1.4 Flood Control and Stormwater Management

The flood defense strategies in the Tyndall CRIP are based on the DFE, which is 19 feet above msl on the Gulf side south of U.S. Highway 98 and 14 feet above msl on the East Bay side, north of U.S. Highway 98. The tops of the earthen levees under Alternative 1 and concrete floodwalls under Alternative 2 would be set at 1 foot above the DFE. To maintain the top of the levees/floodwalls 1 foot above the DFE, the height of each levee/floodwall would vary based on the existing ground elevation along the alignment. The DFE levels were derived by summing the BFE (100-year flood) and the locally adjusted, highest regionalized sea-level rise scenario for Year 2100, which is 7 feet for the Tyndall AFB area. Constructing new buildings

to the DFE and levees/floodwalls 1 foot above the DFE under the CRIP would provide the flood protection expected to be needed through this time period.

The levees under Alternative 1 and floodwalls under Alternative 2 would require gravity drainage structures and stormwater pump stations to remove accumulated rainfall within the protected area. Gravity drainage structures allow rainwater to drain out of the protected area through culverts incorporated into the levee or floodwall. A sluice gate housed within a concrete vault would be incorporated into the levee/wall and closed during surge conditions to prevent water from flowing into the protected area through the gravity drain. During heavy rainfall events, pump stations would transfer accumulated stormwater from the protected area to the flood side of the levee/wall. UFC 3-201-01, Section 3-7, restricts the use of stormwater pump stations except with explicit authorization by the Government. During CRIP workshops, the 325th Civil Engineer Squadron at Tyndall AFB indicated that authorization for a stormwater pump would be provided at the base level if the pump system is determined to be necessary.

Under Section 438 of the Energy Independence and Security Act (EISA) of 2007, herein referred to as EISA Section 438, federal projects having a footprint greater than 5,000 ft^2 are required to use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow. Federal agencies can comply with the requirements of EISA Section 438 by using green infrastructure or low-impact development practices, including reducing impervious surfaces and using vegetative practices, porous pavements, cisterns, and green roofs. UFC 3-210-10, *Low Impact Development*, provides guidance on how to plan and design DoD projects to comply with the requirements of EISA Section 438. The design, construction, and maintenance of the Alternative 1 levees and Alternative 2 floodwalls would follow UFC 3-210-10 and comply with the requirements of EISA Section 438 as applicable for each project. Other CRIP projects having footprints greater than 5,000 ft^2 and generating stormwater runoff would also comply with the requirements of EISA Section 438 as applicable under both alternatives.

Each of the Alternative 1 levees and Alternative 2 floodwalls would disturb more than 1 acre of land and, therefore, would require a DEP NPDES stormwater construction permit. As part of this permit, the DAF would be required to prepare and implement an associated SWPPP, which would outline the BMPs and engineering controls to be used to prevent and minimize indirect erosion, sedimentation, and pollution during construction. Potential BMPs and engineering controls for these project include, but are not limited to, installing silt fence along the perimeter and downstream portions of the construction area to trap sediment in stormwater runoff; protecting onsite wetlands and other surface waters with a double row of silt fence; controlling potential concentrated flows with diversion berms that would divert drainage into spreader swales and check dams to reduce flow velocity and dissipate flow volumes; stabilizing exposed soils in the construction area by seeding or mulching; using erosion control blankets or matting on steep slopes to prevent erosion; preventing release of construction materials that could contaminate the onsite wetlands such as petroleum, oil, and lubricants (POL) onto exposed soils; and ensuring that all construction workers are aware of the location of the onsite wetlands and the associated protection measures required to be implemented. The final suite of measures that would be implemented by the DAF would be based on site conditions and the specific requirements identified in the ERP and final SWPPP.

3.2.2.1.5 Conclusion

Based on the estimated wetland impacts, the compensatory wetland mitigation that would be provided for unavoidable wetland impacts, and the measures that would be implemented to prevent indirect erosion, sedimentation, and pollution impacts to wetlands and other surface waters during construction, all the levees under Alternative 1 and floodwalls under Alternative 2 would have a less-than-significant impact on water resources. The DAF would review any Alternative 1 levees or Alternative 2 floodwalls proposed in the future through the AF Form 813 process to assess their potential impacts on water resources and determine the associated permitting and mitigation requirements.

3.2.2.2 NBS Pilot Projects

The four proposed NBS pilot projects would be constructed in waters that are WOTUS and state jurisdictional, and over state-owned submerged land. Offshore waters are not considered floodplains and the proposed projects would not involve groundwater withdrawal or otherwise affect groundwater. For these reasons, the proposed NBS projects would have no effect on floodplains or groundwater. Estimated impacts to federal and state waters from the construction of the breakwaters under Alternatives 1 and 2, as measured by the respective breakwater footprints on the seafloor, are presented in Table 3-16.

Table 3-16. Estimated Impacts to WOTUS and State Jurisdictional Waters from Construction of Alternative 1 and 2 Breakwaters

NBS Breakwater	Alternative 1	Alternative 2
Submerged Living Shoreline Breakwater	0.81 acre	157 square feet
Submerged Oyster Reef Breakwater	1.35 acres	236 square feet
Submerged Shoreline Stabilization Breakwater	2.17 acres	1.9 acres
Seagrass Enhancement	0	0

For the quarry stone breakwaters under Alternative 1, impacts are estimated to be 0.81 acre for the living shoreline breakwater, 1.35 acres for the oyster reef breakwater, and 2.17 acres for the shoreline stabilization breakwater. Under Alternative 2, the concrete disk breakwaters for the living shoreline and oyster reef sites would be anchored into the seafloor with 12-inch diameter fiberglass pilings and, therefore, would have smaller footprints than the quarry stone breakwaters under Alternative 1. The geotube breakwater under Alternative 2 for the shoreline stabilization site would have impacts that are comparable to those of the quarry stone breakwater under Alternative 1. The seagrass enhancement project would involve the temporary installation of bamboo stakes along the seaward edge of the existing seagrass meadow in St. Andrew Sound and would not displace or otherwise impact WOTUS or state jurisdictional waters.

Construction of the three breakwaters would require a Department of the Army Permit issued by USACE that authorizes impacts to WOTUS and navigable U.S. waters under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. The Department of the Army Permit would require a water quality certification from DEP under Section 401 of the CWA. The breakwaters would also require an ERP permit issued by DEP for impacts to state jurisdictional waters and authorization from DEP to use sovereign submerged lands; this authorization is reviewed through the ERP permit process. The seagrass enhancement project would not displace federal/state waters or state-owned submerged lands and is expected to either be included in the permitting of the breakwaters or be authorized through a Special Activities License issued by FWC. A pre-application meeting for the NBS projects was held on June 1, 2023, with representatives of USACE and DEP to discuss the federal and state permitting requirements for the projects.

There are no practicable alternatives to constructing in WOTUS under Alternatives 1 or 2. The breakwaters must be located offshore and other alternatives such as armoring the shoreline with riprap would result in excessive environmental damage and would not qualify as an NBS strategy. Compensatory mitigation is not expected to be required for the proposed NBS projects based on their beneficial purpose and lack of seagrass impacts. Based on SAV surveys conducted by UF in 2022 and 2023 for these projects, the current design footprints of the breakwaters are 24 to 83 feet from existing seagrass meadows at their closest points. All the constructed breakwaters would be approximately 25 feet or more from the closest seagrass bed (further discussed in Section 3.5). None of the breakwaters would impact seagrass and, therefore, would not require seagrass mitigation. The breakwaters and seagrass enhancement projects are intended

and designed to have a net benefit on the marine and shoreline environments through wave attenuation, enhancement of seagrass habitat, and creation of structural habitats that provide vertically complex, hard-substrate habitat that increase the habitat diversity within large areas consisting mostly of soft sediments that contain infaunal communities but are largely devoid of structural habitat.

The proposed NBS projects would not disturb land and, therefore, would not require a DEP NPDES stormwater construction permit, as discussed for CRIP implementation. Measures would be implemented to minimize potential impacts to bay and Gulf waters during construction of the breakwaters including but not limited to, controlling fugitive dust on the barges, preventing release of construction materials that could contaminate waters such as POLs; and using turbidity curtains and meeting the limit of 29 nephelometric turbidity units (NTUs) above background within the 150-meter mixing zone downstream of the construction work area, as required by DEP

Based on the beneficial impacts of the projects on water resources, the lack of seagrass impacts, and the measures that would be implemented to minimize pollution and turbidity impacts to bay and Gulf waters during construction of the breakwaters, the implementation of the NBS projects under either Alternative 1 or Alternative 2 would have a less-than-significant impact on water resources.

3.2.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no construction-related impacts on water resources resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed. Without implementing the flood defense strategies in the CRIP, continuing sea-level rise and other changes in climatic conditions over time are expected to increase the potential for Tyndall AFB to be adversely impacted by coastal flooding.

3.3 Geological Resources

Geological resources in this EA refer to terrestrial soils, subsurface lithology, and marine sediments. Land-based construction activities associated with implementation of the CRIP would be conducted using standard methods that would not adversely affect subsurface lithology, including geological formations and mineral resources. Therefore, these resources are not analyzed further in this EA.

3.3.1 Affected Environment

3.3.1.1 CRIP Implementation

In general, soils of Tyndall AFB are sandy and acidic (DAF 2020a). Based on the Natural Resources Conservation Service Soil Survey for Bay County, Florida, 20 different soil types exist on Tyndall AFB; the Tyndall AFB Integrated Natural Resources Management Plan (INRMP) includes descriptions of the soil types and shows their distribution on the base (DAF 2020a).

The soils within the footprints of the Alternative 1 levees and Alternative 2 floodwalls have been largely disturbed from past development of the sites and by other land practices adjacent to some of the sites. None of the sites proposed for levees/floodwalls contain prime or unique farmland soils. Prime farmland is protected under the Farmland Protection Policy Act and is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops.

3.3.1.2 NBS Pilot Projects

A geotechnical survey of the proposed NBS breakwater sites was conducted in May 2023 (LMJ 2023). A total of 11 standard penetration borings were installed at the sites: three at the shoreline stabilization site and four each at the other two breakwater sites. Boring depths ranged from 9.5 to 11.5 feet below the seafloor. The results of the borings indicate that the living shoreline and shoreline stabilization sites have sand sediments down to 9.5 feet below the seafloor, and the oyster reef site has sand sediments down to 2

to 4 feet below the seafloor and mostly silty sand sediments thereafter down to 9.5 to 11.5 feet below the seafloor.

3.3.2 Environmental Consequences

The threshold level for a significant impact on geological resources from the Proposed Action is defined in this EA as including any of the following: the loss of large amounts of prime or unique farmland soils; uncontrolled erosion or sedimentation impacts from construction or operation of proposed facilities; or contamination of terrestrial soils or marine sediments.

3.3.2.1 CRIP Implementation

Soils within the footprints of the Alternative 1 levees and Alternative 2 floodwalls would be physically disturbed by construction activities such as site clearing/grubbing, excavation, filling, grading, and paving. The soils within the levee/floodwall footprints have been largely disturbed from past development of the sites and by other land practices adjacent to some of the sites. There is also potential for some of the nonstructural solutions under both alternatives to physically disturb soils.

The amount of earthwork required for the levees and floodwalls would vary among the sites and by alternative. Table 3-17 presents the estimated footprints of the levees and floodwalls and the fill volumes for the levees. As indicated, the Alternative 1 levees would have larger footprints than the Alternative 2 floodwalls. The widths of the earthen levees under Alternative 1 would vary based on land elevations and would be greater than the widths of the concrete floodwalls under Alternative 2, which would be uniform and not vary by land elevation. Among the Alternative 1 levees, the 7000 area levee would have the largest footprint and area of soil disturbance and the fuel depot levee would have the smallest footprint and area of soil disturbance. Among the Alternative 2 floodwalls, the west housing floodwall would have the largest footprint and area of soil disturbance and the fuel depot floodwall would have the smallest footprint and areas of soil disturbance.

Table 3-17. Estimated Footprints and Fill Volumes

Site	Total Footprint	Footprint Width[a]	Total Fill Volume
Wastewater Treatment Plant			
Alternative 1 Levee	6.10	74.1	32,125
Alternative 2 Floodwall	2.97	33	N/A
West Housing Area			
Alternative 1 Levee	16.32	66.9	69,879
Alternative 2 Floodwall	8.30	33	N/A
East Housing Area			
Alternative 1 Levee	5.74	54.7	14,871
Alternative 2 Floodwall	3.44	33	N/A
7000 Area			
Alternative 1 Levee	24.64	101.6	217,989
Alternative 2 Floodwall	8.12	33	N/A
Fuel Depot Area			
Alternative 1 Levee	2.78	82.7[b]	12,094
Alternative 2 Floodwall	1.15	33	N/A
Silver Flag Area			
Alternative 1 Levee	12.10	62.2	46,273
Alternative 2 Floodwall	6.77	33	N/A

[a] Average width for levee footprint (varies with land elevation)

[b] Width of levee portion. Floodwall portion is 33 feet.

Fill material for the levees would be obtained from an off-base source and trucked to the sites. As with the levee footprints, the 7000 area levee and fuel depot levee would have the largest and smallest fill volumes, respectively, among the levees.

The potential for soil erosion and sedimentation impacts during construction under both Alternatives 1 and 2 would be minimized by installing silt fence along the perimeter and downstream portions of the construction area to trap sediment in stormwater runoff; stabilizing exposed soils in the construction area by seeding or mulching; and using erosion control blankets and matting on steep slopes to prevent erosion. Other specific measures to control soil erosion and sedimentation during construction may be specified in the regulatory permits that would be obtained for the project. Measures to prevent soil erosion and sedimentation impacts in areas susceptible to being impacted, such as steeply sloped areas and areas near wetlands, are further discussed in Section 3.2. The management of fugitive dust that would be generated during construction is addressed in Section 3.1.

In conclusion, implementation of the CRIP under either Alternative 1 or 2 would have a less-than-significant impact on geological resources.

3.3.2.2 NBS Pilot Projects

Table 3-18 presents the estimated footprints of the NBS projects under Alternatives 1 and 2. The NBS breakwaters under both alternatives would permanently displace sediments within their footprints. The Alternative 1 quarry stone breakwaters for the living shoreline and oyster reef sites would have larger

footprints than the Alternative 2 concrete disk breakwaters for the same sites, which would be anchored into the seafloor with 12-inch diameter fiberglass pilings. Sediment displacement by the Alternative 2 geotube breakwater for the shoreline stabilization site would be comparable to the sediment displacement by the Alternative 1 quarry stone breakwater for the site. The seagrass enhancement project would involve the temporary installation of bamboo stakes along the seaward edge of the existing seagrass meadow in St. Andrew Sound. The stakes would biodegrade over time and are expected to last approximately 1 year; therefore, they would not permanently displace sediments.

Table 3-18. Estimated Footprints of NBS Pilot Projects

NBS Breakwater	Alternative 1	Alternative 2
Submerged Living Shoreline Breakwater	0.81 acre	157 square feet
Submerged Oyster Reef Breakwater	1.35 acres	236 square feet
Submerged Shoreline Stabilization Breakwater	2.17 acres	1.9 acres
Seagrass Enhancement	0.09 acre	0.09 acre

Limestone boulders and bedding stone for the Alternative 1 breakwaters are expected to be obtained from a quarry in Kentucky that was used to supply rocks for the oyster reef breakwaters constructed for the Pensacola East Bay oyster habitat restoration project in 2020. Rock from this quarry would be barged down the Mississippi River to the breakwater sites. A total of 40,443 tons of limestone and 6,717 tons of bedding stone are estimated to be required for all three breakwaters under Alternative 1.

Based on the predominance of sand sediments in the project areas and the type of construction methods that would be used, construction of the NBS breakwaters under Alternatives 1 or 2 is not expected to generate excessive amounts of turbidity. A long-reach excavator on a barge would place rock within the footprint of each breakwater in a precise manner with regular pauses to allow measurements of the rock placement. There would be no dredging or excavation of the seafloor. Turbidity curtains would be used and the limit of 29 NTUs above background would be met within the 150-meter mixing zone downstream of the construction work area, as required by DEP. Turbidity curtains would be installed to encompass the construction area where rock is being installed by the long-reach excavator. The curtains would extend from one end of the excavator barge, around the area where the excavator is laying rock, to the other end of the excavator barge.

In conclusion, implementation of the NBS projects under either Alternative 1 or 2 would have a less-than-significant impact on geological resources.

3.3.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on geological resources resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.4 Cultural Resources

Cultural resources include historic architectural properties (buildings, structures, districts, and objects), prehistoric and historic archaeological sites, and Traditional Cultural Properties. *Historic property* is defined under 36 CFR 800.16 (l)(1) as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior."

3.4.1 Affected Environment

3.4.1.1 CRIP Implementation

The Tyndall AFB Integrated Cultural Resources Management Plan provides guidance on the management of cultural resources on Tyndall AFB, and the integration of cultural resources management with mission activities and other base management programs (DAF 2023). Archaeological surveys have been conducted for 21,323 acres of the total 27,859 acres identified on Tyndall AFB as being surveyable (undeveloped and accessible) (DAF 2023). A total of 402 archaeological sites have been identified on Tyndall AFB, with 35 sites being listed or eligible for listing in the NRHP, 140 sites determined to be ineligible for NRHP listing, and the remaining 227 sites not yet evaluated for NRHP listing. Three real property facilities on Tyndall AFB are eligible for listing in the NRHP; these facilities are identified as 8BY3220, 8BY3222, and 8BY3223. Six federally recognized Native American tribes have a historic affiliation with the area encompassed by Tyndall AFB and its vicinity; these tribes are the Miccosukee Tribe of Indians of Florida, Muscogee (Creek) Nation, Poarch Band of Creek Indians, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Thlopthlocco Tribal Town.

The nearest known archaeological sites to the CRIP levees and floodwalls were identified and evaluated for this EA. The exact locations of known archaeological sites at Tyndall AFB are purposefully not identified in this EA as required by the Tyndall Cultural Resources Office (CRO) to protect the sites from trespass, vandalism, or other harm in accordance with Section 9 of the Archaeological Resources Protection Act and Section 304 of the NHPA. The known archaeological sites within 100 meters (328 feet) of the CRIP levee and floodwall footprints are identified in Table 3-19. There are a total of six known archaeological sites within 100 meters of a CRIP levee/floodwall. Only one known archaeological site is within the footprint of a proposed CRIP levee/floodwall: site 8BY01294. This site is approximately 28.5 acres and is recommended by Tyndall AFB as being eligible for NRHP listing; the site has yet to be evaluated by SHPO. The footprint of the levee overlays approximately 2 percent of the site and the footprint of the floodwall overlays approximately 1 percent of the site. The other five known archaeological sites range from 4.7 to 86.9 meters from the footprint of the nearest proposed CRIP levee (Table 3-19).

Table 3-19. Known Archaeological Sites within 100 Meters of CRIP Levee and Floodwall Footprints

Archaeological Site	Size (acres)	NRHP Eligibility	Levee/Floodwall Site	Distance from Levee Footprint[a] (meters)
8BY01294	28.47	Eligible	West Housing	Within Footprint
8BY00153	20.83	Potentially eligible	West Housing	4.7
8BY01874	8.87	Potentially eligible	WWTP	12.7
8BY01878	14.7	Potentially eligible	WWTP	57.0
8BY00141	7.26	Potentially eligible	WWTP	80.2
8BY01716	6.76	Potentially eligible	West Housing	86.9

[a] The distance of each site from the floodwall footprint would be slightly greater.

NRHP = National Register of Historic Places; WWTP = wastewater treatment plant

3.4.1.2 NBS Pilot Projects

A Phase I submerged archaeological resources survey was conducted for the four NBS pilot projects by Southeastern Archaeological Research, Inc. (SEARCH) from March 10 to 12, 2023. This survey assessed the presence or absence of potential submerged archaeological resources within the footprints of the NBS projects. The Phase I survey report was sent to the SHPO for review on October 20, 2023.

Prior to the field survey, SEARCH developed a predictive model for potential submerged archaeological resources and reviewed cartographic images, previous investigations, and databases of known cultural

resources in the surrounding area. Based on this review, no shipwrecks or other submerged cultural resources are documented to exist within 1 mile of the footprints of the NBS projects. The submerged archaeological resources field survey was conducted using a cesium marine magnetometer, dual-frequency side-scan sonar, and sub-bottom profiler. The survey area covered the footprint of each NBS project and additional adjacent areas. Transects spaced at 50-foot intervals were surveyed in all portions of the survey area with water depths of 2.5 feet or deeper. A total of 14 magnetic anomalies and 4 acoustic contacts were identified during the survey. Of the magnetic anomalies, one was identified in the living shoreline breakwater survey area, nine in the oyster reef breakwater survey area, and four in the shoreline stabilization/seagrass enhancement survey area. Of the four acoustic contacts identified by side-scan sonar, two were identified in the oyster reef breakwater survey area and two were identified in the shoreline stabilization/seagrass enhancement survey area. SEARCH reported that none of the identified magnetic anomalies displayed similar characteristics to verified shipwreck magnetic signatures or otherwise indicated a potential submerged cultural resource. SEARCH concluded that none of the identified acoustic anomalies exhibited characteristics of verified shipwreck acoustic images such as linear, geometric, or ship-shaped objects or otherwise indicated a potential submerged cultural resource.

3.4.2 Environmental Consequences

The threshold level for a significant impact on cultural resources from the Proposed Action is defined in this EA as an unmitigated impact on a historic property that is listed or eligible for listing in the NRHP or that has been identified by a federally recognized Native American tribe as a sacred site or traditional cultural property.

3.4.2.1 CRIP Implementation

One of the selection standards for the CRIP projects is for the project to not result in significantly adverse impacts to natural or cultural resources (Section 2.2). To comply with this selection standard, portions of the original levee alignments presented in the final CRIP were modified by the CRIP design team for Alternative 1 in this EA to avoid known archaeological sites to the greatest extent practicable. The same alignments are kept for the floodwalls under Alternative 2 so that potential cultural resources impacts are minimized to the extent practicable under both alternatives.

As discussed, a portion of the existing footprint of the levee under Alternative 1 and the floodwall under Alternative 2 for the west housing area is within the boundaries of one known archaeological site. This site is approximately 28.5 acres and is recommended to be eligible for NRHP listing. This portion of the original levee alignment has been modified to avoid this archaeological site to the extent practicable while still allowing the levee to encompass all of the houses within the housing area. Following alignment modification, the footprint of the levee overlays approximately 2 percent of the site and the footprint of the floodwall overlays approximately 1 percent of the site. If either a levee or floodwall is proposed to be constructed in the future for this housing area, the Tyndall CRO would evaluate the potential impacts of the proposed levee/floodwall on the archaeological site and recommend measures to avoid adverse impacts to the site. Adverse impacts to the archaeological site may be avoided by modifying the levee/floodwall alignment to avoid the site entirely or the portions of the site that may contribute to its NRHP eligibility; monitoring the site during construction; and/or taking other measures that would prevent adverse impacts to the site. The Tyndall CRO would coordinate with SHPO on the development and implementation of the final protection measures for the site. Staging areas for the construction of levees or floodwalls would be located outside known archaeological sites. Staging area locations would be evaluated and approved by the Tyndall CRO to avoid potential impacts to known and unknown cultural resources. Provided these measures are taken, none of the Alternative 1 levees or Alternative 2 floodwalls are expected to have an adverse impact on cultural resources. Tyndall AFB would also monitor for potential indirect impacts to cultural resources from constructed levees and floodwalls. Monitoring may include assessing potential impacts to known or unknown cultural sites from soil erosion or altered drainage patterns caused by constructed levees and floodwalls. Monitoring associated with cultural resources would be led by the Tyndall CRO, and potential impacts to cultural resources would be coordinated with SHPO as appropriate. The nonstructural solutions under both alternatives, including

constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options for all seven districts of the base are expected to have no adverse impact on cultural resources. The floodproofing of any real property facility listed or eligible for listing in the NRHP if needed would be managed by the Tyndall CRO in consultation with SHPO. Archaeological surveys would be conducted as needed for future proposed NBS projects at the base. For these reasons, implementation of the Tyndall AFB CRIP under either Alternative 1 or 2 would have a less-than-significant impact on cultural resources.

In the event that unknown cultural resources are inadvertently discovered during work associated with the Tyndall CRIP, they would be protected under 32 CFR Part 229, "Protection of Archaeological Resources" and if they are human remains or burial artifacts, they would also be protected under the Native American Graves Protection and Repatriation Act and its implementing regulations in 32 CFR Part 10. If potential archaeological resources are discovered, all work would stop immediately, the proper authorities would be promptly notified, and measures to protect and evaluate the inadvertent find would be implemented in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023).

3.4.2.2 NBS Pilot Projects

The Phase I submerged archaeological resources survey conducted by SEARCH identified a total of 14 magnetic anomalies and 4 acoustic contacts within the combined footprints of the four NBS pilot projects (Section 3.4.2). SEARCH determined that none of the magnetic anomalies or acoustic contacts had similar characteristics to verified shipwreck magnetic signatures or acoustic images or otherwise indicated a potential submerged cultural resource. Based on these findings, SEARCH recommends no additional archaeological work for the project areas. The monitoring program that would be implemented for the constructed NBS breakwaters would include evaluating the seafloor adjacent to the breakwaters for the presence of any visible submerged archaeological resources and changes in the shoreline over time, which could potentially affect cultural resources management at the base.

Inadvertent discoveries of potential submerged archaeological resources during construction of the proposed NBS pilot projects under Alternatives 1 or 2 would be protected in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023) as discussed for CRIP implementation. Based on the findings of the submerged archaeological resources survey and with the implementation of the established protection measures for any inadvertent finds, implementation of the proposed NBS pilot projects under Alternatives 1 or 2 would have a less-than-significant impact on cultural resources.

3.4.2.3 SHPO and Tribe Consultation

Tyndall AFB is conducting interagency consultation with SHPO and intergovernmental consultation with the six affiliated tribes on the Proposed Action. Scoping letters for the Proposed Action were sent to SHPO on March 13, 2023, and to the affiliated tribes on April 6, 2023. The draft Phase I submerged archaeological resources survey report for the four proposed NBS projects was sent to SHPO for review on November 10, 2023. The draft EA was sent to SHPO and the tribes on [TBD]. Documentation of consultation with SHPO and the tribes is included in Appendix A.

Comments received from the SHPO and tribes will be discussed here.

3.4.2.4 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on cultural resources resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.5 Biological Resources

Biological resources in this EA refer primarily to plants and animals, with focus given to species that are federally listed as Endangered or Threatened, which are afforded legal protection under the Endangered

Species Act (ESA). Certain plant and animal species in Florida are also awarded state listing and associated regulatory protection. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) and EO 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds."

3.5.1 Affected Environment

3.5.1.1 CRIP Implementation

3.5.1.1.1 Vegetation and Habitat

Much of the historical vegetation of the Tyndall AFB peninsula has been altered by past agricultural and silvicultural practices. Slash pine and sand pine (*Pinus clausa*) plantations replaced much of the native longleaf pine (*Pinus palustris*) communities that once covered the area. In 2006, Tyndall AFB shifted from commercial forestry practices (timber production) to an ecosystem-based forestry program that focuses on restoring historical vegetative conditions and natural processes through selective thinning, natural and artificial regeneration of native species, and prescribed fire.

Planted pine (tree plantation) is the dominant vegetative community at Tyndall AFB, accounting for approximately 27 percent of the total land area of the base, followed by wet flatwoods (15 percent), and coastal scrub (9 percent) (DAF 2020a). Hurricane Michael, which made landfall on October 10, 2018, caused extensive damage to the pine forests at Tyndall AFB. Cleanup and timber salvage operations on 9,285 acres began in December 2018 and were completed in March 2020.

Tyndall AFB provides habitat for a wide variety of fish and wildlife species. Terrestrial wildlife species diversity and abundance at the base are generally representative of populations naturally occurring in northwestern Florida. The management of fish and wildlife at Tyndall AFB is integrated closely with several other elements of natural resources management, including management of outdoor recreation, water resources, forests, and invasive and nuisance species.

Levee and Floodwall Sites

The vegetation and wildlife habitat within and near the footprints of the CRIP levees/floodwalls were surveyed in the field for this EA. The surveys covered the accessible portions of the levee/floodwall footprints, except for the 7000 area, which was previously surveyed by others. Table 3-20 identifies the dominant vegetation within the footprints of the CRIP levees/floodwalls.

Table 3-20. Vegetation within Footprints of CRIP Levees/Floodwalls

Location	Dominant Vegetation within Footprint	Existing Conditions
Wastewater Treatment Plant	Mowed grass and coastal scrub	Coast scrub vegetation severely impacted by Hurricane Michael. Current coastal scrub community is mostly shrubs with few standing trees
West Housing Area	Mowed grass. coastal scrub, forested wetland	Coastal scrub and forested wetland vegetation severely impacted by Hurricane Michael. Current coastal scrub and wetlands have many fallen trees
East Housing Area	Mowed grass and coastal scrub	Coastal scrub severely impacted by Hurricane Michael with many fallen trees
7000 Area	Forested, shrub, and emergent wetland	Eastern portion of footprint was formerly pine plantation, which was impacted by Hurricane Michael and subsequently cleared
Fuel Depot Area	Mowed grass and disturbed vegetation alongside ditch	Most of the footprint is mowed grass except the southern portion, which contains disturbed vegetation alongside a ditch

Table 3-20. Vegetation within Footprints of CRIP Levees/Floodwalls

Location	Dominant Vegetation within Footprint	Existing Conditions
Silver Flag Area	Mowed grass, coastal scrub, planted pine, and forested wetland	Coastal scrub, planted pine, and forested wetland vegetation severely impacted by Hurricane Michael with many fallen trees

As indicated in Table 3-20, the dominant vegetation types within the levee/floodwall footprints are mowed grass, coastal scrub, and forested wetlands. The coastal scrub communities within the footprints included sand pine, turkey oak (*Quercus laevis*), myrtle oak (*Quercus myrtifolia*), Chapman oak (*Quercus chapmainii*), sand live oak (*Quercus geminata*), yaupon (*Ilex vomitoria*), woody goldenrod (*Chrysoma pauciflosculosa*), rusty lyonia (*Lyonia fructicosa*), and saw palmetto (*Serenoa repens*). The plant species composition of the wetlands is discussed in Section 3.2. The coastal scrub, planted pine, and some of the forested wetlands within the levee/floodwall footprints have been severely impacted by Hurricane Michael, which hit the base in 2018. These communities have many fallen trees and some of the impacted upland vegetation has been cleared.

In addition to being impacted by Hurricane Michael, most of the vegetative communities within the levee/floodwall footprints have been disturbed by past development of the sites and by other land practices such as silviculture. The vegetative communities also have been impacted by wildfire suppression, which has degraded their plant community characteristics and overall wildlife habitat quality. Overall, the levee/floodwall footprints at all the sites provide relatively low-quality habitat for wildlife based on the identified impacts and the regular noise and activity at the sites, which is expected to reduce the potential for wildlife to occur in proximity to the sites.

3.5.1.1.2 Protected Species

The 325th Civil Engineer Squadron/Environmental Element, Natural Resources, commonly known as Tyndall Natural Resources, has primary responsibility for the management of protected species and their habitat at Tyndall AFB. The federally protected species that occur or potentially occur at Tyndall AFB are presented in Table 3-21.

Table 3-21. Federally Protected Species that Occur or Potentially Occur at Tyndall AFB

Common Name	Scientific Name	Federal Legal Status
Plants		
Godfrey's butterwort	*Pinguicula ionantha*	Threatened
Telephus spurge	*Euphorbia telephioides*	Threatened
Reptiles		
Alligator snapping turtle	*Macrochelys temminckii*	Proposed Threatened
Eastern indigo snake[a]	*Drymarchon couperi*	Threatened
Green sea turtle[b]	*Chelonia mydas*	Threatened
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle[c]	*Caretta caretta*	Threatened

Table 3-21. Federally Protected Species that Occur or Potentially Occur at Tyndall AFB

Common Name	Scientific Name	Federal Legal Status
Birds		
Bald eagle	*Haliaeetus leucocephalus*	Bald and Golden Eagle Protection Act
Eastern black rail	*Laterallus jamaicensis jamaicensis*	Threatened
Piping plover	*Charadrius melodus*	Threatened /Critical Habitat
Red-cockaded woodpecker	*Dryobates borealis*	Endangered
Rufa red knot	*Calidris canutus rufa*	Threatened
Mammals		
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered/Critical Habitat
St. Andrew beach mouse	*Peromyscus polionotus peninsularis*	Endangered/Critical Habitat
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered

Source: DAF 2020a; USFWS 2024

[a] Not documented on Tyndall AFB; however, the species is known to occur in the region and/or appropriate habitat exists on Tyndall AFB.

[b] North Atlantic Distinct Population Segment

[c] Northwest Atlantic Distinct Population Segment

Critical Habitat: critical habitat is designated for the species

Endangered: species in danger of extinction throughout all or a significant portion of its range

Proposed Endangered: species proposed for listing as endangered

Proposed Threatened: species proposed for listing as threatened

Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range

As indicated in Table 3-21, a total of two plant species and 13 animal species that are federally listed as threatened or endangered are known to occur or have potential to occur at Tyndall AFB. Two species that potentially occur at Tyndall AFB are proposed for federal listing: the alligator snapping turtle (*Macrochelys temminckii*) and tricolored bat (*Perimyotis subflavus*). The bald eagle (*Haliaeetus leucocephalus*) is federally protected under the Bald and Golden Eagle Protection Act.

The federally threatened eastern indigo snake (*Drymarchon couperi*) occurs in a variety of habitats and often uses gopher tortoise (*Gopherus polyphemus*) burrows for shelter and egg laying. There have been no sightings of indigo snakes at Tyndall AFB; however, suitable habitat for them exists at the base (DAF 2020a). It is noted that the eastern indigo snake is potentially extirpated in the general area. Recent conservation efforts by USFWS include releases of bred indigo snakes near the Apalachicola River in hopes of restoring the population in the panhandle. The federally endangered red-cockaded woodpecker (RCW) occurs primarily in open, fire-maintained longleaf pine forests, and nests in cavities it creates in living pine trees. There have been no sightings of RCWs at Tyndall AFB, however, RCWs were known to nest on Lathrop Island located approximately 1.5 miles from the base prior to Hurricane Michael. Much of the pine forests on Lathrop Island were destroyed by the hurricane and the status of the RCW population on the island is unknown. Most if not all potential foraging or nesting habitat for RCWs at Tyndall AFB was also destroyed by Hurricane Michael.

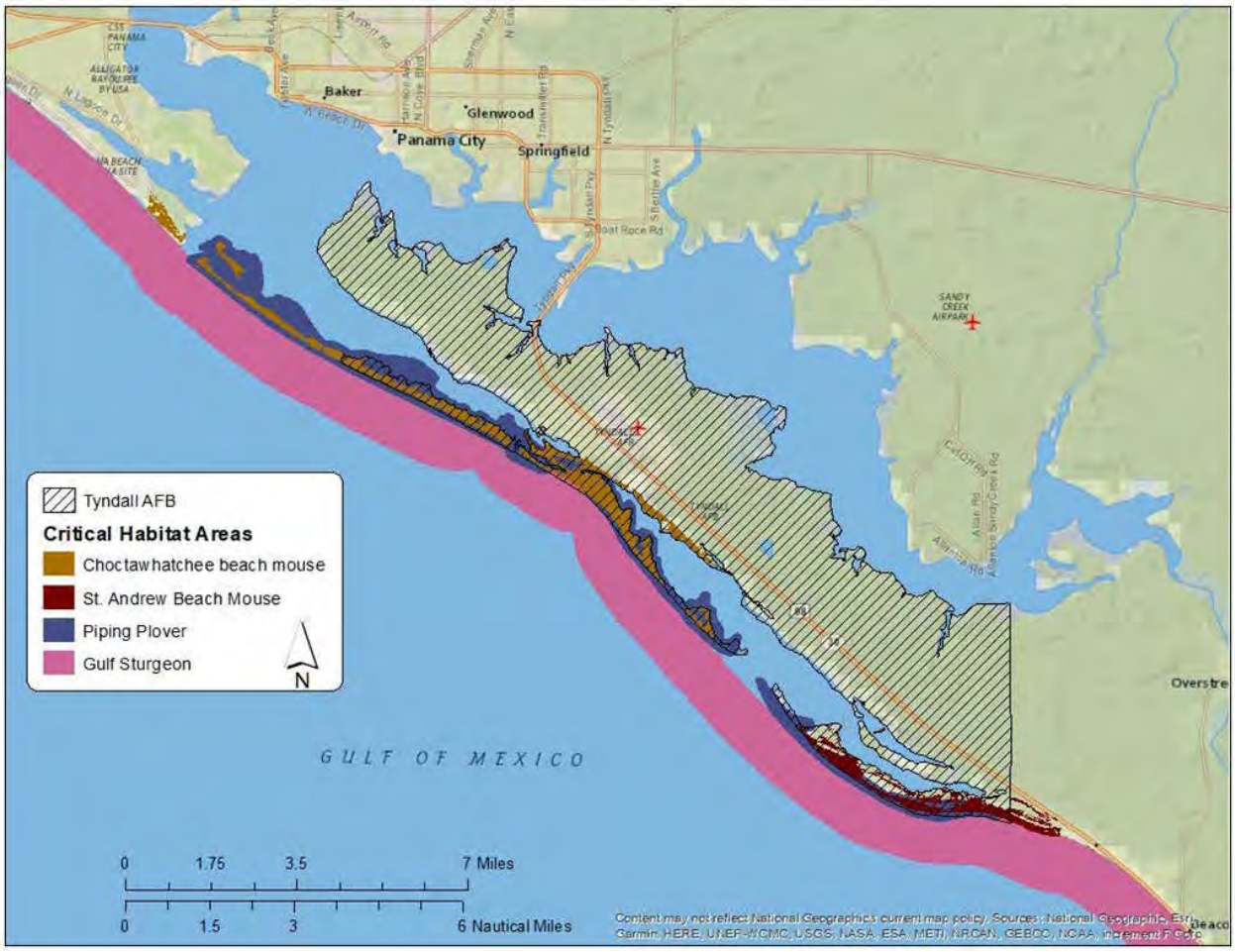
The beaches of the barrier islands of Tyndall AFB are regularly used for nesting by the loggerhead sea turtle (*Caretta caretta*) and the barrier island dunes are important habitat for the Choctawhatchee beach

mouse (*Peromyscus polionotus allophyrs*) and St. Andrew beach mouse (*Peromyscus polionotus peninsularis*). Critical habitat for federally listed species at Tyndall AFB has been designated for the Choctawhatchee beach mouse on Shell Island and Crooked Island West (CIW); for the St. Andrew beach mouse on Crooked Island East (CIE); and for the piping plover (*Charadrius melodus*) on Shell Island, CIW, and CIE. Critical habitat at Tyndall AFB is shown on Figure 3-7. Section 4(a)(3)(B)(i) of the ESA was amended by the National Defense Authorization Act of 2004 to preclude the Secretaries of the Interior (USFWS) and Commerce (NMFS) from designating critical habitat on any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an approved DoD INRMP developed under the Sikes Act Improvement Act of 1997 (16 USC 670a), provided that the appropriate Secretaries certify in writing that the INRMP benefits the species for which critical habitat is proposed. The Tyndall AFB INRMP (DAF 2020a) has been approved by USFWS and includes conservation measures that protect and benefit federally listed species; therefore, implementation of the INRMP should preclude any future critical habitat designation on Tyndall AFB. Critical habitat for the Choctawhatchee beach mouse, St. Andrew beach mouse, and piping plover was designated on Tyndall AFB prior to the finalization of the first Tyndall AFB INRMP in 2006.

Shell Island, CIW, and CIE have been designated by FWC as Critical Wildlife Areas. Public access to portions of these areas may be restricted from April 1 to September 15 for the protection of nesting birds or year-round for the protection of migratory and resident wintering birds (DAF 2020a).

The MBTA currently protects a total of 1,106 bird species (USFWS 2023). Tyndall AFB lies within the Mississippi Flyway, which is a major north-south air corridor used by migratory birds. Numerous bird species known to occur at Tyndall AFB are protected under the MBTA.

Figure 3-7. Critical Habitat on and Near Tyndall AFB
Source: DAF 2020a



Levee and Floodwall Sites

Certain federally protected species have the potential to occur near the sites proposed to be protected by levee or floodwalls. The wetlands around the 7000 area contain suitable habitat for the federally listed Godfrey's butterwort (*Pinguicula ionantha*). A population of this plant species was found near the 7000 area in 2016 and successfully relocated to the drone recovery field (DAF 2020a). USFWS and Tyndall Natural Resources conduct bi-monthly monitoring of the transplanted population to track growth, reproduction, and survival. Telephus spurge (*Euphorbia telephioides*), the other federally listed plant species that occurs at Tyndall AFB, has not been documented to occur near any of the levee/floodwall sites.

All the sites proposed to be protected by levees/floodwalls, except the 7000 area, contain suitable habitat for the state-listed gopher tortoise. No active or inactive gopher tortoise burrows were found during field surveys conducted for this EA, which covered the accessible portions of the levee/floodwall footprints, except for the 7000 area. As discussed, gopher tortoise burrows are used by the federally listed eastern indigo snake; indigo snakes have not been documented to occur at Tyndall AFB. There is an active bald eagle nest within 1/2 mile of the WWTP and an inactive bald eagle nest within 1/2 mile of the Silver Flag area. Lastly, there is potential for the federally listed eastern black rail (*Laterallus jamaicensis jamaicensis*) and the tricolored bat (*Perimyotis subflavus*), which is proposed for federal listing, to occur in the vicinity of some of the levee/floodwall sites. The eastern black rail is a secretive bird that inhabits grassy marsh habitats. The tricolored bat occurs in forested habitats where they roost among the leaves, Spanish moss, palm fronds, and pine needles of live and recently dead trees. Surveys for the eastern black rail and

tricolored bat have not been conducted at Tyndall AFB, and the occurrence of these species on the base is currently not known.

3.5.1.2 NBS Pilot Projects

3.5.1.2.1 Vegetation and Habitat

SAV surveys were conducted for the four NBS pilot projects by the UF Center for Coastal Solutions in 2022 and 2023. The boundaries of the seagrass meadows within the project areas were mapped during the surveys using global positioning system equipment. The July 2022 surveys included quadrat surveys along transects that were perpendicular to the shoreline, extending through the seagrass meadow. Quadrats were 0.5 square meter and located every 10 meters along the transects. The following data were collected by divers at each quadrat:

- Percent cover of seagrass by species
- Percent cover of macroalgae, detritus, and bare sediment
- Seagrass epiphyte load (low, medium, and high)
- Seagrass shoot length by species
- Presence of invertebrates

A total of five seagrass species were identified during the surveys: shoal grass (*Halodule wrightii*), turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), widgeon grass (*Ruppia maritima*), and star grass (*Halophila engelmannii*). Shoal grass and widgeon grass occurred together, and it was not possible to estimate percent cover separately for these species, so their combined percent cover was estimated.

During the June 2023 surveys, UF conducted benthic and SAV surveys within and near the footprints of the proposed NBS breakwaters and reassessed the existing seagrass meadow. The findings of the 2022 and 2023 surveys conducted for the NBS projects are summarized in Table 3-22 and discussed in the subsections that follow. The information collected during these surveys is also included in the Essential Fish Habitat (EFH) Assessment prepared for the four NBS projects. EFH is protected under the Magnuson-Stevens Fishery Conservation and Management Act and defined as “those waters and substrate necessary to fish for spawning, breeding, or growth to maturity” (16 USC 1802(10)). The Habitat Conservation Division (HCD) of NMFS (also known as NOAA Fisheries) regulates EFH. The EFH Assessment for the four NBS projects was submitted to NMFS HCD for review on [TBD].

Table 3-22. Benthic Environment and SAV Cover in NBS Project Areas

NBS Project	Benthic Environment within Project Footprint	SAV Cover
Submerged Living Shoreline Breakwater	Sandy bottom devoid of SAV. Observed fauna included low numbers of ascidians, blue crabs, tubeworms, sand dollars, and sea stars.	Nearest seagrass is about 25 feet from design footprint. Cover in this meadow is 40 to 60 percent and dominated by shoal grass and widgeon grass, followed by turtle grass.
Submerged Oyster Reef Breakwater	Sandy bottom devoid of SAV. Observed faunal activity included high numbers of ghost shrimp burrows and stingray pits.	Nearest seagrass is about 24 feet from design footprint. Cover in this meadow is 20 to 90 percent and dominated by shoal grass and widgeon grass.
Submerged Shoreline Stabilization Breakwater	Sandy bottom devoid of SAV. Observed fauna included low numbers of sand dollars, clams, blue crabs, and sponges, tunicates, ascidians, and anemones attached to dead shells.	Nearest seagrass is about 83 feet from design footprint. Cover in this meadow is 80 to 100 percent and dominated by manatee grass except in the shallowest portions, which are dominated by shoal grass and widgeon grass.
Seagrass Enhancement	Seaward edge of existing seagrass meadow. The edge contains grazed, eroded seagrass adjacent to sandy bottom. Sponges, tubeworms, clams, pen shells, tunicates, sand dollars, sea urchins, blue crabs, and mussels were observed within the seagrass meadow.	The eroding seaward edge of the seagrass meadow has 80 to 100 percent cover and is dominated by manatee grass.

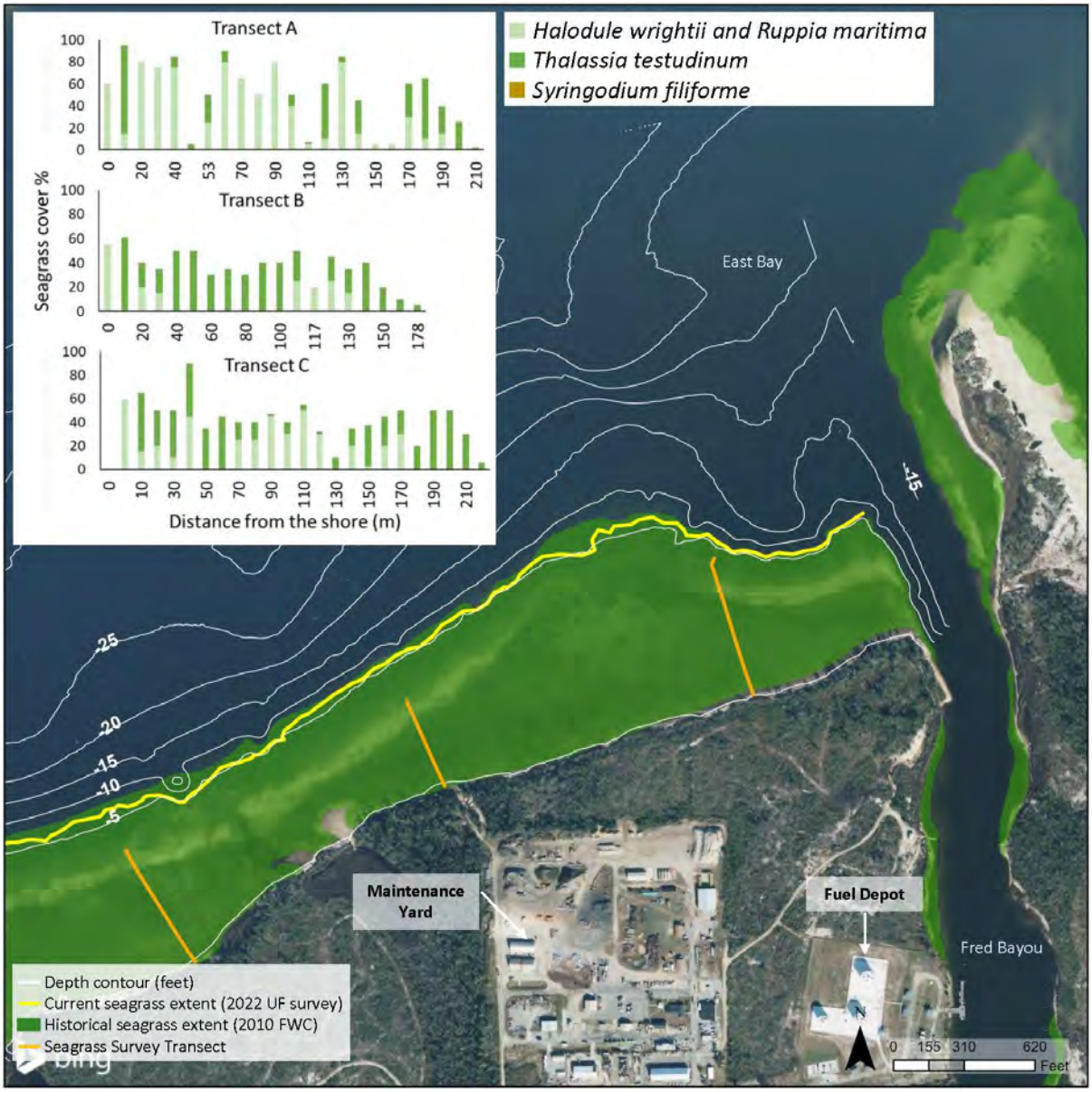
Living Shoreline Breakwater

Based on the SAV surveys conducted by UF in 2022 and 2023, the footprint of the living shoreline breakwater consists of sandy bottom that is devoid of SAV. Fauna observed within the breakwater footprint included low numbers of ascidians, blue crabs, tubeworms, sand dollars, and sea stars. The current design footprint of the living shoreline breakwater is approximately 25 feet from the existing seagrass meadow in the area at its closest point.

Seagrass cover in the existing seagrass meadow at the site was assessed along transects that were 178, 210, and 218 meters long. Seagrass cover along the transects was dominated by shoal grass and widgeon grass, followed by turtle grass (Figure 3-8). Overall percent cover was 40 to 60 percent and ranged from less than 10 percent to over 90 percent.

Macroalgal cover along the transects was low (2 to 10 percent) and consisted primarily of *Hypnea* and *Chondria* spp., with sparser cover of *Acetabularia* spp. Macroalgal cover increased up to 100 percent past the deep seagrass edge. Observed macrofauna along the transect primarily included a few oysters attached to woody debris. Seagrass epiphyte load was higher at this location than the other project areas. The most dominant epiphyte was an unidentified gelatinous algae or bacteria. This epiphyte was not found during visits to the site in October 2022. Other epiphytes included filamentous brown algae and *Bittium* spp. (small sea snails). Seagrass shoot length was approximately 15 to 20 centimeters for shoal grass and widgeon grass and approximately 20 centimeters for turtle grass.

Figure 3-8. Seagrass Cover in Living Shoreline Breakwater Project Area



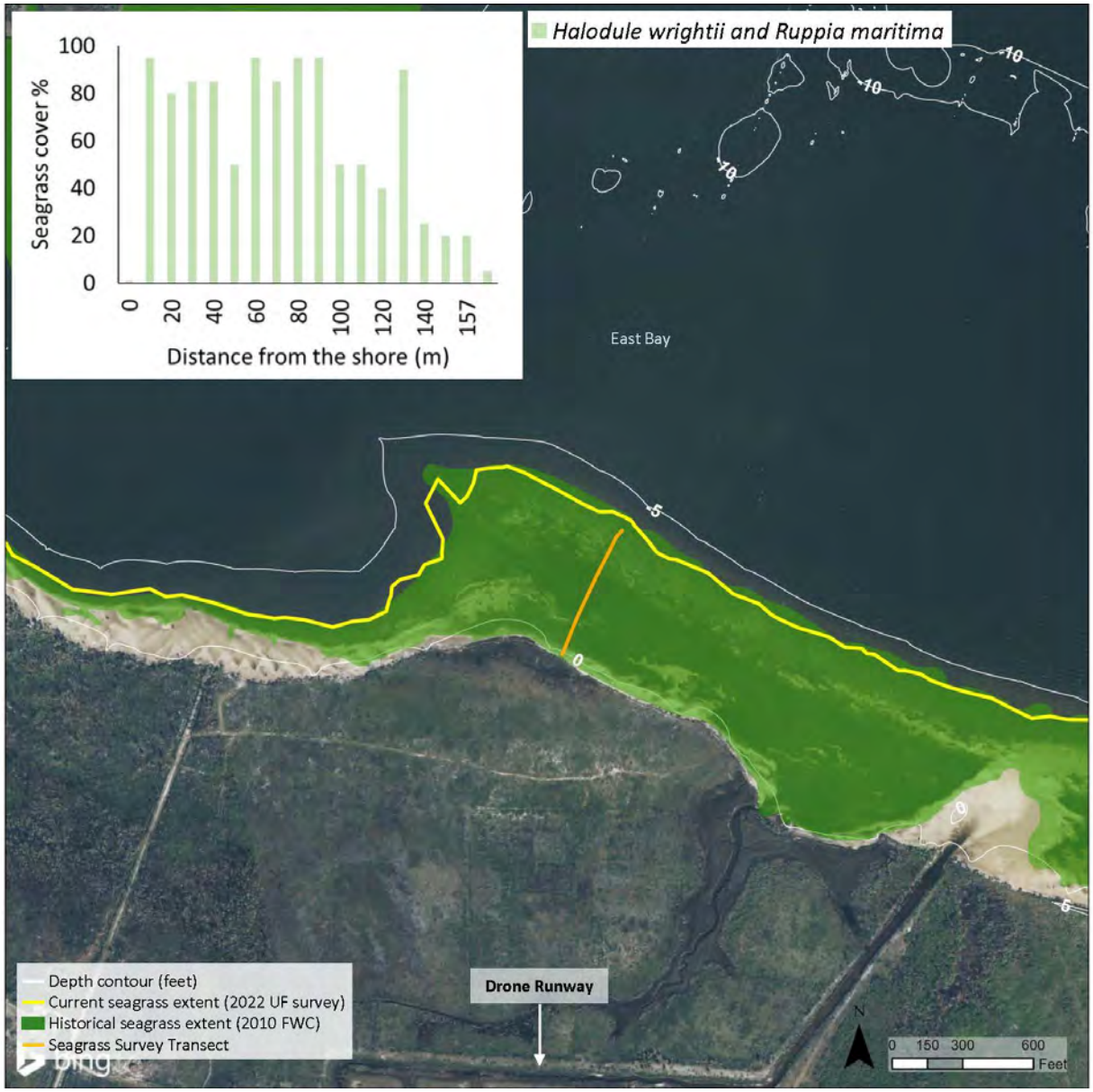
Oyster Reef Breakwater

Based on the SAV surveys conducted by UF in 2022 and 2023, the footprint of the oyster reef breakwater consists of sandy bottom that is devoid of SAV. Faunal activity observed within the breakwater footprint included high numbers of ghost shrimp burrows and stingray pits. The current design footprint of the oyster reef breakwater is approximately 24 feet from the existing seagrass meadow in the area at its closest point.

Seagrass cover in the existing seagrass meadow at the site was assessed along a transect that was 167 meters long. Seagrass cover along the transect was dominated by shoal grass and widgeon grass, with their combined cover within the quadrats ranging from approximately 20 to 90 percent (Figure 3-9). Turtle grass was observed at the site but not along the surveyed transect.

UF reported that the oyster reef breakwater site had lower water quality during the surveys than the other breakwater sites due to higher tannin content. There was no macroalgal cover along the transect. Observed macrofauna along the transect included a few oysters attached to woody debris. Seagrass epiphyte load was moderate to high, with filamentous brown algae and *Bittium* spp. being the primary epiphytes. Seagrass shoot length was approximately 20 centimeters.

Figure 3-9. Seagrass Cover in Oyster Reef Breakwater Project Area



Shoreline Stabilization Breakwater and Seagrass Enhancement

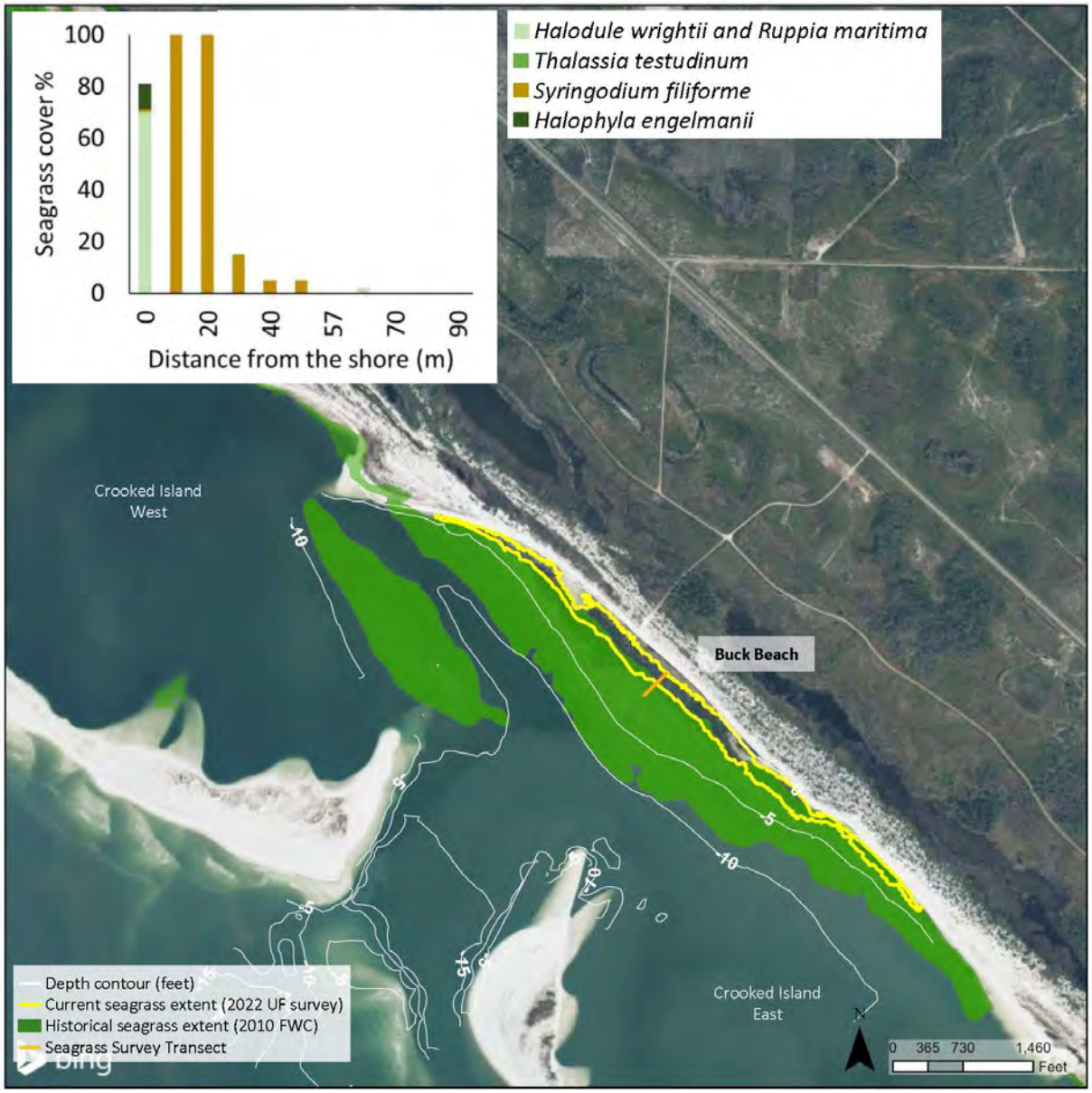
Based on the SAV surveys conducted by UF in 2022 and 2023, the footprint of the shoreline stabilization breakwater consists of sandy bottom that is devoid of SAV. Fauna observed within the breakwater footprint included low numbers of sand dollars, clams, blue crabs, and sponges, tunicates, ascidians, and anemones attached to dead shells. The current design footprint of the shoreline stabilization breakwater is approximately 83 feet from the existing seagrass meadow in the area at its closest point.

Seagrass cover within the first few meters of the transect was dominated by shoal grass and widgeon grass, which had approximately 80 percent cover (Figure 3-10). This zone also included sparse cover of star grass and manatee grass. The remainder of the transect was dominated by dense manatee grass having up to 100 percent cover. The manatee grass beds are heavily grazed from approximately 30 meters offshore to the seaward end of the meadow. Turtle grass was observed at the site but not along the surveyed transect.

Macroalgal cover along the transect was low, with one quadrat having approximately 15 percent cover of *Hypnea* spp. Macrofauna observed within the seagrass beds included sponges, tubeworms, clams, pen shells, tunicates, sand dollars, sea urchins, blue crabs, and mussels. Seagrass epiphyte load was low, with

filamentous brown algae and *Bittium* spp. being the primary epiphytes. Seagrass shoot length varied among the species with shoal grass being approximately 30 centimeters and manatee grass being approximately 50 centimeters if not grazed and approximately 4 centimeters if grazed.

Figure 3-10. Seagrass Cover in Shoreline Stabilization Breakwater and Seagrass Enhancement Project Area



3.5.1.2.2 Protected Species

Potential occurrence of protected species in the project areas of the four proposed NBS pilot projects was initially evaluated by reviewing the Tyndall GIS protected species database, Tyndall AFB INRMP (DAF 2020a), and results of past protected species surveys conducted at the base. The NOAA Fisheries Southeast Region ESA Section 7 Mapper online tool (NMFS 2024) was used to identify potentially affected ESA-listed species under NMFS's jurisdiction and an official list of potentially affected species under USFWS jurisdiction was generated through the USFWS Information for Planning and Conservation (iPAC) process. The USFWS liaison to Tyndall AFB was also consulted to identify which species under USFWS jurisdiction could potentially be affected by the proposed projects. Field surveys to evaluate the marine environment within the project footprints, adjacent shoreline habitats, and potential protected species occurrence in the project areas were conducted over several field events from 2022 to 2024.

The DAF is informally consulting under Section 7(a)(2) of the ESA with NMFS and USFWS on the four proposed NBS projects. Separate Biological Assessments (BAs) that present the DAF's effect determinations for the potentially affected species under each agency's respective jurisdiction were prepared and sent to NMFS on [TBD] and to USFWS on [TBD] (Appendix A). The ESA-listed species potentially occurring within and near the project areas of the four NBS pilot projects are presented in Table 3-23.

Table 3-23. Federally Protected Species that Potentially Occur Within or Near Project Areas of NBS Pilot Projects

Common Name	Scientific Name	Federal Legal Status
Fish		
Giant manta ray	*Manta birostris*	Threatened
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened
Reptiles		
Green sea turtle[a]	*Chelonia mydas*	Threatened
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle[b]	*Caretta caretta*	Threatened
Birds		
Bald eagle	*Haliaeetus leucocephalus*	Bald and Golden Eagle Protection Act
Eastern black rail	*Laterallus jamaicensis jamaicensis*	Threatened
Piping plover	*Charadrius melodus*	Threatened /Critical Habitat
Rufa red knot	*Calidris canutus rufa*	Threatened
Mammals		
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered/Critical Habitat
Florida manatee	*Trichechus manatus*	Threatened
St. Andrew beach mouse	*Peromyscus polionotus peninsularis*	Endangered/Critical Habitat
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered

Source: DAF 2020a; NMFS 2024; USFWS 2024

[a] North Atlantic Distinct Population Segment

[b] Northwest Atlantic Distinct Population Segment

Critical Habitat: critical habitat is designated for the species

Endangered: species in danger of extinction throughout all or a significant portion of its range

Proposed Endangered: species proposed for listing as endangered

Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range

Of the species identified in Table 3-23, the Protected Resources Division (PRD) of NMFS has regulatory jurisdiction for the gulf sturgeon (*Acipenser oxyrinchus desotoi*), giant manta ray (*Manta birostris*), and the following sea turtle species when they are in the marine environment: loggerhead (*Caretta caretta*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), and leatherback (*Dermochelys coriacea*). USFWS

has regulatory jurisdiction for these four sea turtle species when they are nesting, including nests and hatchlings, and for all the bird and mammal species in the table.

Adult gulf sturgeon forage and overwinter in bay and nearshore marine waters during fall and winter and migrate into freshwater rivers during warm months to spawn. Gulf sturgeon have been documented to overwinter in nearshore marine waters off Tyndall AFB. Gulf sturgeon do not spawn in any freshwater system within the St. Andrew Bay Watershed. Critical habitat for the gulf sturgeon near Tyndall AFB extends from the Gulf coastal shoreline out to 1 nautical mile offshore. None of the proposed NBS projects are located within this critical habitat.

The giant manta ray is known to occur in the Gulf of Mexico and has been documented primarily in the southern and northwestern portions of the Gulf (Miller and Klimovich 2017). A giant manta ray was sighted in nearshore waters off St. Andrews State Park in September 2023, indicating that this species also occurs in the northeastern Gulf and has potential to occur in the NBS project areas.

The loggerhead, green, Kemp's ridley, and leatherback sea turtles are all known to occur offshore of Tyndall AFB and to nest on the beaches of the base. The loggerhead is the most common and regularly nests on Shell Island, CIW, and CIE, and occasionally on Buck Beach. CIW and CIE form the inlet of St. Andrew Sound, where the shoreline stabilization breakwater is proposed. Critical habitat for the Northwest Atlantic Distinct Population Segment of the loggerhead sea turtle consists of a terrestrial component of nesting beaches and a marine component of nearshore reproductive, overwintering, breeding, migratory, and *Sargassum* habitats. None of the proposed NBS projects are within this critical habitat. Green sea turtles forage in the nearshore waters off Tyndall AFB and occasionally nest on Shell Island, CIW, and CIE. Leatherback and Kemp's ridley sea turtles occur in lower numbers and nest infrequently on the base. There have been only three documented leatherback nesting events (Shell Island, CIW, and CIE) and two Kemp's ridley nesting events (Shell Island and CIW) at Tyndall AFB (DAF 2020a).

Piping plovers (*Charadrius melodus*) and rufa red knots (*Calidris canutus rufa*) consistently winter on Shell Island, CIW, and CIE during the nonbreeding (wintering and migrating) season from July 15 through May 15 (DAF 2020a). Wintering piping plovers have also been reported to occasionally occur along other shorelines of Tyndall AFB. Critical habitat is designated for the piping plover on Shell Island, CIW, and CIE. None of the proposed NBS projects are located in this critical habitat. Bald eagles are known to nest along the shoreline of St. Andrew Sound, in the vicinity of Buck Beach.

The Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*) occurs on Shell Island and CIW, and the St. Andrew beach mouse (*Peromyscus polionotus peninsularis*) occurs on CIW. Critical habitat is designated for the Choctawhatchee beach mouse on Shell Island and CIW and for the St. Andrew beach mouse on CIE. None of the proposed NBS projects are located in this critical habitat.

The Florida manatee (*Trichechus manatus latirostris*) is occasionally reported to occur in Gulf waters around Tyndall AFB during warmer months, and strandings have occurred in past years near the base, including the winter of 2020. Therefore, there is potential for manatees to occur in or near the NBS project areas. Manatee occurrence would be relatively rare and in low numbers.

The remaining identified species, which include the eastern indigo snake, eastern black rail, and the tricolored bat, occur on land and have relatively low potential to occur in shoreline areas adjacent to the proposed offshore projects. As discussed for CRIP implementation, the occurrence of the eastern back rail and tricolored bat at Tyndall AFB is currently not known. There have been no sightings of indigo snakes at Tyndall AFB and there have been no recent reports of their occurrence in the areas around the base.

3.5.2 Environmental Consequences

The threshold level for a significant impact on biological resources from the Proposed Action is defined in this EA as including any of the following: an excessive loss or degradation of a unique or sensitive vegetative community; an impact that adversely affects the regional population of a plant or animal

species; the taking of a migratory bird in violation of the MBTA; or the taking of a federally listed species in violation of the ESA.

3.5.2.1 CRIP Implementation

3.5.2.1.1 Vegetation and Habitat

As discussed, the vegetative communities within the footprints of the CRIP levees/floodwalls have been impacted by Hurricane Michael, which hit Tyndall AFB in 2018, past development of the sites, land use practices such as silviculture, and wildfire suppression. Based on these impacts and the regular noise and activity from operations at the sites, all the CRIP levee/floodwall footprints provide relatively low-quality habitat for wildlife. Based on the type, quantity, and quality of the vegetation and habitat that would be impacted and the compensatory mitigation that would be provided for any unavoidable wetland impacts, construction of the levees under Alternative 1 or floodwalls under Alternative 2 would have a less-than-significant impact on vegetation and wildlife habitat. The overall potential for unintentional physical impacts to wildlife, including impacts to bird nests or eggs, from construction activities would be relatively low under either alternative based on the types and amount of undeveloped land that would be disturbed. All the sites proposed to be protected by levees or floodwalls provide suboptimal nesting conditions for migratory birds. Any bird nests found during construction would be avoided to the extent practicable. In the event that a bird nest was found within or adjacent to the construction site, the construction contractor would be required to immediately stop work and consult with Tyndall Natural Resources on the protection of the nest before resuming construction activities.

The noise generated during construction associated with CRIP implementation may temporarily disturb wildlife that occur near the construction area; however, any disturbance would be limited to the construction period and is expected to be negligible based on the analysis of construction noise conducted in Section 3.6. In summary, the potential impacts of CRIP implementation under either Alternative 1 or 2 on vegetation and habitat would be less than significant. The DAF would review any Alternative 1 levees, Alternative 2 floodwalls, and other CRIP strategies proposed in the future through the AF Form 813 process to assess their potential impacts on vegetation, habitat, and wildlife, and determine any associated protection measures that should be implemented.

3.5.2.1.2 Protected Species

As discussed, the footprints of the CRIP levees and floodwalls are largely disturbed and provide relatively low-quality habitat for wildlife based on past impacts to vegetative communities and the regular noise and activity at the sites, which are expected to reduce the potential for protected animal species to occur in proximity to the sites.

The wetlands that surround the 7000 area contain suitable habitat for the federally listed Godfrey's butterwort; a population of this species near the 7000 area was successfully relocated in 2016. There is potential for this species to occur within or near the 7000 area and potentially in wetlands within or near the other sites proposed to be protected by levees or floodwalls. Surveys for Godfrey's butterwort would be conducted in all suitable habitat during project planning and before construction for all levees or floodwalls proposed to be constructed at Tyndall AFB. If any populations of Godfrey's butterwort are found within or near the proposed construction limits, the DAF would consult with USFWS on the approach to protect the plants from being impacted, which may involve realignment of the levee/floodwall and/or relocation of plants. Provided that surveys are conducted and conservation measures are implemented for any potentially affected populations, implementation of the CRIP under either Alternative 1 or 2 would not have adverse effects on Godfrey's butterwort. Telephus spurge, the other federally listed plant species that occurs at Tyndall AFB, has not been documented to occur near any of the levee/floodwall sites and is expected to have low potential to occur at the sites. Surveys for this plant species also would be conducted at any site where a levee or floodwall is proposed.

All the sites proposed to be protected by levees/floodwalls, except the 7000 area, contain suitable habitat for the state-listed gopher tortoise. No active or inactive gopher tortoise burrows were found during field surveys conducted for this EA, which covered the accessible portions of the levee/floodwall footprints,

except for the 7000 area. Gopher tortoise burrows are used by the federally listed eastern indigo snake. Indigo snakes have not been documented to occur at Tyndall AFB and there is currently low potential for their occurrence on the base. Ongoing conservation measures, which include releases of bred indigo snakes into portions of the Florida panhandle, may increase the potential for indigo snakes to occur on Tyndall AFB in the future. Tyndall Natural Resources requires the implementation of specific protection measures for the gopher tortoise and eastern indigo snake for all construction projects that occur in suitable gopher tortoise habitat. Gopher tortoise surveys are required for all proposed projects that involve ground disturbance in suitable habitat. These surveys are typically required 30 days prior to ground disturbance to ensure that tortoises that may recruit onto the site close to the construction period are identified. If any found burrows cannot be avoided by 25 feet, the tortoises and any commensal species would be relocated in accordance with FWC guidelines (FWC 2015). If gopher tortoises were near an area that would be disturbed by construction, silt fencing or some other type of barrier would be erected to keep tortoises from moving into the construction area after surveys have been completed. All pre-construction gopher tortoise survey and protection measures required by Tyndall AFB would be implemented for the construction of levees under Alternative 1, floodwalls under Alternative 2, and all other CRIP flood defense strategies that involve ground disturbance in suitable gopher tortoise habitat. For the protection of the eastern indigo snake, Tyndall AFB requires that construction projects comply with the *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2013); these protection measures would be implemented under both alternatives.

Active and inactive bald eagle nests currently exist within 1/2 mile of the WWTP and 1/2 mile of the Silver Flag area, respectively. The locations of bald eagle nests change over time and there is potential for new nests to be located closer to some levee/floodwall sites in the future. All construction activity associated with implementation of the CRIP under Alternatives 1 and 2 would follow the recommendations in *National Bald Eagle Management Guidelines* (USFWS 2007), including maintaining the minimum buffer distances around active nests during the construction period.

Lastly, there is potential for the federally listed eastern black rail and the tricolored bat, which is proposed for federal listing, to occur in the vicinity of some of the levee/floodwall sites. Surveys for the eastern black rail and tricolored bat have not been conducted at Tyndall AFB, and the occurrence of these species on the base is currently not known. Levee or floodwall construction at the proposed sites are not expected to adversely affect these species. The potential occurrence of these species would be assessed for any levee or floodwall that is proposed in the future.

Bird species protected under the MBTA would be protected from being impacted during CRIP implementation to the extent practicable. Potential impacts to breeding birds and bird nests would be relatively low under Alternatives 1 and 2 based on the types and amounts of undeveloped land that would be disturbed. Any bird nests found during construction would be avoided to the extent practicable, and if the nest is within or adjacent to the construction site, the construction contractor would be required to immediately stop work and consult with Tyndall Natural Resources on the protection of the nest before resuming construction activities.

Based on the analysis of protected species occurrence and potential impacts, and the protection measures that would be implemented as needed, including those for Godfrey's butterwort, the bald eagle, gopher tortoise, and indigo snake during construction, implementation of the CRIP is not expected to adversely affect any ESA-listed species or designated critical habitat. The DAF would review any Alternative 1 levees, Alternative 2 floodwalls, and other CRIP strategies proposed in the future through the AF Form 813 process to assess their potential impacts on protected species and determine the associated consultation and mitigation requirements for the species.

3.5.2.1.3 Conclusion

Based on the type, quantity, and quality of the vegetation and habitat that would be impacted, and the determination that potential impacts to ESA-listed species would not be adverse, implementation of the CRIP under either Alternative 1 or 2 would have a less-than-significant impact on biological resources.

3.5.2.2 NBS Pilot Projects

3.5.2.2.1 Vegetation and Habitat

The footprints of all three proposed NBS breakwaters consist of sandy bottom that is devoid of SAV. The benthic EFH that would be displaced by each breakwater is ubiquitous in the area and, therefore, would represent a negligible loss of such habitat and an insignificant impact on the marine biota that use it. The estimated footprints of the NBS projects on the seafloor under Alternatives 1 and 2 are presented in Table 3-18. The NBS breakwaters under both alternatives would permanently displace EFH substrate within their footprints. The Alternative 1 quarry stone breakwaters for the living shoreline and oyster reef sites would have larger footprints than the Alternative 2 concrete disk breakwaters for the same sites, which would be anchored into the seafloor with 12-inch diameter fiberglass pilings. EFH substrate displacement by the Alternative 2 geotube breakwater for the shoreline stabilization site would be comparable to the EFH displacement by the Alternative 1 quarry stone breakwater for the site.

Installation of the breakwaters would create structural habitat for a wide variety of marine life and would result in a net increase in habitat substrate in the project areas. The quarry stone breakwaters under Alternative 1 would provide considerably more structural habitat than the Alternative 2 breakwaters in terms of total footprint and structural habitat surface area. By reducing wave energy, the breakwaters under both alternatives would enhance existing seagrass and marsh habitats in the project areas.

Each constructed breakwater would be approximately 25 feet or more from the closest seagrass bed. Based on the predominance of sand sediments in the project areas and the type of construction methods that would be used, construction of the breakwaters under either alternative is not expected to generate excessive amounts of turbidity. A long-reach excavator on a barge would place rock within the footprint of each Alternative 1 breakwater in a precise manner with regular pauses to allow measurements of the rock placement. There would be no dredging or excavation of the seafloor. Turbidity curtains would be used and the limit of 29 NTUs above background would be met within the 150-meter mixing zone downstream of the construction work area, as required by DEP. Turbidity curtains would be installed to encompass the construction area where rock is being installed by the long-reach excavator. The curtains would extend from one end of the excavator barge, around the area where the excavator is laying rock, to the other end of the excavator barge. For these reasons, there would be no adverse effects from turbidity on seagrass or other EFH.

The proposed NBS projects have been developed to attenuate wave energy and reduce the rate of coastal erosion, thereby improving the resilience of Tyndall AFB against coastal flooding impacts from strong storms and sea-level rise. For these reasons, the proposed NBS projects would have beneficial effects on how EFH in the project areas is affected by climate change over time, including projected increases in storm intensity and sea-level rise.

The installation of bamboo stakes along the seaward edge of the existing seagrass meadow for the seagrass enhancement project would restrict grazing of the meadow edge by green sea turtles. Preventing seagrass grazing on the eroding edge of the meadow using the proposed technique is expected to allow the seagrass edge to grow and better resist sediment burial, with the goal of reducing further seagrass loss and promoting new seagrass growth, thereby enhancing EFH in the project area.

3.5.2.2.2 EFH Effect Determination

Based on the type and amount of benthic habitat that would be affected, the new structural habitat that would be created, and the benefits to other EFH from reduced wave energy, the DAF has determined that all four proposed NBS projects under Alternative 1 would not adversely affect EFH or federally managed fisheries. The DAF requested concurrence from NMFS HCD on this determination. The EFH Assessment for the four NBS projects was submitted to NMFS HCD for review on July 15, 2024. In a reply email dated July 16, 2024, NMFS HCD indicated that based on its review of the EFH Assessment, it anticipates that any adverse effects that might occur on marine and anadromous fishery resources would be minimal and that the EFH consultation requirement for the project has been satisfied (Appendix A). The DAF has determined that the four proposed NBS projects under Alternative 2 also would not adversely affect EFH

or federally managed fisheries. The DAF would request separate concurrence from NMFS HCD on this determination if Alternative 2 is proposed to be implemented.

3.5.2.2.3 Protected Species

The DAF is informally consulting under Section 7(a)(2) of the ESA with NMFS and USFWS on the four proposed NBS projects under Alternative 1, the preferred alternative. The findings of the BAs prepared for each respective consultation are summarized in this section. As discussed, NMFS PRD has jurisdiction for the gulf sturgeon, giant manta ray, and the four identified sea turtle species, which include the loggerhead, green, Kemp's ridley, and leatherback, when they are in the marine environment and USFWS has jurisdiction for the same sea turtle species when they are nesting, including nests and hatchlings, and for all the bird and mammal species identified in Table 3-23.

Gulf Sturgeon, Giant Manta Ray, and Sea Turtles in Marine Environment

The gulf sturgeon, giant manta ray, and identified sea turtle species may be affected by noise generated during breakwater construction; however, any effects on these species would be insignificant. During installation of the proposed NBS breakwaters under Alternative 1, noise would be generated primarily from operation of the long-reach excavator, barges, and tugboats and from the rocks as they are being placed within the breakwater footprints. No appreciable noise would be generated by the installation of bamboo stakes for the seagrass enhancement project. Installation of the proposed breakwaters under Alternative 1 would not involve pile driving, and the use of an excavator on a barge to place rocks within the breakwater footprints would not generate excessive underwater noise levels. Installation of the concrete disk breakwaters under Alternative 2 for the living shoreline and oyster reef breakwater sites would involve pile driving to install the pilings of the disk breakwaters into the seafloor and, therefore, would generate higher underwater noise levels than the installation of the Alternative 1 breakwaters at the same sites. The fiberglass pilings of the disk breakwaters would be small relative to most construction pilings and, therefore, would generate relatively low noise levels compared to typical construction projects that involve pile driving. Pile driving under Alternative 2 would be conducted only at the two East Bay sites. The installation of a geotube breakwater at the shoreline stabilization site under Alternative 2 would generate comparable and likely less noise levels than the installation of a quarry stone breakwater under Alternative 1. Underwater noise generated by the barges and tugboats under both alternatives would not be excessive and would be at levels typical for such vessels. The potential for injurious noise effects conceivably exists close to the underwater construction; however, injurious effects are extremely unlikely based on the mobility of the identified ESA-listed species, which allows them to move away from any noise disturbance, and the requirement to stop work if a protected species is observed within 150 feet of the operation according to NOAA Fisheries' *Protected Species Construction Conditions* (2021a). For these reasons, potential noise impacts on the identified species would be limited to temporary behavioral disturbance under both alternatives. The overall likelihood for behavioral disturbance to any of the species is relatively low, and any behavioral disturbance experienced would have an insignificant impact on the species.

The gulf sturgeon, giant manta ray, and identified sea turtle species may be affected by turbidity generated during breakwater construction; however, any effects on these species would be insignificant. These species would be able to swim away from generated turbidity if encountered, and only such avoidance behavioral effects are expected. Based on the predominance of sand sediments in the project areas and the type of construction methods that would be used, construction of the breakwaters under Alternatives 1 or 2 is not expected to generate excessive amounts of turbidity. Turbidity curtains would be used and the regulatory limit of 29 NTUs above background would be met within the 150-meter mixing zone downstream of the construction work area. Turbidity curtains would be installed to encompass the construction area where rock is being installed by the long-reach excavator, as discussed earlier. The turbidity curtains and the manner in which they are used would comply with the requirements specified in NOAA Fisheries' *Protected Species Construction Conditions* (2021a) to prevent entanglement and entrapment of protected species.

Installation of the proposed NBS breakwaters would displace benthic habitat potentially used for foraging by the gulf sturgeon, loggerhead sea turtle, and Kemp's ridley sea turtle. The estimated footprints of the NBS projects on the seafloor under Alternatives 1 and 2 are presented in Table 3-18. The living shoreline, oyster reef, and shoreline stabilization breakwaters under Alternative 1 would displace approximately 0.81 acre, 1.35 acres, and 2.17 acres of benthic habitat, respectively. The concrete disk breakwaters under Alternative 2 would displace less benthic habitat at the living shoreline and oyster reef breakwater sites. The NBS project areas are outside critical habitat for the gulf sturgeon. The habitat within each breakwater footprint consists of sandy bottom that is devoid of SAV. The habitat in each footprint has the potential to contain prey items for the gulf sturgeon, such as crustaceans, mollusks, and marine worms, and for the loggerhead and Kemp's ridley sea turtles, such as crabs, clams, sponges, and sea stars. The benthic habitat that would be displaced is ubiquitous in the area and, therefore, would represent a negligible loss of foraging habitat and an insignificant impact on these ESA-listed species. The breakwaters themselves would provide a considerable amount of structural habitat that would support many of the same prey items supported by the habitat that would be displaced. The quarry stone breakwaters under Alternative 1 would provide considerably more structural habitat than the Alternative 2 breakwaters in terms of total footprint and structural habitat surface area.

The installation of bamboo stakes along the seaward edge of the existing seagrass meadow for the seagrass enhancement project would restrict grazing of the meadow edge by green sea turtles. The bamboo stockade would be 1 square meter wide and 400 meters long and would restrict less than 1 percent of the existing meadow in the area being grazed. Preventing seagrass grazing on the eroding edge of the meadow using the proposed technique is expected to allow the seagrass edge to grow and better resist sediment burial, with the goal of reducing further seagrass loss and promoting new seagrass growth, thereby improving the foraging habitat for green sea turtles in the area over time.

The presence of barges and turbidity curtains, operating construction equipment, and the associated construction noise under Alternatives 1 or 2 may prevent or deter the identified ESA-listed species from accessing the project area. Any associated effects to these species would be temporary and insignificant. Potential exclusion or deterrence from the project area would be temporary, lasting only during the in-water construction period for each breakwater, which is estimated to be 3 months each for the living shoreline and oyster reef breakwaters in East Bay and approximately 6 months for the shoreline stabilization breakwater in St. Andrew Sound. The area encompassed by the turbidity curtains would be approximately 0.5 to 1 acre, and underwater construction noise would not be excessive; therefore, the size of the areas from which the listed species would be excluded or deterred would be small compared with the total amount of the same habitat that is available to the species around Tyndall AFB.

It is extremely unlikely that the gulf sturgeon, giant manta ray, or identified sea turtle species would be physically injured by the installation of the proposed NBS breakwaters under Alternative 1 or 2 based on the ability of these species to swim away from the construction area if disturbed and the requirement to stop all moving equipment if a protected species is sighted within 150 feet of the operation. Construction workers would be trained on how to identify the ESA-listed species and all the protection measures to be followed, including NOAA Fisheries' *Protected Species Construction Conditions* (2021a) and *Vessel Strike Avoidance Measures* (2021b). Construction work would be conducted during daylight hours with few exceptions, which would allow workers to better see protected species that may occur in the area. If a listed species is sighted within 150 feet of the operation, activities would not resume until the species has departed the project area of its own volition. Nighttime construction would be conducted only if necessary and would be prohibited at Buck Beach during sea turtle nesting season in accordance with the conservation measures proposed for nesting sea turtles the DAF's ESA Section 7 consultation with USFWS.

All the requirements pertaining to in-water lines and turbidity curtains in NOAA Fisheries' *Protected Species Construction Conditions* (2021a) would be strictly followed to prevent entanglement and entrapment of sea turtles. The conditions require turbidity curtains to be made of material that cannot entangle protected species and to be regularly monitored to avoid protected species entrapment. In-water lines (rope, chain, and cable) must be stiff, taut, and non-looping. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, must be enclosed in a plastic or rubber sleeve or tube to add

rigidity and prevent the line from looping and tangling. In all instances, no excess line is allowed in the water. In-water lines and equipment must be placed in a manner that does not entrap species within the project area or block access for them to navigate around the project area.

Effect Determinations for ESA-listed Species Regulated by NMFS

Based on the presented analysis of potential effects, the DAF has determined that the four proposed NBS projects under Alternative 1 are not likely to adversely affect the gulf sturgeon, giant manta ray, or identified sea turtle species in the marine environment or any other listed species or critical habitat under NMFS's jurisdiction. The DAF has requested concurrence from NMFS PRD on this determination. The BA prepared for the ESA-listed species regulated by NMFS for the four NBS projects was submitted to NMFS PRD for review on July 15, 2024 (Appendix A). The DAF has determined that the four proposed NBS projects under Alternative 2 also would not adversely affect any ESA-listed species regulated by NMFS. The DAF would request separate concurrence from NMFS PRD on this determination if Alternative 2 is proposed to be implemented.

NMFS PRD comments received will be discussed here.

Nesting Sea Turtles

The proposed living shoreline breakwater and oyster reef breakwater are located in East Bay; the shorelines adjacent to these project sites are not used by sea turtles for nesting. The shoreline stabilization breakwater and seagrass enhancement projects are located within St. Andrew Sound offshore of Buck Beach. Buck Beach is occasionally used by loggerheads for nesting, and CIW and CIE, which are the barrier islands that form the mouth of St. Andrew Sound, are used for nesting by all four identified sea turtle species, although Kemp's ridley and leatherback nesting is rare at Tyndall AFB. Construction of the shoreline stabilization breakwater, and the other two breakwaters, would be conducted entirely from a barge under Alternatives 1 or 2. No construction activity, including staging areas or support operations, would be conducted on land. Therefore, construction of this breakwater would have no potential to physically impact nesting sea turtles or sea turtle nests under either alternative. The shoreline stabilization breakwater would be approximately 216 to 816 feet from the shoreline (Buck Beach) depending on the breakwater segment. At its nearest point, the breakwater would be approximately 1,915 feet from CIW and 1,239 feet from CIE. To minimize the potential for construction-related disturbance to nesting sea turtles during construction of this breakwater, nighttime construction between 7:00 p.m. and dawn would be prohibited between May 1 to October 31 for this breakwater under either alternative. Nighttime construction would be conducted only if necessary on a limited basis or not at all during the remainder of the year. Construction barges may be staged in St. Andrew Sound overnight. To prevent lighting impacts on sea turtle hatchlings, all operating exterior lights on barges and other vessels staged overnight in St. Andrew Sound would comply with the lighting criteria in *FWC Sea Turtle Lighting Guidelines* (FWC 2018). With the implementation of these conservation measures, any impact to nesting sea turtles from the construction of the shoreline stabilization project under either Alternatives 1 or 2 would be insignificant. The seagrass enhancement project would have no effect on nesting sea turtles. The project would not involve construction, and the bamboo stakes would be installed along the seaward edge of the seagrass meadow by hand and only during daytime hours.

Piping Plover and Rufa Red Knot

The proposed living shoreline breakwater and oyster reef breakwater are located in East Bay; the shorelines adjacent to these project sites are not known to be used by wintering piping plovers or rufa red knots. The proposed shoreline stabilization breakwater would be constructed within St. Andrew Sound. At its nearest point, the breakwater would be approximately 1,915 feet from CIW and 1,239 feet from CIE, where piping plovers and rufa red knots are known to winter. As discussed, all construction would be conducted on a barge, and no activity, including staging areas or support operations, would be conducted on land under Alternatives 1 or 2. Therefore, construction of this breakwater would have no potential to physically impact wintering piping plovers or rufa red knots that may occur on CIW or CIE during the construction period. Based on the noise levels estimated for breakwater construction at this site under Alternatives 1 and 2 (Section 3.6) and the noise dissipation expected to occur over the distance between

the barge at it nearest point to CIW (1,915 feet) and CIE (1,239 feet), maximum construction noise levels on these barrier islands would be approximately 55 to 58 decibels (dB) during construction of the breakwater under either alternative. Actual and perceived noise levels on these barrier islands would be lower with the dampening effects of onshore winds and waves on the islands. Any noise disturbance from the construction of the Alternative 1or 2 breakwaters to wintering piping plovers and rufa red knots would be insignificant. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on these wintering birds.

Choctawhatchee Beach Mouse and St. Andrew Beach Mouse

As discussed, no construction activity, including staging areas or support operations, would be conducted on land; therefore, construction of the shoreline stabilization breakwater in St. Andrew Sound would have no potential to physically impact beach mice or their habitat that occur on CIW or CIE. As discussed for the piping plover and rufa red knot, construction of the shoreline stabilization breakwater would generate noise that could be audible on CIW and CIE. Based on the expected noise levels on these barrier islands, any noise disturbance from the construction of the breakwater under Alternatives 1 or 2 to beach mice would be insignificant. Moreover, there would be low potential for noise disturbance at night when the beach mice are active. Nighttime construction would be prohibited during sea turtle nesting season and would be conducted only if necessary on a limited basis or not at all during the remainder of the year. Therefore, there would be little to no nighttime construction, which would have greater potential to disturb these beach mice species because they are active primarily during nighttime. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on both beach mice species.

Florida Manatee

The potential for adverse noise impacts or physical injury to the Florida manatee from construction equipment is extremely unlikely. Based on the analysis conducted for the ESA-listed species regulated by NMFS, any associated construction noise impacts to the manatee under Alternatives 1 or 2 would be insignificant. It is extremely unlikely that a manatee would be physically injured by the installation of the proposed NBS breakwaters based on its ability to swim away from the construction area if disturbed and the requirement to stop all in-water operations if a manatee is sighted within 50 feet of the operation according to *Standard Manatee Conditions for In-water Work* (USFWS 2011). If a manatee is sighted within 50 feet of the operation, activities would not resume until the manatee has departed the project area of its own volition. All the other protection measures for manatees specified in USFWS's *Standard Manatee Conditions for In-water Work* would be followed, including those pertaining to vessel speeds and drafts, turbidity curtains, and posting of manatee signage during construction. The footprints of all three NBS breakwaters consist of sandy bottom that is devoid of SAV; therefore, construction of the breakwaters would not result in the loss of any manatee foraging habitat. All three breakwaters and the seagrass enhancement project would have beneficial impacts on seagrass habitat, which would benefit the manatee. For these reasons, and with the implementation of the identified conservation measures, any effects on the Florida manatee from the four proposed NBS projects would be insignificant.

Other Species

Other ESA-listed species under USFWS jurisdiction having potential to occur in the vicinity of the project areas of the NBS projects include the eastern black rail, tricolored bat, and eastern indigo snake. Given that there would be no construction activity on land, construction of the proposed NBS breakwaters would not physically impact any of these species or their habitat. Based on the expected construction noise levels and the mobility of these species, no associated noise impacts are expected on these species under either Alternative 1 or 2.

Effect Determinations for ESA-listed Species Regulated by USFWS

Based on the presented analysis of potential effects, the DAF has determined that the four proposed NBS projects under Alternative 1 may affect but are not likely to adversely affect the loggerhead, green,

Kemp's ridley, and leatherback sea turtles when nesting, and the piping plover, rufa red knot, Choctawhatchee beach mouse, St. Andrew beach mouse, and Florida manatee. The DAF has determined that the projects would not result in destruction or adverse modification of critical habitat designated for any species under USFWS jurisdiction. The DAF has requested concurrence from USFWS on this determination. The BA for the ESA-listed species regulated by USFWS for the four NBS projects was submitted to USFWS for review on July 15, 2024 (Appendix A). The DAF has determined that the four NBS projects under Alternative 1 would have no effect on the eastern black rail, tricolored bat, eastern indigo snake, and any other federally listed species. The DAF has determined that the four NBS projects under Alternative 2 also would not adversely affect any ESA-listed species regulated by USFWS. The DAF would request separate concurrence from USFWS on this determination if Alternative 2 is proposed to be implemented.

USFWS comments received will be discussed here.

3.5.2.2.4 Conclusion

The DAF has determined that the four proposed NBS pilot projects under Alternatives 1 or 2 would not adversely affect EFH, ESA-listed species regulated by NMFS, or ESA-listed species regulated by USFWS. Based on the type, quantity, and quality of the vegetation and habitat that would be impacted, and the determination that potential impacts to EFH and ESA-listed species would not be adverse, implementation of the four NBS pilot projects under either Alternative 1 or 2 would have a less-than-significant impact on biological resources.

3.5.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on biological resources resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.6 Noise

Noise can be simply defined as unwanted sound. Sound levels are measured on a logarithmic scale in decibels (dB). Sound measurement may be further refined through the use of frequency weighting, which accounts for the sensitivity of receptors such as humans to hearing certain frequencies. A-weighted measurements emphasize the frequency range to which human hearing is most sensitive and are expressed in terms of A-weighted decibels (dBA). The standard metric used to measure cumulative noise impacts on humans is the Day-Night Average Sound Level (DNL), which is the noise level averaged over a 24-hour day-night annual period.

3.6.1 Affected Environment

The primary sources of ambient noise at Tyndall AFB include military aircraft operations, vehicular traffic, grounds maintenance activities, and construction. Intermittent noise from military aircraft operations including takeoffs and landings at the airfield and aircraft operations in the various airspaces over and near Tyndall AFB is the greatest contributor to the overall noise environment at the base. Traffic and grounds maintenance activities at Tyndall AFB together represent negligible sources of low-level, intermittent noise at the base. Construction noise is also intermittent and varies in location. According to the Tyndall AFB Air Installations Compatibility Use Zones (AICUZ) Study (DAF 2016), the 65-dB DNL noise contour associated with the Tyndall AFB airfield encompasses much of the base. The dB DNL noise levels estimated in the AICUZ Study for the locations of the proposed CRIP levees/floodwalls and NBS pilot projects are presented in Table 3-24.

Table 3-24. AICUZ Noise Levels at Locations of CRIP Levees/Floodwalls and NBS Pilot Projects

Location	Noise Level (dB DNL)
CRIP Levees and Floodwalls	
Wastewater Treatment Plant	70 to 75
West Housing Area	65 to 70
East Housing Area	Less than 65
7000 Area	65 to 75
Fuel Depot Area	75 to 80
Silver Flag Area	Less than 65
NBS Pilot Projects	
Living Shoreline Breakwater	70 to 75
Oyster Reef Breakwater	65 to 70
Shoreline Stabilization Breakwater/Seagrass Enhancement	65 to 70

Source: DAF 2016

3.6.2 Environmental Consequences

The threshold level for a significant noise impact from the Proposed Action is defined in this EA as a permanent increase in noise or prolonged periods of nighttime noise in noise-sensitive areas (NSAs). Implementation of the Tyndall AFB CRIP would not change the type or level of operations conducted in the areas where the CRIP strategies would be implemented and, therefore, would not affect existing operational noise levels or add new operational noise to the areas. Following construction, operation of the levees under Alternative 1 or floodwalls under Alternative 2 would generate relatively low noise levels that would have no appreciable effect on the noise environment. Likewise, the nonstructural CRIP solutions and the proposed NBS breakwater structures would not generate any appreciable noise after they are constructed. For these reasons, only construction noise has the potential to have any appreciable noise-related effects under the Proposed Action.

Construction associated with implementation of the CRIP and associated NBS pilot projects would temporarily increase ambient noise levels in and around the construction area. The increased noise levels would be intermittent and limited to daytime working hours with few exceptions and the overall construction period. Table 3-25 identifies typical noise levels from representative construction equipment presented in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) and *FHWA Highway Construction Noise Handbook* (FHWA 2006). As indicated, typical noise levels generated from the identified construction equipment range from 76 dBA to 101 dBA, approximately 50 feet from the equipment source.

Table 3-25. Typical Noise Levels from Representative Construction Equipment

Construction Equipment	Typical Noise Level 50 Feet from Source (dBA)
Backhoe	80
Compactor	82
Dozer	85
Generator	82
Grader	85
Jackhammer	88
Loader	80
Paver	85
Pile driver (impact)	101
Roller	85
Saw	76
Truck	84

Sources: FTA 2018; FHWA 2006

When distance is the only factor considered (free-field conditions), noise levels are estimated to decrease by approximately 6 dBA with every doubling of distance from a noise source; the presence of obstructions such as vegetation and structures can further decrease noise levels with increasing distance (FHWA 2006).

3.6.2.1 CRIP Implementation

Table 3-26 identifies the nearest NSAs to the proposed CRIP levees/floodwalls, and the estimated outdoor noise levels at the NSAs during the construction period. It is assumed that the construction of levees and construction of floodwalls would generate comparable noise levels; therefore, they are not differentiated for the noise analysis. For the CRIP levees and floodwalls, the noise levels were estimated based on the range in noise levels of the equipment identified in Table 3-25 and the dissipation of those noise levels with distance under free-field conditions.

Table 3-26. Estimated Construction Noise Levels at Nearest Off-base Noise-sensitive Areas for CRIP Implementation

Levee/Floodwall Location	NSA Type	Distance from Source (miles)	Direction from Source	Estimated Outdoor Noise Levels at NSA
Wastewater Treatment Plant	Residential	1.2	North	34 to 59
West Housing Area	Residential	1.6	North	32 to 57
East Housing Area	Residential	2.1	North	30 to 55
7000 Area	Residential	3.3	East	25 to 50
Fuel Depot Area	Residential	1.2	Northwest	34 to 59
Silver Flag Area	Residential	0.8	Northeast	38 to 63

Based on the noise dissipation estimated to occur over the associated distance, outdoor noise levels in the nearest NSAs to the locations of the proposed CRIP levees and floodwalls during the construction period are estimated to range from 25 to 63 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by normal conversation at the high end. Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. The west and east housing areas are on-base NSAs. During the construction of a levee or floodwall for these NSAs, outdoor noise levels could be greater than 90 dBA depending on the construction equipment being operated and the distance of the house from the noise source. Indoor noise levels would be 20 to 30 dBA lower than the outdoor noise levels. Noise that is audible at the nearest NSAs would be heard only during daytime and only over the duration of the construction period. Based on the estimated construction noise levels, implementation of the CRIP under either Alternative 1 or 2 would have a less-than-significant noise impact.

3.6.2.2 NBS Pilot Projects

Table 3-27 identifies the nearest NSAs to the proposed NBS pilot projects, and the estimated outdoor noise levels at the NSAs during the construction period under Alternatives 1 and 2. The primary construction equipment that would be used to construct the three NBS pilot project breakwaters under Alternative 1 would be a long-reach excavator operated on a barge. The noise level identified in Table 3-25 for a dozer (85 dBA) was used to represent the noise level of a long-reach excavator to estimate the construction noise for the Alternative 1 breakwaters. Installation of the concrete disk breakwaters under Alternative 2 for the living shoreline and oyster reef breakwater sites would involve pile driving to install the pilings of the disk breakwaters into the seafloor. The noise level identified in Table 3-27 for a pile driver (101 dBA) was used to represent the construction noise level for the living shoreline and oyster breakwaters under Alternative 2. The installation of a geotube breakwater at the shoreline stabilization site under Alternative 1 is assumed to generate the same noise levels as the installation of a quarry stone breakwater under Alternative 1.

Table 3-27. Estimated Construction Noise Levels at Nearest Off-base Noise-sensitive Areas for NBS Breakwaters under Alternatives 1 and 2

NBS Breakwater	NSA Type	Distance from Source (miles)	Direction from Source	Estimated Outdoor Noise Levels at NSA Under Alternative 1	Estimated Outdoor Noise Levels at NSA Under Alternative 2
Living Shoreline Breakwater	Residential	0.8	Northwest	47	63
Oyster Reef Breakwater	Residential	2.0	East	40	55
Shoreline Stabilization Breakwater	Residential	3.2	Northeast	35	35

Under Alternative 1, outdoor noise levels in the NSAs nearest to the NBS breakwaters during the construction period are estimated to range from 35 to 47 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by a refrigerator at the high end (Harris 1998). Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. Under Alternative 2, outdoor noise levels in the NSAs during the construction period are estimated to range from 35 to 63 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by normal conversation or a sewing machine at the high end (Harris 1998). Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise

levels. Noise that is audible at the nearest NSAs under either alternative would be heard only during daytime and only over the duration of the construction period. Based on the estimated construction noise levels, implementation of the NBS projects under either Alternative 1 or 2 would have a less-than-significant noise impact.

3.6.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no noise-related effects resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.7 Infrastructure

3.7.1 Affected Environment

Infrastructure in this EA refers primarily to utilities and roadways. Gulf Coast Electric Cooperative owns and maintains the electrical infrastructure on Tyndall AFB and supplies electricity to the base via two lines to an electrical substation in the western portion of the base. Tyndall AFB purchases natural gas from TECO Peoples Gas and has approximately 14 miles of natural gas lines. Tyndall AFB obtains potable water from Bay County, which sources its water supply from the Deer Point Reservoir 14 miles north of the base. The base potable water system includes storage tanks and distribution lines and a limited number of potable groundwater wells in certain areas.

The wastewater system at Tyndall AFB consists of sanitary sewer lines, lift stations, septic systems, and the Bay County WWTP, which is proposed by the CRIP to be protected by a levee. The stormwater system at Tyndall AFB consists primarily of aboveground drainage ditches, underground stormwater piping, and stormwater detention ponds in limited areas.

The Tyndall AFB peninsula is bisected by U.S. Highway 98, which serves as the primary artery for access to and from the base. Most of the base traffic flows through the Airey (Main), Tyndall, and Sabre Gates and commercial vehicle traffic is processed through the Cleveland Gate. The road network at Tyndall AFB consists of paved roads that provide access to the primary infrastructure and operational areas and dirt and semi-improved roads that are used for forestry operations and access to undeveloped portions with the base.

All of the sites where levees/floodwalls are proposed contain electrical power, natural gas, potable water, sanitary sewer, and stormwater utility systems, and they all have paved roads and parking areas. There are no utilities or roadways in the offshore locations of the proposed NBS pilot projects.

3.7.2 Environmental Consequences

The threshold level for a significant impact on infrastructure from the Proposed Action is defined in this EA as including any of the following: an exceedance of the existing utility service capacity; a permanent increase in traffic volume in a given area; or an increase in road hazards.

3.7.2.1 CRIP Implementation

Operation and maintenance of constructed levees or floodwalls may involve a small number of permanent employee hires, some of which may include permanent relocations to the area. The small increase in personnel would have no appreciable effect on utility demand at Tyndall AFB in terms of electricity and water consumption and wastewater generation.

Connections would be made to existing electrical utilities to provide power for the lighting systems and other components of any levees or floodwalls that are constructed at Tyndall AFB. Connections to existing electrical lines at the sites would have no adverse impacts. Gravity drainage structures and stormwater pump stations would be required for both levees and floodwalls to remove accumulated rainfall from the protected area (discussed further in Section 3.2).

Certain levees under Alternative 1 and floodwalls under Alternative 2 would require one or more access gates for ingress and egress. These road gates would remain open during normal conditions and closed during flood events. They would be roller gates or swing-type road closure gates integrated with T-walls. Road gates are included in the conceptual designs for the levees/floodwalls for the WWTP, fuel depot area, and 7000 area. Elevated roads are recommended to provide ingress and egress for the levees/floodwalls for the housing areas and Silver Flag area. The construction of road gates, elevated roads, and other portions of the levees/floodwalls would require modifications to certain existing roads at the sites. Such modifications would not adversely affect the overall road infrastructure at the sites and would have no effect on the road network outside the sites.

Given that CRIP implementation would not appreciably change the number of persons working at Tyndall AFB, it would have no appreciable effect on overall commuter traffic in the local area. Construction work may temporarily increase traffic at and near Tyndall AFB. Based on the number of construction vehicles needed, construction-related traffic may at times be heavy on the defined haul routes in and out of the base The overall associated impact on commuter traffic at and near the Tyndall AFB would be intermittent, localized (limited to defined haul routes), and temporary (limited to the construction period).

In conclusion, implementation of the Tyndall AFB CRIP under either Alternative 1 or 2 would have a less-than-significant impact on infrastructure. Implementation of the structural and nonstructural flood defense strategies in the CRIP would have beneficial effects on critical infrastructure at Tyndall AFB.

3.7.2.2 NBS Pilot Projects

None of the NBS projects have the potential to affect utilities, roadways, or other infrastructure on or off Tyndall AFB. Therefore, implementation of the NBS projects under either Alternative 1 or 2 would have no effect on infrastructure.

3.7.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on infrastructure resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.8 Land Use

Land use describes how land is developed and managed for different uses. Land use planning refers to the planned development of property typically with the goal of achieving compatibility among uses within and adjacent to the property. Real property “includes structures, buildings, or other infrastructure of a military installation, roadways and defense access roads, and any other area on the grounds of a military installation” (10 USC Section 2661(c)(2)(B)).

3.8.1 Affected Environment

Land use at Tyndall AFB was affected extensively by Hurricane Michael, which made landfall on October 10, 2018, and caused catastrophic damage to the infrastructure and natural resources of the base. Following initial damage assessments by multiple task forces, a Program Management Office was established in November 2018 to support long-term redevelopment of Tyndall AFB as the model Air Force Installation of the Future. The ongoing rebuilding of Tyndall AFB along with changes to the military mission associated with the addition of three squadrons of F-35 aircraft is resulting in associated land use changes.

Tyndall AFB is divided into the following seven districts for planning purposes: Sabre, Support, Flightline, North, Drone, Crooked Island, and Silver Flag. The predicted flood exposure of these districts over time, in terms of facility and operational impacts, is shown on Figure 2-1. Existing land uses at Tyndall AFB are described in the Tyndall AFB Installation Development Plan (DAF 2015). Based on the Installation Development Plan, approximately 66 percent of the land area of Tyndall AFB is classified as *Open Space;* this land use category is undeveloped land, which at Tyndall AFB consists primarily of forested habitats.

Table 3-28 identifies the land use classifications of the areas where levels and floodwalls are proposed. All of the proposed NBS pilot projects would be located in waters offshore of Tyndall AFB that do not have a land use classification. The offshore locations of the four NBS pilot projects are used by the public for recreational boating and fishing. Portions of the shorelines adjacent to the project areas are open to the public for hunting and recreation with restrictions. Buck Beach is available outside certain mission hours for recreational beach activities.

Table 3-28. Land Use Classifications of Locations of Proposed CRIP Levees and Floodwalls

Location	Base District	Land Use Classification
Wastewater Treatment Plant	Sabre	Industrial
West Housing Area	Sabre	Housing
East Housing Area	Sabre	Housing
7000 Area	North	Industrial
Fuel Depot Area	Flightline	Industrial
Silver Flag Area	Sliver Flag	Training

3.8.2 Environmental Consequences

The threshold level for a significant impact on land use from the Proposed Action is defined in this EA as a disruption or displacement of an existing or planned land use without providing a suitable means to replace or relocate the affected land use.

3.8.2.1 CRIP Implementation

Implementing the flood defense strategies under the Tyndall AFB CRIP, including constructing the levees under Alternative 1 or floodwalls under Alternative 2 and implementing the nonstructural solutions under both alternatives is expected to have no adverse effects on existing or future land uses. Implementing the structural and nonstructural CRIP strategies is not expected to change the current land use classification of any area on the base or adversely affect any existing base operations. Implementation of the CRIP would have beneficial effects on existing and future base operations and the overall mission of Tyndall AFB by improving the coastal resilience of areas that contain critical base infrastructure. For these reasons, implementation of the Tyndall AFB CRIP under either Alternative 1 or 2 would have a less-than-significant impact on land use.

3.8.2.2 NBS Pilot Projects

The four proposed NBS pilot projects would be implemented offshore of Tyndall AFB over state-owned submerged land. The projects would obtain authorization from DEP to use sovereign submerged lands through the ERP permit process (Section 3.2). The offshore locations of the projects are used by the public for recreational boating and fishing. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary lasting only during the in-water construction period for each breakwater, which is estimated to be 3 months each for the living shoreline and oyster reef breakwaters in East Bay and approximately 6 months for the shoreline stabilization breakwater in St. Andrew Sound. Based on the size of the construction area and duration of the construction period, any associated impacts on public use of the offshore locations would not be significant.

The proposed NBS breakwaters have been designed to reduce the rate of coastal erosion in the project areas over time and are not expected to adversely affect any existing or future operations at Tyndall AFB. The selection standards used for developing the alternatives for the NBS projects included the requirements for the breakwater to protect critical base assets, not impact Tyndall AFB's mission, and not

increase the BASH risk at the base (Section 2.2). All three NBS breakwaters have been designed to be submerged to not increase the BASH risk at the base, which is a critical safety and operational consideration for Tyndall AFB's mission. The proposed NBS breakwaters would have beneficial effects on existing and future base operations and land use by improving the coastal resilience of areas that contain critical assets. For these reasons, implementation of the NBS projects under either Alternative 1 or 2 would have a less-than-significant impact on land use.

3.8.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on land use resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.9 Public Health and Safety

3.9.1 Affected Environment

The 325 Fighter Wing Safety Office has primary responsibility for the safe conduct of military operations at Tyndall AFB; it includes Flight Safety, Weapons Safety, and Occupational Safety. Flight Safety ensures safe flying operations for assigned and transient aircraft; Weapons Safety is responsible for safety associated with the use, storage, and transportation of explosive materials; and Occupational Safety is responsible for the safety of the Base population, including military personnel, civilian employees, and dependents.

Measures taken to minimize the risk to public safety at Tyndall AFB include enforcing restrictions on public access, either permanently or temporarily, to portions of the base that pose safety risks. The extent of such restrictions is based on careful evaluation of all potential safety risk factors, which include but are not limited to, noise levels, blast effects, munition projectile impacts, and potential presence of unexploded ordnance. In addition to the general public, access restrictions could also apply to military personnel, Tyndall AFB employees, or contractors who are not authorized to access the restricted areas.

Due to the safety risks posed by military operations, portions of Tyndall AFB are closed to the public at times. Gates, warning signs, identification requirements, and other public-access controls are used to prevent entry of unauthorized persons into these areas. Any portion of Tyndall AFB may be restricted to the public at any time, if the area is determined to pose a potential risk to public safety. Some military missions require temporary closures of areas normally open to the public; the extent of such temporary closures is dependent on the considered safety risks. The 325 Fighter Wing Safety Office has the primary responsibility of determining the limits and duration of such temporary closures.

Flight safety involves the potential for aircraft mishaps, which include collisions with other aircraft, objects, or wildlife, and mishaps caused by weather, equipment malfunction, pilot error, or other factors. BASH refers to the hazard associated with incidents of birds and other types of wildlife striking aircraft. The 325th Fighter Wing/Flight Safety, commonly known as Tyndall Flight Safety, has primary responsibility for implementing the Tyndall AFB BASH program. The U.S. Department of Agriculture's Wildlife Services support the Tyndall AFB BASH program with an on-base biologist who conducts wildlife surveys, maintains databases of wildlife activities and aircraft strikes, implements active and passive wildlife-control measures, and trains airfield management personnel on proper BASH response.

Access into Tyndall AFB is controlled through security gates. The WWTP, fuel depot, and 7000 area have their own security gates and procedures for access. There is no security control or restrictions on public access to the offshore locations of the NBS pilot projects.

3.9.2 Environmental Consequences

The threshold level for a significant impact on public health and safety from the Proposed Action is defined in this EA as exposing workers to health and safety hazards without proper protection or creating health and safety hazards that could adversely affect the public or Tyndall AFB personnel.

3.9.2.1 CRIP Implementation

Occupational health and safety hazards associated with the construction of levees under Alternative 1, construction of floodwalls under Alternative 2, and the implementation of certain nonstructural solutions under both alternatives would include loud noise, heavy machinery, debris, electricity, and hazardous materials used or encountered during work. To minimize such risks, workers would wear and use appropriate personal protective equipment and comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds Occupational Safety and Health Administration (OSHA) standards. A health and safety plan would be developed and implemented by the construction contractor for each project. All construction and other ground-disturbing activity proposed at Tyndall AFB must be issued a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation.

The CRIP flood defense strategies would be confined within the boundaries of Tyndall AFB and, therefore, would not affect public health and safety outside the base. For each project, work areas would be clearly marked with appropriate signage and secured against unauthorized entry. Standard construction traffic control measures would be implemented as appropriate. Provided that these established safety measures are followed, there would be low overall potential for associated safety impacts to construction workers and no appreciable potential for safety impacts to Tyndall AFB personnel or the general public. Implementation of the CRIP would improve coastal resilience and reduce the potential for flooding impacts at Tyndall AFB and, therefore, would have beneficial impacts on safety at the base. For these reasons, CRIP implementation under either Alternative 1 or 2 would have a less-than-significant impact on public health and safety.

3.9.2.2 NBS Pilot Projects

Construction of the proposed NBS breakwaters would comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds OSHA standards. A health and safety plan would be developed and implemented by the construction contractor for each breakwater project. Each project would be required to obtain a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation.

The offshore locations of the NBS projects are open to the public. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary, lasting only during the in-water construction period for each breakwater. All vessels associated with the construction would operate at idle speed/no wake at all times while in the construction area. Permanent in-water signage would be installed around each breakwater that alerts the public to the presence of the structure. The signage would require a Private Aids to Navigation permit from the U.S. Coast Guard. The NBS breakwaters under Alternatives 1 and 2 have been designed to be submerged to not attract birds and increase the BASH risk at the base. This was an important safety consideration that was coordinated closely with members of the Tyndall AFB BASH program. For these reasons, implementation of the NBS projects under either Alternative 1 or 2 would have a less-than-significant impact on public health and safety.

3.9.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on public health and safety resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.10 Hazardous Materials and Wastes

Hazardous waste is any solid, liquid, or contained gas waste that is dangerous or potentially harmful to human health or the environment. Characteristic hazardous wastes exhibit one or more of the following traits: ignitability, reactivity, corrosivity, or toxicity. A toxic substance is a substance that when ingested or absorbed is harmful or fatal to living organisms. EPA regulates toxic substances such as asbestos, lead-based paint (LBP), polychlorinated biphenyls, radon, and certain perfluoroalkyl and polyfluoroalkyl

substances (PFAS). Certain PFAS are toxic and also pose environmental concerns because they do not break down via natural processes and are considered persistent organic pollutants, or forever chemicals.

DoD's Environmental Restoration Program consists of the Installation Restoration Program (IRP), which has been developed to respond to releases of hazardous substances, pollutants, and contaminants, and the Military Munitions Response Program, which has been developed to address sites that contain unexploded ordnance, discarded military munitions, or munitions constituents.

3.10.1 Affected Environment

The Tyndall AFB Hazardous Waste Management Plan provides guidance on the proper handling and disposal of hazardous waste, including spill contingency and response requirements, on Tyndall AFB property. Procedures and responsibilities for responding to a hazardous waste spill or other incident are also addressed in the Tyndall AFB Spill Prevention, Control, and Countermeasure Plan. The 325th Civil Engineer Squadron, Environmental Element, Compliance (325 CES/CEIEC) has primary responsibility for the management of hazardous waste at Tyndall AFB. Nonhazardous solid waste generated at Tyndall AFB is managed in compliance with the Tyndall AFB Integrated Solid Waste Management Plan. Nonhazardous solid waste is properly collected, handled, managed, transported, and disposed of off-base by a contractor.

Tyndall AFB is classified as a Large Quantity Generator of hazardous waste. Wastes on Tyndall AFB property are controlled and managed from the point of generation to the point of ultimate disposal. Hazardous wastes are temporarily stored at designated initial accumulation points at work locations. Once the storage limit is reached, the wastes are transferred to the 90-Day Hazardous Waste Accumulation Site (Building 6011). Within 90 days, the wastes are transported off-base and disposed of in accordance with applicable regulations. Initial accumulation points for waste collection are located in all the sites proposed for levees except the west and east housing areas.

Tyndall AFB has plans that provide guidance on managing asbestos-containing materials (ACM) and LBP at the base in accordance with all applicable regulations. Tyndall AFB is located in an area that has low radon levels; indoor radon accumulation has been determined to not be a concern at the base.

There are active IRP sites within or adjacent to the footprints of the levees/floodwalls for the fuel depot area and Silver Flag area (Figures 2-15, 2-20, 2-34, and 2-35). In addition to the IRP site shown for the fuel depot, there is another active IRP site adjacent to the fuel depot that also includes portions of Fred Bayou. The 325 CES/CEIEC manages the investigation and remediation of these sites and maintains all associated documentation. There are no active IRP sites within or adjacent to the footprints of the levees/floodwalls for the WWTP, housing areas, or 7000 area. There are no IRP sites that include the offshore locations of the NBS pilot projects and there is no evidence of past contamination in these offshore locations.

3.10.2 Environmental Consequences

The threshold level for a significant impact on hazardous materials and wastes from the Proposed Action is defined in this EA as an unmitigated release of hazardous materials or wastes into the environment or a violation of local, state, or federal regulations pertaining to hazardous materials or wastes.

3.10.2.1 CRIP Implementation

As discussed, there are active IRP sites within or adjacent to the footprints of the levee/floodwalls for the fuel depot area and Silver Flag area. The CRIP recommends that a levee/floodwall be constructed for the fuel depot area now and for the Silver Flag area by 2080. In the event that a levee or floodwall is constructed for either of these areas, it is possible that the IRP sites in the areas would still be active, especially the ones in the fuel depot area. If any of the IRP sites are active when a levee or floodwall is proposed to be constructed, the design and construction of the levee/floodwall would be closely coordinated with the 325 CES/CEIEC to prevent any health and safety impacts to construction workers or site personnel and avoid impacting ongoing investigation or remediation of the sites. The 325 CES/CEIEC

would assess potential impacts to active IRP sites from Alternative 1 levees or Alternative 2 floodwalls when they are proposed through the AF Form 813 process. Based on this assessment, the levee/floodwall may need to be designed to avoid the IRP site. Construction that occurs in the vicinity of an IRP site may require special management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures. Management of soil and groundwater and other measures pertaining to the IRP sites would be required to be conducted in coordination with the 325 CES/CEIEC, and in accordance with Tyndall AFB protocols and all applicable environmental regulations.

The levees/floodwalls have been designed to avoid facilities and, therefore, would not require the demolition of any existing structures as currently designed. If different designs that require demolition of structures are proposed, the DAF would conduct ACM and LBP surveys for any older structures proposed to be demolished. Any encountered ACM or LBP would be remediated and disposed of in accordance with Tyndall AFB's ACM and LBP management plans and in compliance with all applicable regulations prior to demolition of the structures.

Construction activities associated with implementation of the CRIP would require the use of hazardous materials such as gasoline, oils, coolant, and lubricants commonly used by construction equipment; paints; solvents; preservatives; and sealants. Equipment servicing and repair activities could temporarily generate oily and hazardous wastes, such as spent solvents, residual fuels, used oils, used batteries, antifreeze, and filters. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans.

Construction and land clearing activities would generate nonhazardous, construction-related solid waste such as scrap metal, rubble, and stripped vegetation. Such solid waste would be disposed at an off-base landfill or recycled/reused as appropriate. Solid waste generated during construction and demolition activities would be managed in accordance with the Tyndall AFB Integrated Solid Waste Management Plan.

Provided that measures are taken to avoid impacts to and from IRP sites and with proper management of hazardous materials and wastes during construction, implementation of the CRIP under either Alternative 1 or 2 would have a less-than-significant impact associated with hazardous materials and wastes.

3.10.2.2 NBS Pilot Projects

There are no IRP sites that include the offshore locations of the NBS pilot projects and there is no evidence of past contamination in these offshore locations. Construction of the NBS breakwaters from barges would require the use of hazardous materials such as gasoline, oils, coolant, and lubricants commonly used by construction equipment. Equipment servicing and repair could temporarily generate oily and hazardous wastes, such as residual fuels, used oils, used batteries, and filters. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans. Nonhazardous solid wastes that are generated during construction would be properly disposed of off-base. With proper management of hazardous materials and wastes during construction, implementation of the NBS pilot projects under either Alternative 1 or 2 would have a less-than-significant impact associated with hazardous materials and wastes.

3.10.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on or from hazardous materials or wastes resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.11 Socioeconomics

3.11.1 Affected Environment

In 2020, the population of Bay County, Florida was 175,216 (U.S. Census Bureau 2020). Based on American Community Survey 5-year estimates for 2017 to 2022, the median age in the county is 41.2, the total labor force is 91,416, the median household income is $65,999, and the per capita income is $36,868 (U.S. Census Bureau 2022).

The total number of personnel directly associated with Tyndall AFB was estimated to be 23,208 in 2022 (Tyndall AFB 2022). The economic impact of Tyndall AFB on the local area (within 50 miles of the base) in Fiscal Year 2022 was estimated to be $4.54 billion (Tyndall AFB 2022). A large portion of this impact is attributed to military construction projects for post-hurricane rebuilding and the beddown of three F-35 squadrons being added to the base, in both direct and indirect expenditures.

3.11.2 Environmental Consequences

The threshold level for a significant impact on socioeconomics from the Proposed Action is defined in this EA as a substantial change in population, demographics, economic conditions, housing, or public services.

3.11.2.1 CRIP Implementation

Planning-level cost estimates for the implementation of the CRIP under Alternatives 1 and 2 are presented in Tables 3-29 and 3-30, respectively. The alternatives would differ only with respect to the costs of the structural solutions, which for Alternative 1 are levees and for Alternative 2 are floodwalls. The alternatives would include the same nonstructural solutions for the districts, which primarily include wet and dry floodproofing, and the same NBS solutions, which are based on five conceptual NBS projects that would involve breakwater construction, marsh restoration, and barrier island enhancement.

As indicated in Tables 3-29 and 3-30, the floodwalls under Alternative 2 would cost more than the levees under Alternative 1. The planning-level cost estimates for CRIP implementation under Alternatives 1 and 2 are approximately $280 million and $494 million, respectively. These total costs assume that all the identified solutions would be implemented. The costs would be incurred intermittently when projects are implemented, over several decades out to approximately 2080, when the levee for the Silver Flag area is recommended to be constructed.

Table 3-29. Planning-level Cost Estimate for CRIP Implementation under Alternative 1

District	Structural Solutions (Levees)	Nonstructural Solutions (Floodproofing)	NBS Solutions
Flightline	$15M	$9M	$99M
North	$45M	$1M	
Drone	$0	$1M	
Silver Flag	$29M	$2M	
Support	$0	$5M	
Sabre	$67M	$4M	
Crooked Island	$0	$2M	
Subtotal	$156M	$25M	
Total		$280M	

Table 3-30. Planning-Level Cost Estimate for CRIP Implementation under Alternative 2

District	Structural Solutions (Levees)	Nonstructural Solutions (Floodproofing)	NBS Solutions
Flightline	$20M	$9M	$99M
North	$102M	$1M	
Drone	$0	$1M	
Silver Flag	$77M	$2M	
Support	$0	$5M	
Sabre	$170M	$4M	
Crooked Island	$0	$2M	
Subtotal	$370M	$25M	
Total		$494M	

Direct and indirect construction-related expenditures associated with CRIP implementation under Alternative 1 or 2 would have beneficial impacts on the local economy. Direct expenditures for construction-related materials would benefit local suppliers, and secondary spending by construction workers would benefit businesses in the area such as gas stations and restaurants. These benefits would be temporary and make are minor contribution to the overall local economy. Construction work would have no appreciable effect on the total labor force or employment in the region due to the low number of jobs that would be created; any increase in employment would be temporary. Nonlocal construction workers who may be hired are not expected to permanently relocate to the area given that the construction work would be temporary. Operation and maintenance of constructed levees or floodwalls may involve a small number of permanent employee hires, some of which may include permanent relocations to the area; however, the small number of hires and potential relocations would have no appreciable effect on the local economy or population. For these reasons, implementation of the CRIP under either Alternative 1 or 2 would have a less-than-significant impact on socioeconomics.

3.11.2.2 NBS Pilot Projects

Class 2 cost estimates, as defined by the Association for the Advancement of Cost Engineering International, for the construction of the NBS breakwaters under Alternative 1 are presented in Table 3-31. The cost estimates are based on the 60 percent design developed for the breakwaters and will change for the final design. Cost estimates have not been developed for the Alternative 2 breakwaters or seagrass enhancement project.

Table 3-31. Phase 2 Cost Estimate NBS Breakwaters under Alternative 1

NBS Project	Low Range	Estimate	High Range
Submerged Living Shoreline Breakwater	$3,091,368	$3,636,904	$4,364,285
Submerged Oyster Reef Breakwater	$3,395,752	$3,995,002	$4,794,002
Submerged Shoreline Stabilization Breakwater	$5,134,462	$6,040,544	$7,248,653

As indicated in Table 3-31, the cost estimates for breakwater construction under Alternative 1 range from approximately $3.1 to $4.4 million for the living shoreline breakwater, $3.4 to $4.8 million for the oyster reef breakwater, and $5.1 to $7.2 million for the shoreline stabilization breakwater. Direct and indirect expenditures associated with the construction of the breakwaters under Alternative 1 or 2 would have temporary beneficial impacts on the local economy, as discussed for CRIP implementation. Construction work would have no appreciable effect on the total labor force or employment in the region due to the low number of jobs that would be created; any increase in employment would be temporary. Nonlocal construction workers who may be hired are not expected to permanently relocate to the area given that the construction work would be temporary. Once constructed, maintenance of the breakwaters would not involve employee hires or otherwise change the number of persons working at Tyndall AFB or living in the local area. For these reasons, implementation of the NBS projects under either Alternative 1 or 2 would have a less-than-significant impact on socioeconomics.

3.11.2.3 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no effect on socioeconomics resulting from the implementation of the flood defense options in the CRIP or the four associated NBS pilot projects as proposed.

3.12 Environmental Justice and Protection of Children

The White House defines environmental justice as "the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment" (EO 14096). EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," charges federal agencies with "identifying and addressing . . . human health or environmental effects of [federal] programs, policies, and activities on minority populations and low-income populations," including human health, social, and economic effects. EO 14096, "Revitalizing Our Nation's Commitment to Environmental Justice for All," directs federal agencies to "identify, analyze, and address disproportionate and adverse human health and environmental effects (including risks) and hazards of Federal activities, including . . . cumulative impacts . . . on communities with environmental justice concerns."

Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ 1997) provides definitions for minority and low-income populations. This guidance defines a minority person as someone who identifies as "American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic

origin; or Hispanic" (CEQ 1997, 25). According to the CEQ guidance, "minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population" (CEQ 1997, 25). The CEQ guidance recommends using poverty thresholds established by the U.S. Census Bureau to identify low-income populations. If the total income is less than the corresponding poverty threshold, the individual or family is classified as "below the poverty level."

Guidelines for the protection of children are specified in EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks." This EO requires that federal agencies prioritize identifying and assessing environmental health and safety risks that may disproportionately affect children, and ensuring that policies, programs, and standards address disproportionate risks to children that result from environmental health or safety risks.

3.12.1 Affected Environment

Tyndall AFB is bordered by the Gulf of Mexico to the west and south. Adjacent land to the northwest, north, and east of Tyndall AFB is divided into 10 census tracts; these census tracts represent the ROI for the environmental justice analysis. EJScreen: EPA's Environmental Justice Screening and Mapping Tool (EPA 2023b) was used to determine the minority population percentage and low-income population percentage within these census tracts. The minority and low-income population percentages in these census tracts and in Bay County and the state of Florida are presented in Table 3-32. The minority population percentages of the census tracts adjacent to the base range from 7 percent to 60 percent. Nine of the 10 census tracts have minority population percentages less than the 50 percent threshold. Five census tracts have higher minority population percentages than Bay County and one census tract has a higher minority population percentage than the state of Florida. The low-income population percentages of the census tracts range from 13 percent to 53 percent. Five census tracts have higher low-income population percentages than Bay County and four census tracts have higher low-income population percentage than the state of Florida.

Table 3-32. Percentages of Minority and Low-Income Populations in Census Tracts Adjacent to Tyndall AFB

Area	Minority Population Percentage	Low-Income Population Percentage
CT 12005000500	28%	27%
CT 12005000600	11%	17%
CT 12005000806	26%	33%
CT 12005000900	22%	35%
CT 12005001000	42%	48%
CT 12005001900	14%	27%
CT 12005002000	37%	53%
CT 12005002200	60%	46%
CT 12005002607	17%	24%
CT 12005002608	7%	13%
Bay County	25%	32%
Florida	45%	33%

Source: EPA 2023b

CT = Census Tract

3.12.2 Environmental Consequences

3.12.2.1 CRIP Implementation and NBS Pilot Projects

Based on the demographic data presented in Section 3.12.1, 9 of the 10 census tracts that compose the ROI have minority population percentages less than the 50 percent threshold. Five of the census tracts have higher minority and low-income population percentages than those of Bay County. Based on the analyses conducted in this EA, implementation of the CRIP and associated NBS pilot projects under the Proposed Action would not result in any adverse environmental or human health and safety risks to human populations; therefore, implementation of the CRIP under Alternatives 1 or 2 or the four NBS projects under Alternatives 1 or 2 would not have disproportionate environmental or human health effects on minority or low-income populations. This finding is based on the results of the analyses conducted in this EA, which indicate that each alternative analyzed would have less-than-significant impacts associated with air quality, noise, human health and safety, and hazardous materials and wastes.

Based on the findings of this EA, implementation of the CRIP and the NBS pilot projects under either Alternative 1 or 2 would not result in disproportionate environmental health or safety risks to children. Under EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," environmental health and safety risks refer to "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Children would not be allowed in the construction or operational areas where the CRIP strategies or NBS projects would be implemented and based on the findings of this EA, there would be no potential for the Proposed Action to expose children outside these areas to any environmental health or safety risks.

3.12.2.2 No Action Alternative

Under the No Action Alternative, the Tyndall AFB CRIP and associated NBS pilot projects would not be implemented. Therefore, there would be no associated disproportionate environmental or human health

effects on minority or low-income populations or disproportionate environmental health or safety risks to children.

3.13 Cumulative Impacts

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

3.13.1 Past, Present, and Reasonably Foreseeable Future Actions

Tyndall AFB has been an active military installation for over 78 years, from its beginning in 1941 to the present. The area surrounding Tyndall AFB has experienced steady population and economic growth during this period; past major actions in the area have been primarily associated with residential and commercial development in the population centers and development of regional infrastructure such as roadways, airports, and utility systems. Various projects at Tyndall AFB involving improvements to existing on-base facilities, roads, and utility systems and construction of new infrastructure have been conducted over the years as needed to support the base's mission.

On October 10, 2018, Tyndall AFB and surrounding areas were directly hit by Hurricane Michael, which had the highest sustained wind speeds of any hurricane to hit the continental U.S. in over 25 years. The affected region experienced catastrophic damage from the hurricane and has been in recovery mode ever since. Based on initial assessments, approximately 100 facilities were destroyed, and 195 facilities sustained moderate-to-severe damage at Tyndall AFB. A Program Management Office established by the Air Force Installation and Mission Support Center in November 2018 led the effort to resume mission operations and initiate planning for long-term redevelopment of Tyndall AFB as the model Air Force Installation of the Future. The DAF completed an EA in 2020 that analyzed the potential impacts associated with post-hurricane reconstruction at the base (DAF 2020b). Repair and rebuilding of hurricane-damaged Infrastructure is ongoing and constitutes the primary foreseeable mission-support actions at Tyndall AFB.

Numerous capital improvement projects are underway and planned to rebuild and improve transportation, utility, and other infrastructure in the areas around Tyndall AFB. These include projects to repair and improve roadways for better mobility; projects to upgrade stormwater pipes, drains, and detention systems; and projects to improve wastewater collection and treatment systems in the area. The ongoing Tyndall flyover project, which will connect Tyndall AFB's gates under U.S. Highway 98, is a major current infrastructure improvement project in the vicinity of the base. Notable foreseeable future projects in the area include the planned replacement of the DuPont Bridge that runs between the city of Parker and Tyndall AFB.

Tyndall AFB's mission and the type and level of military operations conducted at the base have undergone many changes over the years. Tyndall AFB is currently transitioning from an F-22 pilot training base to an F-35 operations base. Three squadrons of 24 F-35 aircraft are planned for beddown at Tyndall AFB, with the first squadron expected to be fully relocated to the base by 2025. A number of infrastructure projects are planned for the beddown of the incoming F-35 aircraft, including hangars and headquarters for each of the three squadrons. The potential impacts of the F-35 beddown at Tyndall AFB were analyzed in an environmental impact statement completed in 2020 (DAF 2020c).

3.13.2 Assessment of Cumulative Impacts by Resource

The Proposed Action would have no appreciable effect or only beneficial effects on airspace, cultural resources, infrastructure, land use, public health and safety, socioeconomics, environmental justice, or protection of children. Therefore, when added to past, present, and reasonably foreseeable actions, the Proposed Action is not expected to have significantly adverse cumulative impacts on any of these

resources. The potential cumulative impacts of the Proposed Action on the other resources analyzed in detail in this EA are discussed in the subsections that follow.

3.13.2.1 Air Quality and Climate Change

Air emissions in Bay County originate primarily from various sources in Panama City and other cities and unincorporated areas in the county including Tyndall AFB. Countywide emissions primarily include those from burning of fossil fuels (for example, coal, oil, and natural gas), industrial and commercial facilities, vehicular traffic, military air operations, non-military flight activity, construction activity, and prescribed burning. Construction emissions of criteria pollutants, VOCs, and GHGs under all the alternatives analyzed for CRIP implementation and the NBS breakwaters would be temporary and well below insignificance thresholds. Steady increases in emissions as a result of post-hurricane rebuilding and population growth can be expected in and around Tyndall AFB. Considerable regional infrastructure projects involving utility upgrades and road improvements are underway to accommodate this growth. Air emissions from these and other construction projects in the county would be temporary. Estimated increases in air emissions from foreseeable future actions at Tyndall AFB, the largest being the beddown and operations of three squadrons of F-35 aircraft at the base, are not expected to be significant (DAF 2020c). Based on the estimated construction air emissions, which would be temporary and well below insignificance thresholds, projected air emissions from other sources, and the attainment status of the area, implementation of the CRIP and construction of the NBS breakwaters under Alternative 1 or 2 would not have adverse cumulative impacts on air quality or climate change when combined with other past, present, or reasonably foreseeable future actions.

3.13.2.2 Water Resources

Given that compensatory mitigation would be provided to offset unavoidable wetlands impacts, implementation of the CRIP would not contribute to cumulative loss of wetlands or other surface waters when combined with other unrelated actions. Potential cumulative impacts on wetlands/waters from CRIP strategies requiring construction and other construction projects in the region would be minimized by BMPs and engineering controls that are required by regulation to be implemented. Based on the required implementation of such measures and the compensatory mitigation that would be provided, implementation of the CRIP under either alternative would not have adverse cumulative impacts on water resources when combined with past, present, or future actions. The combination of the proposed NBS projects with other NBS projects that are implemented in the future at Tyndall AFB to reduce wave energy and coastal erosion would have beneficial cumulative impacts on water resources.

3.13.2.3 Geological Resources

The soils within the CRIP levee/floodwall footprints have been largely disturbed from past development of the sites and by other land practices adjacent to some of the sites. None of the CRIP projects would be located in areas containing prime or unique farmland soils. Potential impacts on soils from the CRIP projects would be comparable to those from most other ongoing and foreseeable future development projects in the area. Measures to prevent and minimize soil erosion are required to be implemented by regulation for the Proposed Action and for other projects that involve land disturbance. For these reasons, no adverse cumulative impacts to soils are expected to result from the combination of the CRIP projects with other unrelated actions in the area. Construction of the NBS breakwaters under Alternative 1 or 2 would displace sediments that are ubiquitous in the area and would not generate excessive amounts of turbidity. When combined with past, present, and reasonably foreseeable actions, implementation of the NBS projects under either alternative would not have adverse cumulative impacts on geological resources.

3.13.2.4 Biological Resources

The footprints of the CRIP levees and floodwalls are largely disturbed and provide relatively low-quality habitat for wildlife. Displacement of the vegetation within the footprints would not adversely affect any wildlife population, including species listed as threatened or endangered under the ESA. The footprints of all three NBS breakwaters consist of sandy bottom that is devoid of SAV. The benthic EFH that would be displaced by each breakwater is ubiquitous in the area and, therefore, would represent a negligible loss of

such habitat and an insignificant impact on the marine biota that use it. The CRIP projects and NBS projects under either alternative would not adversely affect ESA-listed species or their habitat. Based on the project locations and lack of adverse impacts to habitat or species, implementation of the CRIP and NBS projects under either alternative would not have adverse cumulative impacts on biological resources when combined with other past, present, or reasonably foreseeable future actions.

3.13.2.5 Noise

The CRIP levees and floodwalls and the NBS breakwaters would not generate any appreciable noise after they are constructed; therefore, only construction noise has the potential to have any appreciable noise-related effects under the Proposed Action. Based on the estimated contribution that construction noise would have on ambient noise levels, construction of the CRIP and NBS projects under Alternative 1 or 2 would not have adverse cumulative noise impacts when combined with other unrelated actions. Based on the expected construction noise levels under the Proposed Action, adverse cumulative noise impacts are not expected when construction noise under the Proposed Action is concurrent with noise from other sources. The resulting cumulative noise would be intermittent and would not have a continuous effect on any single area.

3.13.2.6 Hazardous Materials and Wastes

There are active IRP sites within or adjacent to the footprints of the CRIP levee/floodwalls for the fuel depot area and Silver Flag area. There are no IRP sites that include the offshore locations of the NBS projects, and there is no evidence of past contamination in these offshore locations. Provided that measures are taken to avoid impacts to and from IRP sites and with proper management of hazardous materials and wastes during construction, implementation of the CRIP under Alternative 1 or 2 would not have adverse cumulative impacts on hazardous materials and wastes when combined with past, present, and reasonably foreseeable actions.

3.14 Summary of Environmental Consequences

The potential environmental consequences of CRIP implementation under Alternatives 1 and 2, and the No Action Alternative, on the resources analyzed in this EA are summarized in Table 3-33. The potential environmental consequences of the NBS pilot projects under Alternatives 1 and 2, and the No Action Alternative, on the resources analyzed in this EA are summarized in Table 3-34.

Table 3-33. Summary of Potential Environmental Consequences for CRIP Implementation

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Airspace Use and Management	*No Effect* Implementation of the CRIP under Alternative 1 would have no effect on the classification, dimensions, or other parameters of any existing airspace. It would also have no potential to result in airspace restrictions or congestion, or otherwise impact air traffic control or military or non-military use of any airspace.	*No Effect* Implementation of the CRIP under Alternative 2 would have no effect on the classification, dimensions, or other parameters of any existing airspace. It would also have no potential to result in airspace restrictions or congestion, or otherwise impact air traffic control or military or non-military use of any airspace.	*No Effect* There would be no effect on airspace use and management.
Air Quality and Climate Change	*Less-than-Significant Impact* Based on the quantities of criteria pollutants, VOCs, and fugitive dust estimated to be generated, construction of the Alternative 1 levees would have a less-than-significant impact on air quality. Measures to control fugitive dust during construction are identified in Section 3.1. The estimated quantities of GHGs from levee construction would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. The actual air emissions of all CRIP projects proposed to be implemented in the future would be reviewed by the DAF through the AF Form 813 process when they are proposed. There would be no appreciable effect on air quality from the operation of the Alternative 1 levees. Implementation of the CRIP would not affect permitted stationary sources of air emissions at Tyndall AFB. The Alternative 1 levees are conceptually designed to mitigate the anticipated increases in sea-level rise and associated coastal flooding impacts associated with climate change over time. Based on the estimated construction air emissions, which would be temporary and well below insignificance thresholds; projected air emissions from other sources; and the attainment status of the area, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on air quality or climate change when combined with other past, present, or reasonably foreseeable future actions.	*Less-than-Significant Impact* Based on the quantities of criteria pollutants, VOCs, and fugitive dust estimated to be generated, construction of the Alternative 2 floodwalls would have a less-than-significant impact on air quality. Measures to control fugitive dust during construction are identified in Section 3.1. The estimated quantities of GHGs from floodwall construction would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. The actual air emissions of all CRIP projects proposed to be implemented in the future would be reviewed by the DAF through the AF Form 813 process when they are proposed. There would be no appreciable effect on air quality from the operation of the Alternative 2 floodwalls. Implementation of the CRIP would not affect permitted stationary sources of air emissions at Tyndall AFB. The Alternative 2 floodwalls are conceptually designed to mitigate the anticipated increases in sea-level rise and associated coastal flooding impacts associated with climate change over time. Based on the estimated construction air emissions, which would be temporary and well below insignificance thresholds; projected air emissions from other sources; and the attainment status of the area, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on air quality or climate change when combined with other past, present, or reasonably foreseeable future actions.	*No Effect* There would be no effect on air quality or climate change. Without implementing the flood defense strategies in the CRIP, continuing sea-level rise and other changes in climatic conditions over time are expected to increase the potential for Tyndall AFB to be adversely impacted by coastal flooding.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Water Resources	*Less-than-Significant Impact* Dewatering of uncontaminated groundwater during construction of an Alternative 1 levee would be authorized by the DEP NPDES stormwater construction permit that would be obtained for the project. Appropriate BMPs for dewatering identified in the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual* (State Erosion and Sediment Control Task Force 2013) would be implemented. Any dewatering of contaminated groundwater would be conducted in coordination with DEP and authorized through a generic dewatering permit or individual wastewater permit. Dewatering of groundwater within or in proximity to a contaminated site may require special testing, handling, and disposal procedures depending on the nature of the site contamination. Estimated wetland impacts for the Alternative 1 levees range from 0 acres for the WWTP and fuel depot levees up to 16.7 acres for the 7000 area levee. Impacts to WOTUS from the construction of levees would require a Department of the Army Permit issued by USACE and ERP permit issued by DEP. Levees that would impact WOTUS and require a Department of the Army Permit would require a water quality certification from DEP under Section 401 of the CWA. Impacts to wetlands that do not qualify as WOTUS but are state jurisdictional would be permitted through the ERP program. There are no practicable alternatives to constructing in wetlands under Alternative 1. The 7000 area, the site with the most wetland impacts, is surrounded by wetlands and no layout or design could avoid wetland impacts at this site. Portions of the original levee alignments were modified to avoid wetland impacts to the extent practicable while still allowing the levees to encompass all the assets within the protected area. Opportunities to further reduce and potentially eliminate wetland impacts at some of the sites would be assessed during future actual design. Wetland impacts from constructing the Alternative 1 levees would be offset by purchasing wetland mitigation credits from the HCMB. Based on the wetland mitigation plan developed for this EA, construction of all the levees under Alternative 1 would require 10.93 PFO credits and 1.94 PEM credits from the HCMB. Tyndall AFB commits to purchasing this estimated maximum number of mitigation credits, or the actual number if different, to offset the wetland impacts from implementing the CRIP under the Proposed Action. Based on current HCMB credit prices, the credits required for all the levees under Alternative 1 would cost a total of $1,052,050. The amount of floodplain area within the footprints of the Alternative 1 levees ranges from 0.46 acre for the fuel depot levee up to 20.5 acres for the 7000 area levee. There are no practicable alternatives to constructing in floodplains under Alternative 1. The entire area that encompasses the 7000 area and adjacent areas are within the floodplain; therefore, no layout or design could avoid construction in floodplains at this site. Opportunities to further reduce and potentially eliminate floodplain displacement at some of the sites would be assessed during future actual design. Loss of floodplain function would be offset as needed through the site drainage design, which would be authorized through the ERP permitting process. The design, construction, and maintenance of the Alternative 1 levees and other CRIP projects having footprints greater than 5,000 ft^2 would follow UFC 3-210-10 and comply with the requirements of EISA Section 438 by using green infrastructure or low-impact development as applicable for each project. Each of the Alternative 1 levees would disturb more than 1 acre of land and, therefore, would require a DEP NPDES stormwater construction permit. As part of this permit, the DAF would be required to prepare and implement an associated SWPPP, which would outline the BMPs and engineering controls to be used to prevent and minimize indirect erosion, sedimentation, and pollution during construction. Potential BMPs and engineering controls for Alternative 1 are identified in Section 3.2. The DAF would review any Alternative 1 levee proposed in the future through the AF Form 813 process to assess its potential impacts on water resources and determine the associated permitting and mitigation requirements. Given that compensatory mitigation would be provided to offset unavoidable wetlands impacts, implementation of the CRIP would not contribute to cumulative loss of wetlands or other surface waters when combined with other unrelated actions.	*Less-than-Significant Impact* Dewatering of uncontaminated groundwater during construction of an Alternative 2 floodwall would be authorized by the DEP NPDES stormwater construction permit that would be obtained for the project. Appropriate BMPs for dewatering identified in the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual* (State Erosion and Sediment Control Task Force 2013) would be implemented. Any dewatering of contaminated groundwater would be conducted in coordination with DEP and authorized through a generic dewatering permit or individual wastewater permit. Dewatering of groundwater within or in proximity to a contaminated site may require special testing, handling, and disposal procedures depending on the nature of the site contamination. Estimated wetland impacts for the Alternative 2 floodwalls range from 0 acres for the WWTP and fuel depot floodwalls up to 4.8 acres for the 7000 area floodwall. Impacts to WOTUS from the construction of floodwalls would require a Department of the Army Permit issued by USACE and ERP permit issued by DEP. Floodwalls that would impact WOTUS and require a Department of the Army Permit would require a water quality certification from DEP under Section 401 of the CWA. Impacts to wetlands that do not qualify as WOTUS but are state jurisdictional would be permitted through the ERP program. There are no practicable alternatives to constructing in wetlands under Alternative 2. The 7000 area, the site with the most wetland impacts, is surrounded by wetlands and no layout or design could avoid wetland impacts at this site. Portions of the original floodwall alignments were modified to avoid wetland impacts to the extent practicable while still allowing the floodwalls to encompass all the assets within the protected area. Opportunities to further reduce and potentially eliminate wetland impacts at some of the sites would be assessed during future actual design. Wetland impacts from constructing the Alternative 2 floodwalls would be offset by purchasing wetland mitigation credits from the HCMB. Based on the wetland mitigation plan developed for this EA, construction of all the floodwalls under Alternative 2 would require 2.99 PFO credits and 0.6 PEM credit from the HCMB. Tyndall AFB commits to purchasing this estimated number of mitigation credits, or the actual number if different, to offset the wetland impacts from implementing the CRIP under the Proposed Action. Based on current HCMB credit prices, the credits required for all the floodwalls under Alternative 2 would cost a total of $299,150. The amount of floodplain area within the footprints of the Alternative 2 floodwalls ranges from 0.22 acre for the east housing area floodwall up to 5.93 acres for the 7000 area floodwall. There are no practicable alternatives to constructing in floodplains under Alternative 2. The entire area that encompasses the 7000 area and adjacent areas are within the floodplain; therefore, no layout or design could avoid construction in floodplains at this site. Opportunities to further reduce and potentially eliminate floodplain displacement at some of the sites would be assessed during future actual design. Loss of floodplain function would be offset as needed through the site drainage design, which would be authorized through the ERP permitting process. The design, construction, and maintenance of the Alternative 2 floodwalls and other CRIP projects having footprints greater than 5,000 ft^2 would follow UFC 3-210-10 and comply with the requirements of EISA Section 438 by using green infrastructure or low-impact development as applicable for each project. Each of the Alternative 2 floodwalls would disturb more than 1 acre of land and, therefore, would require a DEP NPDES stormwater construction permit. As part of this permit, the DAF would be required to prepare and implement an associated SWPPP, which would outline the BMPs and engineering controls to be used to prevent and minimize indirect erosion, sedimentation, and pollution during construction. Potential BMPs and engineering controls for Alternative 2 are identified in Section 3.2. The DAF would review any Alternative 2 floodwall proposed in the future through the AF Form 813 process to assess its potential impacts on water resources and determine the associated permitting and mitigation requirements. Given that compensatory mitigation would be provided to offset unavoidable wetlands impacts, implementation of the CRIP would not contribute to cumulative loss of wetlands or other surface waters when combined with other unrelated actions.	*No Effect* There would be no construction-related impacts on water resources Without implementing the flood defense strategies in the CRIP, continuing sea-level rise and other changes in climatic conditions over time are expected to increase the potential for Tyndall AFB to be adversely impacted by coastal flooding.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Geological Resources	*Less-than-Significant Impact* Soils within the footprints of the Alternative 1 levees would be physically disturbed by construction activities. The soils within the levee footprints have been largely disturbed from past site development and other land practices. The Alternative 1 levees would have larger footprints than the Alternative 2 floodwalls. The 7000 area levee would have the largest footprint and area of soil disturbance and the fuel depot levee would have the smallest footprint and area of soil disturbance. Fill material for the levees would be obtained from an off-base source and trucked to the sites. As with the levee footprints, the 7000 area levee and fuel depot levee would have the largest and smallest fill volumes, respectively, among the levees. The potential for soil erosion and sedimentation impacts during construction under Alternative 1 would be minimized by the measures identified in Section 3.3. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on geological resources.	*Less-than-Significant Impact* Soils within the footprints of the Alternative 2 floodwalls would be physically disturbed by construction activities. The soils within the floodwall footprints have been largely disturbed from past site development and other land practices. The Alternative 2 floodwalls would have smaller footprints than the Alternative 1 levees. The west housing floodwall would have the largest footprint and area of soil disturbance and the fuel depot floodwall would have the smallest footprint and areas of soil disturbance. The potential for soil erosion and sedimentation impacts during construction under Alternative 2 would be minimized by the measures identified in Section 3.3. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on geological resources.	*No Effect* There would be no effect on geological resources.
Cultural Resources	*Less-than-Significant Impact* A portion of the existing footprint of the west housing area levee is within the boundaries of one known archaeological site. This site is approximately 28 acres and potentially eligible for NRHP listing. This portion of the original levee alignment has been modified to avoid this archaeological site to the extent practicable while still allowing the levee to encompass all of the houses within the housing area. Following alignment modification, the footprint of the levee overlays approximately 2 percent of the site. If a levee is proposed to be constructed in the future for this housing area, the Tyndall CRO would evaluate the potential impacts of the proposed levee on the archaeological site and recommend measures to avoid adverse impacts to the site. Adverse impacts to the archaeological site may be avoided by modifying the levee alignment to avoid the site entirely or the portions of the site that contribute to its NRHP eligibility, monitoring the site during construction, and/or taking other measures that would prevent adverse impacts to the site. The Tyndall CRO would coordinate with SHPO on the development and implementation of the final protection measures for the site. Staging areas for the construction of levees would be sited outside known archaeological sites. Staging area locations would be evaluated and approved by the Tyndall CRO to avoid potential impacts to known and unknown cultural resources. The Tyndall CRO would coordinate with SHPO on the development and implementation of the final protection measures for the site. Provided these measures are taken, none of the Alternative 1 levees are expected to have an adverse impact on cultural resources. Tyndall AFB would also monitor for potential indirect impacts to cultural resources from constructed levees. Monitoring may include assessing potential impacts to known or unknown cultural sites from soil erosion or altered drainage patterns caused by constructed levees. Monitoring associated with cultural resources would be led by the Tyndall CRO, and potential impacts to cultural resources would be coordinated with SHPO as appropriate. Nonstructural solutions, including constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options for all seven districts of the base are expected to have no adverse impact on cultural resources. The floodproofing of any real property facility listed or eligible for listing in the NRHP if needed would be managed by the Tyndall CRO in consultation with SHPO. Archaeological surveys would be conducted as needed for future proposed NBS projects at the base. In the event that unknown cultural resources are inadvertently discovered during work associated with the Tyndall CRIP, they would be protected under 32 CFR Part 229, "Protection of Archaeological Resources" and if they are human remains or burial artifacts, they would also be protected under the Native American Graves Protection and Repatriation Act and its implementing regulations in 32 CFR Part 10. If potential archaeological resources are discovered, all work would stop immediately, the proper authorities would be promptly notified, and measures to protect and evaluate the inadvertent find would be implemented in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023). When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on cultural resources.	*Less-than-Significant Impact* A portion of the existing footprint of the west housing area floodwall is within the boundaries of one known archaeological site. This site is approximately 28 acres and potentially eligible for NRHP listing. This portion of the original floodwall alignment has been modified to avoid this archaeological site to the extent practicable while still allowing the levee to encompass all of the houses within the housing area. Following alignment modification, the footprint of the floodwall overlays approximately 1 percent of the site. If a floodwall is proposed to be constructed in the future for this housing area, the Tyndall CRO would evaluate the potential impacts of the proposed floodwall on the archaeological site and recommend measures to avoid adverse impacts to the site. Adverse impacts to the archaeological site may be avoided by modifying the floodwall alignment to avoid the site entirely or the portions of the site that contribute to its NRHP eligibility, monitoring the site during construction, and/or taking other measures that would prevent adverse impacts to the site. The Tyndall CRO would coordinate with SHPO on the development and implementation of the final protection measures for the site. Staging areas for the construction of floodwalls would be sited outside known archaeological sites. Staging area locations would be evaluated and approved by the Tyndall CRO to avoid potential impacts to known and unknown cultural resources. The Tyndall CRO would coordinate with SHPO on the development and implementation of the final protection measures for the site. Provided these measures are taken, none of the Alternative 2 floodwalls are expected to have an adverse impact on cultural resources. Tyndall AFB would also monitor for potential indirect impacts to cultural resources from constructed floodwalls. Monitoring may include assessing potential impacts to known or unknown cultural sites from soil erosion or altered drainage patterns caused by constructed floodwalls. Monitoring associated with cultural resources would be led by the Tyndall CRO, and potential impacts to cultural resources would be coordinated with SHPO as appropriate. Nonstructural solutions, including constructing new buildings to the DFE, floodproofing existing at-risk buildings, and incorporating NBS options for all seven districts of the base are expected to have no adverse impact on cultural resources. The floodproofing of any real property facility listed or eligible for listing in the NRHP if needed would be managed by the Tyndall CRO in consultation with SHPO. Archaeological surveys would be conducted as needed for future proposed NBS projects at the base. In the event that unknown cultural resources are inadvertently discovered during work associated with the Tyndall CRIP, they would be protected under 32 CFR Part 229, "Protection of Archaeological Resources" and if they are human remains or burial artifacts, they would also be protected under the Native American Graves Protection and Repatriation Act and its implementing regulations in 32 CFR Part 10. If potential archaeological resources are discovered, all work would stop immediately, the proper authorities would be promptly notified, and measures to protect and evaluate the inadvertent find would be implemented in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023). When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on cultural resources.	*No Effect* There would be no effect on cultural resources.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Biological Resources	*Less-than-Significant Impact* The footprints of the Alternative 1 levees are largely disturbed and provide relatively low-quality habitat for wildlife. Construction noise associated with CRIP implementation would be temporary and is expected to have no adverse effect on wildlife. The wetlands that surround the 7000 area contain suitable habitat for the federally listed Godfrey's butterwort. Surveys for Godfrey's butterwort would be conducted for the 7000 area levee and other levees that contain suitable habitat during project planning and before construction. If any populations of Godfrey's butterwort are found within or near the proposed construction limits, the DAF would consult with USFWS on the approach to protect the plants from being impacted, which may involve realignment of the levee and/or relocation of plants. Surveys for telephus spurge, the other federally listed plant species at Tyndall AFB, also would be conducted at any site where an Alternative 1 levee is proposed. All the sites proposed to be protected by levees, except the 7000 area, contain suitable habitat for the state-listed gopher tortoise and federally listed eastern indigo snake. Gopher tortoise surveys would be required by Tyndall AFB for all proposed CRIP projects that would involve ground disturbance in suitable gopher tortoise habitat. These surveys are typically required 30 days prior to ground disturbance. If any found burrows cannot be avoided by 25 feet, the tortoises and any commensal species would be relocated in accordance with FWC guidelines (FWC 2015). If gopher tortoises were near an area that would be disturbed by construction, silt fencing or some other type of barrier would be erected to keep tortoises from moving into the construction area after surveys have been completed. For the protection of the eastern indigo snake, the project would be required by Tyndall AFB to implement the *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2013) Active and inactive bald eagle nests currently exist within 1/2 mile of the WWTP and 1/2 mile of the Silver Flag area, respectively. The locations of bald eagle nests change over time and there is potential for new nests to be located closer to some levee sites in the future. All construction activity associated with implementation of the CRIP under Alternative 1 would follow the recommendations in *National Bald Eagle Management Guidelines* (USFWS 2007), including maintaining the minimum buffer distances around active nests during the construction period. Bird species protected under the MBTA would be protected from being impacted during CRIP implementation to the extent practicable. Potential impacts to breeding birds and bird nests would be relatively low under Alternative 1 based on the types and amounts of undeveloped land that would be disturbed. Any bird nests found during construction would be avoided to the extent practicable, and if the nest is within or adjacent to the construction site, the construction contractor would be required to immediately stop work and consult with Tyndall Natural Resources on the protection of the nest before resuming construction activities. Based on the current analysis of protected species occurrence and potential impacts, and the protection measures that would be implemented as needed, including those for Godfrey's butterwort, the bald eagle, gopher tortoise, and indigo snake during construction, implementation of the CRIP is not expected to adversely affect any ESA-listed species or designated critical habitat. The DAF would review any Alternative 1 levees and other CRIP strategies proposed in the future through the AF Form 813 process to assess their potential impacts on protected species, and determine the associated consultation and mitigation requirements for potentially affected species. Based on the project locations and lack of adverse impacts to habitat or species, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on biological resources when combined with other past, present, or reasonably foreseeable future actions.	*Less-than-Significant Impact* The footprints of the Alternative 2 floodwalls are largely disturbed and provide relatively low-quality habitat for wildlife. Construction noise associated with CRIP implementation would be temporary and is expected to have no adverse effect on wildlife. The wetlands that surround the 7000 area contain suitable habitat for the federally listed Godfrey's butterwort. Surveys for Godfrey's butterwort would be conducted for the 7000 area floodwall and other floodwalls that contain suitable habitat during project planning and before construction. If any populations of Godfrey's butterwort are found within or near the proposed construction limits, the DAF would consult with USFWS on the approach to protect the plants from being impacted, which may involve realignment of the floodwall and/or relocation of plants. Surveys for telephus spurge, the other federally listed plant species at Tyndall AFB, also would be conducted at any site where an Alternative 2 floodwall is proposed. All the sites proposed to be protected by floodwalls, except the 7000 area, contain suitable habitat for the state-listed gopher tortoise and federally listed eastern indigo snake. Gopher tortoise surveys would be required by Tyndall AFB for all proposed CRIP projects that would involve ground disturbance in suitable gopher tortoise habitat. These surveys are typically required 30 days prior to ground disturbance. If any found burrows cannot be avoided by 25 feet, the tortoises and any commensal species would be relocated in accordance with FWC guidelines (FWC 2015). If gopher tortoises were near an area that would be disturbed by construction, silt fencing or some other type of barrier would be erected to keep tortoises from moving into the construction area after surveys have been completed. For the protection of the eastern indigo snake, the project would be required by Tyndall AFB to implement the *Standard Protection Measures for the Eastern Indigo Snake* (USFWS 2013) Active and inactive bald eagle nests currently exist within 1/2 mile of the WWTP and 1/2 mile of the Silver Flag area, respectively. The locations of bald eagle nests change over time and there is potential for new nests to be located closer to some levee sites in the future. All construction activity associated with implementation of the CRIP under Alternative 2 would follow the recommendations in *National Bald Eagle Management Guidelines* (USFWS 2007), including maintaining the minimum buffer distances around active nests during the construction period. Bird species protected under the MBTA would be protected from being impacted during CRIP implementation to the extent practicable. Potential impacts to breeding birds and bird nests would be relatively low under Alternative 2 based on the types and amounts of undeveloped land that would be disturbed. Any bird nests found during construction would be avoided to the extent practicable, and if the nest is within or adjacent to the construction site, the construction contractor would be required to immediately stop work and consult with Tyndall Natural Resources on the protection of the nest before resuming construction activities. Based on the current analysis of protected species occurrence and potential impacts, and the protection measures that would be implemented as needed, including those for Godfrey's butterwort, the bald eagle, gopher tortoise, and indigo snake during construction, implementation of the CRIP is not expected to adversely affect any ESA-listed species or designated critical habitat. The DAF would review any Alternative 2 floodwalls and other CRIP strategies proposed in the future through the AF Form 813 process to assess their potential impacts on protected species, and determine the associated consultation and mitigation requirements for potentially affected species. Based on the project locations and lack of adverse impacts to habitat or species, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on biological resources when combined with other past, present, or reasonably foreseeable future actions.	*No Effect* There would be no effect on biological resources.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Noise	*Less-than-Significant Impact* Outdoor noise levels in the nearest NSAs to the locations of the Alternative 1 levees during the construction period are estimated to range from 25 to 63 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by normal conversation at the high end. Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. The west and east housing areas are on-base NSAs. During the construction of a levee for these NSAs, outdoor noise levels could be greater than 90 dBA depending on the construction equipment being operated and the distance of the house from the noise source. Indoor noise levels would be 20 to 30 dBA lower than the outdoor noise levels. Noise that is audible at the nearest NSAs would be heard only during daytime and only over the duration of the construction period. Based on the estimated contribution that construction noise would have on ambient noise levels, Alternative 1 would not have adverse cumulative noise impacts when combined with other unrelated actions.	*Less-than-Significant Impact* Outdoor noise levels in the nearest NSAs to the locations of the Alternative 2 floodwalls during the construction period are estimated to range from 25 to 63 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by normal conversation at the high end. Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. The west and east housing areas are on-base NSAs. During the construction of a floodwall for these NSAs, outdoor noise levels could be greater than 90 dBA depending on the construction equipment being operated and the distance of the house from the noise source. Indoor noise levels would be 20 to 30 dBA lower than the outdoor noise levels. Noise that is audible at the nearest NSAs would be heard only during daytime and only over the duration of the construction period. Based on the estimated contribution that construction noise would have on ambient noise levels, Alternative 2 would not have adverse cumulative noise impacts when combined with other unrelated actions.	*No Effect* There would be no noise-related effects.
Infrastructure	*Less-than-Significant Impact* Operation and maintenance of Alternative 1 levees may involve a small number of permanent employee hires, some of which may include permanent relocations to the area. The small increase in personnel would have no appreciable effect on utility demand at Tyndall AFB in terms of electricity and water consumption and wastewater generation. Connections to existing electrical lines at the levee sites would have no adverse impacts. Gravity drainage structures and stormwater pump stations would be required for the Alternative 1 levees to remove accumulated rainfall from the protected area. The construction of road gates, elevated roads, and other portions of the Alternative 1 levees would require modifications to certain existing roads at the sites. Such modifications would not adversely affect the overall road infrastructure at the sites and would have no effect on the road network outside the sites. The overall impact of construction on commuter traffic at and near the Tyndall AFB would be intermittent, localized (limited to defined haul routes), and temporary (limited to the construction period). Construction of the Alternative 1 levees and implementation of the nonstructural CRIP strategies would have beneficial effects on critical infrastructure at Tyndall AFB. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on infrastructure.	*Less-than-Significant Impact* Operation and maintenance of Alternative 2 floodwalls may involve a small number of permanent employee hires, some of which may include permanent relocations to the area. The small increase in personnel would have no appreciable effect on utility demand at Tyndall AFB in terms of electricity and water consumption and wastewater generation. Connections to existing electrical lines at the levee sites would have no adverse impacts. Gravity drainage structures and stormwater pump stations would be required for the Alternative 2 floodwalls to remove accumulated rainfall from the protected area. The construction of road gates, elevated roads, and other portions of the Alternative 2 floodwalls would require modifications to certain existing roads at the sites. Such modifications would not adversely affect the overall road infrastructure at the sites and would have no effect on the road network outside the sites. The overall impact of construction on commuter traffic at and near the Tyndall AFB would be intermittent, localized (limited to defined haul routes), and temporary (limited to the construction period). Construction of the Alternative 2 floodwalls and implementation of the nonstructural CRIP strategies would have beneficial effects on critical infrastructure at Tyndall AFB. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on infrastructure.	*No Effect* There would be no effect on infrastructure.
Land Use	*Less-than-Significant Impact* CRIP implementation under Alternative 1 is expected to have no adverse effects on existing or future land uses. Construction of Alternative 1 levees and implementing the nonstructural CRIP strategies is not expected to change the current land use classification of any area on the base or adversely affect any existing base operations. Implementation of the CRIP would have beneficial effects on existing and future base operations and the overall mission of Tyndall AFB by improving the coastal resilience of areas that contain critical base infrastructure. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on land use.	*Less-than-Significant Impact* CRIP implementation under Alternative 2 is expected to have no adverse effects on existing or future land uses. Construction of Alternative 2 floodwalls and implementing the nonstructural CRIP strategies is not expected to change the current land use classification of any area on the base or adversely affect any existing base operations. Implementation of the CRIP would have beneficial effects on existing and future base operations and the overall mission of Tyndall AFB by improving the coastal resilience of areas that contain critical base infrastructure. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on land use.	*No Effect* There would be no effect on land use.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Public Health and Safety	*Less-than-Significant* The construction of Alternative 1 levees and any other CRIP strategy that involves construction would comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds OSHA standards. A health and safety plan would be developed and implemented by the construction contractor for each project. All construction and other ground-disturbing activity under Alternative 1 must be issued a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation. The CRIP flood defense strategies under Alternative 1 would be confined within the boundaries of Tyndall AFB and, therefore, would not affect public health and safety outside the base. For each project, work areas would be clearly marked with appropriate signage and secured against unauthorized entry. Standard construction traffic control measures would be implemented as appropriate. Implementation of the CRIP would improve coastal resilience and reduce the potential for flooding impacts at Tyndall AFB and, therefore, would have beneficial impacts on safety at the base. When combined with other unrelated actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on public health and safety.	*Less-than-Significant* The construction of Alternative 2 floodwalls and any other CRIP strategy that involves construction would comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds OSHA standards. A health and safety plan would be developed and implemented by the construction contractor for each project. All construction and other ground-disturbing activity under Alternative 2 must be issued a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation. The CRIP flood defense strategies under Alternative 2 would be confined within the boundaries of Tyndall AFB and, therefore, would not affect public health and safety outside the base. For each project, work areas would be clearly marked with appropriate signage and secured against unauthorized entry. Standard construction traffic control measures would be implemented as appropriate. Implementation of the CRIP would improve coastal resilience and reduce the potential for flooding impacts at Tyndall AFB and, therefore, would have beneficial impacts on safety at the base. When combined with other unrelated actions, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on public health and safety.	*No Effect* There would be no effect on public health and safety.
Hazardous Materials and Wastes	*Less-than-Significant Impact* There are active IRP sites within or adjacent to the footprints of the Alternative 1 levees for the fuel depot area and Silver Flag area. If any IRP sites within the footprint are active when a levee is proposed to be constructed, the design and construction of the levee would be closely coordinated with the 325 CES/CEIEC to prevent any health and safety impacts to construction workers or site personnel and avoid impacting ongoing investigation or remediation of the sites. The 325 CES/CEIEC would assess potential impacts to active IRP sites from Alternative 1 levees when they are proposed through the AF Form 813 process. Based on this assessment, the levee may need to be designed to avoid the IRP site. Construction that occurs in the vicinity of an IRP site may require special management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures. Management of soil and groundwater and other measures pertaining to the IRP sites would be required to be conducted in coordination with the 325 CES/CEIEC, and in accordance with Tyndall AFB protocols and all applicable environmental regulations. The DAF would conduct ACM and LBP surveys for any older structures proposed to be demolished under Alternative 1. Any encountered ACM or LBP would be remediated and disposed of in accordance with Tyndall AFB's ACM and LBP management plans and in compliance with all applicable regulations prior to demolition of the structures. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on hazardous materials and wastes.	*Less-than-Significant Impact* There are active IRP sites within or adjacent to the footprints of the Alternative 2 floodwalls for the fuel depot area and Silver Flag area. If any IRP sites within the footprint are active when a floodwall is proposed to be constructed, the design and construction of the floodwall would be closely coordinated with the 325 CES/CEIEC to prevent any health and safety impacts to construction workers or site personnel and avoid impacting ongoing investigation or remediation of the sites. The 325 CES/CEIEC would assess potential impacts to active IRP sites from Alternative 2 floodwalls when they are proposed through the AF Form 813 process. Based on this assessment, the floodwall may need to be designed to avoid the IRP site. Construction that occurs in the vicinity of an IRP site may require special management of soil and groundwater encountered during construction, including testing, handling, and disposal procedures. Management of soil and groundwater and other measures pertaining to the IRP sites would be required to be conducted in coordination with the 325 CES/CEIEC, and in accordance with Tyndall AFB protocols and all applicable environmental regulations. The DAF would conduct ACM and LBP surveys for any older structures proposed to be demolished under Alternative 2. Any encountered ACM or LBP would be remediated and disposed of in accordance with Tyndall AFB's ACM and LBP management plans and in compliance with all applicable regulations prior to demolition of the structures. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 2 would not have adverse cumulative impacts on hazardous materials and wastes.	*No Effect* There would be no effect on hazardous materials and wastes.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Socioeconomics	*Less-than-Significant Impact* The planning-level cost estimate for CRIP implementation under Alternative 1 is approximately $280 million. The Alternative 1 levees would not cost less to construct than the Alternative 2 floodwalls. Costs to implement the CRIP under Alternative 1 would be incurred intermittently when projects are implemented, over several decades out to approximately 2080, when the levee for the Silver Flag area is recommended to be constructed. Direct and indirect construction-related expenditures associated with CRIP implementation under Alternative 1 would have temporary beneficial impacts on the local economy. Construction work would have no appreciable effect on the total labor force or employment in the region. Operation and maintenance of constructed levees may involve a small number of permanent employee hires that may involve relocations to the area; however, the small number of hires and potential relocations would have no appreciable effect on the local economy or population. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on socioeconomics.	*Less-than-Significant Impact* The planning-level cost estimate for CRIP implementation under Alternative 2 is approximately $494 million. The Alternative 2 floodwalls would cost more to construct than the Alternative 1 levees. Costs to implement the CRIP under Alternative 2 would be incurred intermittently when projects are implemented, over several decades out to approximately 2080, when the floodwall for the Silver Flag area is recommended to be constructed. Direct and indirect construction-related expenditures associated with CRIP implementation under Alternative 2 would have temporary beneficial impacts on the local economy. Construction work would have no appreciable effect on the total labor force or employment in the region. Operation and maintenance of constructed levees may involve a small number of permanent employee hires that may involve relocations to the area; however, the small number of hires and potential relocations would have no appreciable effect on the local economy or population. When combined with past, present, and reasonably foreseeable actions, implementation of the CRIP under Alternative 1 would not have adverse cumulative impacts on socioeconomics.	*No Effect* There would be no effect on socioeconomics.
Environmental Justice and Protection of Children	*No Effect* Implementation of the CRIP under Alternative 1 would not result in any adverse environmental or human health and safety risks to human populations; therefore, it would not have disproportionate environmental or human health effects on minority or low-income populations. This finding is based on the results of the analyses conducted in this EA, which indicate that Alternative 1 would have less-than-significant impacts associated with air quality, noise, public health and safety, and hazardous materials and wastes. Implementation of the CRIP under Alternative 1 would not result in disproportionate environmental health or safety risks to children. Under EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," environmental health and safety risks refer to "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Children would not be allowed in the construction or operational areas where the CRIP strategies would be implemented and based on the findings of this EA, there would be no potential for Alternative 1 to expose children outside these areas to any environmental health or safety risks.	*No Effect* Implementation of the CRIP under Alternative 2 would not result in any adverse environmental or human health and safety risks to human populations; therefore, it would not have disproportionate environmental or human health effects on minority or low-income populations. This finding is based on the results of the analyses conducted in this EA, which indicate that Alternative 2 would have less-than-significant impacts associated with air quality, noise, public health and safety, and hazardous materials and wastes. Implementation of the CRIP under Alternative 2 would not result in disproportionate environmental health or safety risks to children. Under EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," environmental health and safety risks refer to "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Children would not be allowed in the construction or operational areas where the CRIP strategies would be implemented and based on the findings of this EA, there would be no potential for Alternative 2 to expose children outside these areas to any environmental health or safety risks.	*No Effect* There would be no disproportionate environmental or human health effects on minority or low-income populations. There would be no disproportionate environmental health or safety risks to children.
Cumulative Impacts	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, Alternative 1 would not have significantly adverse cumulative impacts on any resource.	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, Alternative 2 would not have significantly adverse cumulative impacts on any resource.	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, the No Action Alternative would not have significantly adverse cumulative impacts on any resource.

Table 3-34. Summary of Potential Environmental Consequences for NBS Pilot Projects

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Airspace Use and Management	*No Effect* Implementation of the NBS projects under Alternative 1 would have no effect on the classification, dimensions, or other parameters of any existing airspace. It would also have no potential to result in airspace restrictions or congestion, or otherwise impact air traffic control or military or non-military use of any airspace.	*No Effect* Implementation of the NBS projects under Alternative 2 would have no effect on the classification, dimensions, or other parameters of any existing airspace. It would also have no potential to result in airspace restrictions or congestion, or otherwise impact air traffic control or military or non-military use of any airspace.	*No Effect* There would be no effect on airspace use and management.
Air Quality and Climate Change	*Less-than-Significant Impact* Based on the quantities of criteria pollutants, VOCs, and fugitive dust estimated to be generated, construction of the NBS breakwaters under Alternative 1 would have a less-than-significant impact on air quality. Measures to control fugitive dust during construction are identified in Section 3.1. The estimated quantities of GHGs from breakwater construction would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. The NBS projects under Alternative 1 would not affect permitted stationary sources of air emissions at Tyndall AFB. The NBS breakwaters have been located and designed specifically to address coastal erosion associated with sea-level rise and, therefore, once constructed would have only beneficial effects associated with climate change. Based on the estimated construction air emissions, which would be temporary and well below insignificance thresholds; projected air emissions from other sources; and the attainment status of the area, implementation of the NBS projects under Alternative 1 would not have adverse cumulative impacts on air quality or climate change when combined with other past, present, or reasonably foreseeable future actions.	*Less-than-Significant Impact* Based on the quantities of criteria pollutants, VOCs, and fugitive dust estimated to be generated, construction of the NBS breakwaters under Alternative 2 would have a less-than-significant impact on air quality. Measures to control fugitive dust during construction are identified in Section 3.1. The estimated quantities of GHGs from breakwater construction would be well below the insignificance threshold of 68,039 mtpy established by the DAF for GHG emissions and, therefore, would be insignificant. The NBS projects under Alternative 2 would not affect permitted stationary sources of air emissions at Tyndall AFB. The NBS breakwaters have been located and designed specifically to address coastal erosion associated with sea-level rise and, therefore, once constructed would have only beneficial effects associated with climate change. Based on the estimated construction air emissions, which would be temporary and well below insignificance thresholds; projected air emissions from other sources; and the attainment status of the area, implementation of the NBS projects under Alternative 2 would not have adverse cumulative impacts on air quality or climate change when combined with other past, present, or reasonably foreseeable future actions.	*No Effect* There would be no effect on air quality or climate change. Without implementing the proposed NBS projects, the shorelines at the NBS project sites would erode from continuing sea-level rise and other changes in climatic conditions over time at a faster rate.
Water Resources	*Less-than-Significant Impact* The NBS projects under Alternative 1 would have no effect on floodplains or groundwater. Under Alternative 1, the estimated impacts to WOTUS and state jurisdictional waters are 0.81 acre for the living shoreline breakwater, 1.35 acres for the oyster reef breakwater, and 2.17 acres for the shoreline stabilization breakwater. The seagrass enhancement project would not displace or otherwise impact WOTUS or state jurisdictional waters. Construction of the three Alternative 1 breakwaters would require a Department of the Army Permit issued by USACE that authorizes impacts to WOTUS and navigable U.S. waters under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. The breakwaters would also require an ERP permit issued by DEP for impacts to state jurisdictional waters and authorization from DEP to use sovereign submerged lands; this authorization is reviewed through the ERP permit process. The seagrass enhancement project would not displace federal/state waters or state-owned submerged lands, and is expected to be either included in the permitting of the breakwaters or be authorized through a Special Activities License issued by FWC. There are no practicable alternatives to constructing in WOTUS under Alternative 1. The breakwaters must be located offshore and other alternatives such as armoring the shoreline with riprap would result in excessive environmental damage and would not qualify as an NBS strategy. Compensatory mitigation is not expected to be required for the Alternative 1 NBS projects based on their beneficial purpose and lack of seagrass impacts. None of the Alternative 1 breakwaters would impact seagrass and, therefore, would not require seagrass mitigation. Measures would be implemented to minimize potential impacts to bay and Gulf waters during construction of the breakwaters including but not limited to, controlling fugitive dust on the barges, preventing release of construction materials that could contaminate waters such as POLs; and using turbidity curtains and meeting the turbidity limit of 29 NTUs above background within the 150-meter mixing zone downstream of the construction work area, as required by DEP. The combination of the proposed NBS projects with other NBS projects that are implemented in the future at Tyndall AFB to reduce wave energy and coastal erosion would have beneficial cumulative impacts on water resources.	*Less-than-Significant Impact* The NBS projects under Alternative 2 would have no effect on floodplains or groundwater. Under Alternative 2, the estimated impacts to WOTUS and state jurisdictional waters are 157 square feet for the living shoreline breakwater, 236 square feet for the oyster reef breakwater, and 1.9 acres for the shoreline stabilization breakwater. The seagrass enhancement project would not displace or otherwise impact WOTUS or state jurisdictional waters. Construction of the three Alternative 2 breakwaters would require a Department of the Army Permit issued by USACE that authorizes impacts to WOTUS and navigable U.S. waters under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act. The breakwaters would also require an ERP permit issued by DEP for impacts to state jurisdictional waters and authorization from DEP to use sovereign submerged lands; this authorization is reviewed through the ERP permit process. The seagrass enhancement project would not displace federal/state waters or state-owned submerged lands, and is expected to be either included in the permitting of the breakwaters or be authorized through a Special Activities License issued by FWC. There are no practicable alternatives to constructing in WOTUS under Alternative 2. The breakwaters must be located offshore and other alternatives such as armoring the shoreline with riprap would result in excessive environmental damage and would not qualify as an NBS strategy. Compensatory mitigation is not expected to be required for the Alternative 2 NBS projects based on their beneficial purpose and lack of seagrass impacts. None of the Alternative 2 breakwaters would impact seagrass and, therefore, would not require seagrass mitigation. Measures would be implemented to minimize potential impacts to bay and Gulf waters during construction of the breakwaters including but not limited to, controlling fugitive dust on the barges, preventing release of construction materials that could contaminate waters such as POLs; and using turbidity curtains and meeting the turbidity limit of 29 NTUs above background within the 150-meter mixing zone downstream of the construction work area, as required by DEP. The combination of the proposed NBS projects with other NBS projects that are implemented in the future at Tyndall AFB to reduce wave energy and coastal erosion would have beneficial cumulative impacts on water resources.	*No Effect* There would be no construction-related impacts on water resources.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Geological Resources	*Less-than-Significant Impact* The Alternative 1 breakwaters would permanently displace sediments within their footprints. The seagrass enhancement project would not permanently displace sediments. A total of 40,443 tons of limestone and 6,717 tons of bedding stone are estimated to be required for all three breakwaters under Alternative 1. Construction of the Alternative 1 breakwaters is not expected to generate excessive amounts of turbidity. There would be no dredging or excavation of the seafloor. Turbidity curtains would be used and the turbidity limit of 29 NTUs above background would be met within the 150-meter mixing zone downstream of the construction work area, as required by DEP. Turbidity curtains would be installed to encompass the construction area where rock is being installed by the long-reach excavator. The curtains would extend from one end of the excavator barge, around the area where the excavator is laying rock, to the other end of the excavator barge. When combined with past, present, and reasonably foreseeable actions, the NBS projects under Alternative 1 would not have adverse cumulative impacts on geological resources.	*Less-than-Significant Impact* The Alternative 2 breakwaters would permanently displace sediments within their footprints. The seagrass enhancement project would not permanently displace sediments. Construction of the Alternative 2 breakwaters is not expected to generate excessive amounts of turbidity. There would be no dredging or excavation of the seafloor. Turbidity curtains would be used and the turbidity limit of 29 NTUs above background would be met within the 150-meter mixing zone downstream of the construction work area, as required by DEP. Turbidity curtains would be installed to encompass the construction area where rock is being installed by the long-reach excavator. The curtains would extend from one end of the excavator barge, around the area where the excavator is laying rock, to the other end of the excavator barge. When combined with past, present, and reasonably foreseeable actions, the NBS projects under Alternative 2 would not have adverse cumulative impacts on geological resources.	*No Effect* There would be no effect on geological resources.
Cultural Resources	*Less-than-Significant Impact* The Phase I submerged archaeological resources survey conducted by SEARCH identified a total of 14 magnetic anomalies and 4 acoustic contacts within the combined footprints of the four NBS pilot projects. SEARCH determined that none of the magnetic anomalies or acoustic contacts had similar characteristics to verified shipwreck magnetic signatures or acoustic images or otherwise indicated a potential submerged cultural resource. Based on these findings, SEARCH recommends no additional archaeological work for the project areas. The monitoring program that would be implemented for the constructed Alternative 1 breakwaters would include evaluating the seafloor adjacent to the breakwaters for the presence of any visible submerged archaeological resources and changes in the shoreline over time, which could potentially affect cultural resources management at the base. Inadvertent discoveries of potential submerged archaeological resources during construction of the NBS projects under Alternative 1 would be protected in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023). Tyndall AFB is conducting interagency consultation with SHPO and intergovernmental consultation with the six affiliated tribes on the proposed NBS projects. When combined with past, present, and reasonably foreseeable actions, the NBS projects under Alternative 1 would not have adverse cumulative impacts on cultural resources.	*Less-than-Significant Impact* The Phase I submerged archaeological resources survey conducted by SEARCH identified a total of 14 magnetic anomalies and 4 acoustic contacts within the combined footprints of the four NBS pilot projects. SEARCH determined that none of the magnetic anomalies or acoustic contacts had similar characteristics to verified shipwreck magnetic signatures or acoustic images or otherwise indicated a potential submerged cultural resource. Based on these findings, SEARCH recommends no additional archaeological work for the project areas. The monitoring program that would be implemented for the constructed Alternative 2 breakwaters would include evaluating the seafloor adjacent to the breakwaters for the presence of any visible submerged archaeological resources and changes in the shoreline over time, which could potentially affect cultural resources management at the base. Inadvertent discoveries of potential submerged archaeological resources during construction of the NBS projects under Alternative 1 would be protected in accordance with SOP 7.4, *Discoveries of Archaeological Resources and NAGPRA Cultural Items*, in the Tyndall AFB ICRMP (DAF 2023). Tyndall AFB is conducting interagency consultation with SHPO and intergovernmental consultation with the six affiliated tribes on the proposed NBS projects. When combined with past, present, and reasonably foreseeable actions, the NBS projects under Alternative 2 would not have adverse cumulative impacts on cultural resources.	*No Effect* There would be no effect on cultural resources.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Biological Resources	*Less-than-Significant Impact* The footprints of all three Alternative 1 breakwaters consist of sandy bottom that is devoid of SAV. The benthic EFH that would be displaced by each breakwater is ubiquitous in the area and, therefore, would represent a negligible loss of such habitat and an insignificant impact on the marine biota that use it. Installation of the breakwaters would create structural habitat for a wide variety of marine life and would result in a net increase in habitat substrate in the project areas. The Alternative 1 breakwaters would provide considerably more structural habitat than the Alternative 2 breakwaters in terms of total footprint and structural habitat surface area. By reducing wave energy, the Alternative 1 breakwaters would enhance existing seagrass and marsh habitats in the project areas. Each constructed Alternative 1 breakwater would be approximately 25 feet or more from the closest seagrass bed. The seagrass enhancement project is expected to reduce further seagrass loss and promote new seagrass growth, thereby enhancing EFH in the project area. The DAF has determined that the NBS projects under Alternative 1 would not adversely affect EFH or federally managed fisheries. The DAF requested concurrence from NMFS HCD on this determination. In a reply email dated July 16, 2024, NMFS HCD indicated that based on its review of the EFH Assessment, it anticipates that any adverse effects that might occur on marine and anadromous fishery resources would be minimal and that the EFH consultation requirement for the project has been satisfied. The DAF is informally consulting under Section 7(a)(2) of the ESA with NMFS and USFWS on the NBS projects under Alternative 1, the preferred alternative. Potentially affected ESA-species regulated by NMFS include the gulf sturgeon, giant manta ray, and the following sea turtle species when in the marine environment: loggerhead, green, Kemp's ridley, and leatherback. The NBS project areas are outside critical habitat for the gulf sturgeon and loggerhead sea turtle. Construction noise and turbidity impacts on the gulf sturgeon, giant manta ray, and identified sea turtle species under Alternative 1 would be insignificant. Installation of the Alternative 1 breakwaters would not involve pile driving, and the use of an excavator on a barge to place rocks within the breakwater footprints would not generate excessive underwater noise levels. Injurious noise effects are extremely unlikely based on the mobility of the species and the requirement to stop work if a protected species is observed within 150 feet of the operation according to NOAA Fisheries *Protected Species Construction Conditions*. Construction of the Alternative 1 breakwaters is not expected to generate excessive amounts of turbidity and the mobility of the species would prevent adverse impacts. The Alternative 1 breakwaters would displace benthic habitat potentially used for foraging by the gulf sturgeon, loggerhead sea turtle, and Kemp's ridley sea turtle. The benthic habitat that would be displaced is ubiquitous in the area and, therefore, would represent a negligible loss of foraging habitat and an insignificant impact on these ESA-listed species. The breakwaters themselves would provide a considerable amount of structural habitat that would support many of the same prey items supported by the habitat that would be displaced. The installation of bamboo stakes along the seaward edge of the existing seagrass meadow for the seagrass enhancement project would restrict grazing of the meadow edge by green sea turtles. The bamboo stockade would restrict less than 1 percent of the existing meadow in the area being grazed. The project is expected to reduce further seagrass loss and promote new seagrass growth, thereby improving the foraging habitat for green sea turtles in the area over time. Potential exclusion or deterrence of ESA-listed species from the project area would be temporary, lasting only during the in-water construction period for each breakwater. Construction workers would be trained on how to identify the ESA-listed species and all the protection measures to be followed, including NOAA Fisheries' *Protected Species Construction Conditions* (May 2021) and *Vessel Strike Avoidance Measures* (May 2021). The DAF has determined that the four proposed NBS projects under Alternative 1 are not likely to adversely affect the gulf sturgeon, giant manta ray, or identified sea turtle species in the marine environment or any other listed species or critical habitat under NMFS's jurisdiction. The DAF has requested concurrence from NMFS on this determination.	*Less-than-Significant Impact* The footprints of all three Alternative 2 breakwaters consist of sandy bottom that is devoid of SAV. The benthic EFH that would be displaced by each breakwater is ubiquitous in the area and, therefore, would represent a negligible loss of such habitat and an insignificant impact on the marine biota that use it. Installation of the breakwaters would create structural habitat for a wide variety of marine life and would result in a net increase in habitat substrate in the project areas. The Alternative 2 breakwaters would provide considerably less structural habitat than the Alternative 1 breakwaters in terms of total footprint and structural habitat surface area. By reducing wave energy, the Alternative 2 breakwaters would enhance existing seagrass and marsh habitats in the project areas. Each constructed Alternative 2 breakwater would be approximately 25 feet or more from the closest seagrass bed. The seagrass enhancement project is expected to reduce further seagrass loss and promote new seagrass growth, thereby enhancing EFH in the project area. The DAF has determined that the NBS projects under Alternative 2 would not adversely affect EFH or federally managed fisheries. The DAF would request separate concurrence from NMFS HCD on this determination if Alternative 2 is proposed to be implemented. Potentially affected ESA-species regulated by NMFS include the gulf sturgeon, giant manta ray, and the following sea turtle species when in the marine environment: loggerhead, green, Kemp's ridley, and leatherback. The NBS project areas are outside critical habitat for the gulf sturgeon and loggerhead sea turtle. Construction noise and turbidity impacts on the gulf sturgeon, giant manta ray, and identified sea turtle species under Alternative 2 would be insignificant. Installation of the Alternative 2 disk breakwaters at the living shoreline and oyster reef breakwater sites would involve pile driving and, therefore, would generate higher underwater noise levels than the installation of the Alternative 1 breakwaters at the same sites. The fiberglass pilings of the disk breakwaters would be small relative to most construction pilings and, therefore, would generate relatively low noise levels compared to typical construction projects that involve pile driving. The installation of a geotube breakwater at the shoreline stabilization site under Alternative 2 would generate comparable noise levels to the installation of a quarry stone breakwater under Alternative 1. Injurious noise effects are extremely unlikely based on the mobility of the species and the requirement to stop work if a protected species is observed within 150 feet of the operation according to NOAA Fisheries *Protected Species Construction Conditions*. Construction of the Alternative 2 breakwaters is not expected to generate excessive amounts of turbidity and the mobility of the species would prevent adverse impacts. The Alternative 2 breakwaters would displace benthic habitat potentially used for foraging by the gulf sturgeon, loggerhead sea turtle, and Kemp's ridley sea turtle. The benthic habitat that would be displaced is ubiquitous in the area and, therefore, would represent a negligible loss of foraging habitat and an insignificant impact on these ESA-listed species. The breakwaters themselves would provide a considerable amount of structural habitat that would support many of the same prey items supported by the habitat that would be displaced. The installation of bamboo stakes along the seaward edge of the existing seagrass meadow for the seagrass enhancement project would restrict grazing of the meadow edge by green sea turtles. The bamboo stockade would restrict less than 1 percent of the existing meadow in the area being grazed. The project is expected to reduce further seagrass loss and promote new seagrass growth, thereby improving the foraging habitat for green sea turtles in the area over time. Potential exclusion or deterrence of ESA-listed species from the project area would be temporary, lasting only during the in-water construction period for each breakwater. Construction workers would be trained on how to identify the ESA-listed species and all the protection measures to be followed, including NOAA Fisheries' *Protected Species Construction Conditions* (May 2021) and *Vessel Strike Avoidance Measures* (May 2021). The DAF has determined that the four proposed NBS projects under Alternative 1 are not likely to adversely affect the gulf sturgeon, giant manta ray, or identified sea turtle species in the marine environment or any other listed species or critical habitat under NMFS's jurisdiction. The DAF	*No Effect* There would be no effect on biological resources.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
	Potentially affected ESA-listed species regulated by USFWS include the identified sea turtle species when nesting and the piping plover, rufa red knot, Choctawhatchee beach mouse, St. Andrew beach mouse, and Florida manatee. Breakwater construction under Alternative 1 would be conducted entirely from a barge. No construction activity, including staging areas or support operations, would be conducted on land. Therefore, breakwater construction under Alternative 1 would have no potential to physically impact nesting sea turtles, sea turtle nests, wintering piping plovers, wintering rufa red knots, or the two beach mouse species. To minimize the potential for construction-related disturbance to nesting sea turtles during construction of the shoreline stabilization breakwater, nighttime construction between 7:00 p.m. and dawn would be prohibited between May 1 to October 31 in St. Andrew Sound for this breakwater. Nighttime construction would be conducted only if necessary on a limited basis or not at all during the remainder of the year. To prevent lighting impacts on sea turtle hatchlings, all operating exterior lights on barges and other vessels staged overnight in St. Andrew Sound would comply with the lighting criteria in *FWC Sea Turtle Lighting Guidelines* (FWC 2018). The seagrass enhancement project would have no effect on nesting sea turtles. The project would not involve construction, and the bamboo stakes would be installed along the seaward edge of the seagrass meadow by hand and only during daytime hours. The shorelines adjacent to the living shoreline and oyster reef breakwater sites are not known to be used by wintering piping plovers or rufa red knots. These bird species do winter on CIW and CIE. Based on the noise levels estimated for breakwater construction at this site and the locations of CIW and CIE relative to the shoreline stabilization breakwater, construction noise disturbance under Alternative 1 to wintering piping plovers and rufa red knots would be insignificant. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on these wintering bird species. Any construction noise disturbance under Alternative 1 to the Choctawhatchee and St. Andrew beach mice that occur on CIW and CIE, respectively would be insignificant. Moreover, there would be low potential for noise disturbance at night when the beach mice are active. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on both beach mice species. The potential for adverse noise impacts or physical injury to the Florida manatee from construction equipment is extremely unlikely based on the ability of this species to swim away from the construction area if disturbed and the requirement to stop all in-water operations if a manatee is sighted within 50 feet of the operation according to *Standard Manatee Conditions for In-water Work* (USFWS 2011). The footprints of all three Alternative 1 breakwaters consist of sandy bottom that is devoid of SAV; therefore, construction of the breakwaters would not result in the loss of any manatee foraging habitat. All three Alternative 1 breakwaters and the seagrass enhancement project would have beneficial impacts on seagrass habitat, which would benefit the manatee. The DAF has determined that the four proposed NBS projects under Alternative 1 may affect but are not likely to adversely affect the loggerhead, green, Kemp's ridley, and leatherback sea turtles when nesting, and the piping plover, rufa red knot, Choctawhatchee beach mouse, St. Andrew beach mouse, and Florida manatee. The DAF has determined that the projects would not result in destruction or adverse modification of critical habitat designated for any species under USFWS jurisdiction. The DAF has requested concurrence from USFWS on this determination. The DAF has determined that the four NBS projects under Alternative 1 would have no effect on the eastern black rail, tricolored bat, eastern indigo snake, and any other ESA-listed species regulated by USFWS.	would request separate concurrence from NMFS PRD on this determination if Alternative 2 is proposed to be implemented. Potentially affected ESA-listed species regulated by USFWS include the identified sea turtle species when nesting and the piping plover, rufa red knot, Choctawhatchee beach mouse, St. Andrew beach mouse, and Florida manatee. Breakwater construction under Alternative 2 would be conducted entirely from a barge. No construction activity, including staging areas or support operations, would be conducted on land. Therefore, breakwater construction under Alternative 2 would have no potential to physically impact nesting sea turtles, sea turtle nests, wintering piping plovers, wintering rufa red knots, or the two beach mouse species. To minimize the potential for construction-related disturbance to nesting sea turtles during construction of the shoreline stabilization breakwater in St. Andrew Sound, nighttime construction between 7:00 p.m. and dawn would be prohibited between May 1 to October 31 for this breakwater. Nighttime construction would be conducted only if necessary on a limited basis or not at all during the remainder of the year. To prevent lighting impacts on sea turtle hatchlings, all operating exterior lights on barges and other vessels staged overnight in St. Andrew Sound would comply with the lighting criteria in *FWC Sea Turtle Lighting Guidelines* (FWC 2018). The seagrass enhancement project would have no effect on nesting sea turtles. The project would not involve construction, and the bamboo stakes would be installed along the seaward edge of the seagrass meadow by hand and only during daytime hours. The shorelines adjacent to the living shoreline and oyster reef breakwater sites are not known to be used by wintering piping plovers or rufa red knots. These bird species do winter on CIW and CIE. Based on the noise levels estimated for breakwater construction at this site and the locations of CIW and CIE relative to the shoreline stabilization breakwater, construction noise disturbance under Alternative 2 to wintering piping plovers and rufa red knots would be insignificant. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on these wintering bird species. Any construction noise disturbance under Alternative 2 to the Choctawhatchee and St. Andrew beach mice that occur on CIW and CIE, respectively, would be insignificant. Moreover, there would be low potential for noise disturbance at night when the beach mice are active. The presence of the construction barges within St. Andrew Sound and the periodic transiting of barges and vessels in and out of St. Andrew Sound would also have an insignificant impact on both beach mice species. The potential for adverse noise impacts or physical injury to the Florida manatee from construction equipment is extremely unlikely based on the ability of this species to swim away from the construction area if disturbed and the requirement to stop all in-water operations if a manatee is sighted within 50 feet of the operation according to *Standard Manatee Conditions for In-water Work* (USFWS 2011). The footprints of all three Alternative 2 breakwaters consist of sandy bottom that is devoid of SAV; therefore, construction of the breakwaters would not result in the loss of any manatee foraging habitat. All three Alternative 2 breakwaters and the seagrass enhancement project would have beneficial impacts on seagrass habitat, which would benefit the manatee. The DAF has determined that the four proposed NBS projects under Alternative 2 may affect but are not likely to adversely affect the loggerhead, green, Kemp's ridley, and leatherback sea turtles when nesting, and the piping plover, rufa red knot, Choctawhatchee beach mouse, St. Andrew beach mouse, and Florida manatee. The DAF has determined that the projects would not result in destruction or adverse modification of critical habitat designated for any species under USFWS jurisdiction. The DAF would request separate concurrence from USFWS on this determination if Alternative 2 is proposed to be implemented. The DAF has determined that the four NBS projects under Alternative 2 would have no effect on the eastern black rail, tricolored bat, eastern indigo snake, and any other ESA-listed species regulated by USFWS.	

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Noise	*Less-than-Significant Impact* Under Alternative 1, outdoor noise levels in the NSAs nearest to the NBS breakwaters during the construction period are estimated to range from 35 to 47 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by a refrigerator at the high end. Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. Noise that is audible at the nearest NSAs under Alternative 1 would be heard only during daytime and only over the duration of the construction period. Based on the estimated contribution that construction noise would have on ambient noise levels, implementation of the NBS projects under Alternative 1 would not have adverse cumulative noise impacts when combined with other unrelated actions.	*Less-than-Significant Impact* Under Alternative 2, outdoor noise levels in the NSAs nearest to the NBS breakwaters during the construction period are estimated to range from 35 to 63 dBA, depending on the location. This noise range is comparable to noise perceived to be faint at the low end to noise generated by normal conversation or a sewing machine at the high end. Noise levels inside the houses in these residential communities would be approximately 20 to 30 dBA lower than the outdoor noise levels. Noise that is audible at the nearest NSAs under Alternative 2 would be heard only during daytime and only over the duration of the construction period. Based on the estimated contribution that construction noise would have on ambient noise levels, implementation of the NBS projects under Alternative 2 would not have adverse cumulative noise impacts when combined with other unrelated actions.	*No Effect* There would be no noise-related effects.
Infrastructure	*No Effect* None of the NBS projects under Alternative 1 would have the potential to affect utilities, roadways, or other infrastructure on or off Tyndall AFB. Therefore, implementation of the NBS projects under Alternative 1 would have no effect on infrastructure.	*No Effect* None of the NBS projects under Alternative 2 would have the potential to affect utilities, roadways, or other infrastructure on or off Tyndall AFB. Therefore, implementation of the NBS projects under Alternative 2 would have no effect on infrastructure.	*No Effect* There would be no effect on infrastructure.
Land Use	*Less-than-Significant Impact* The NBS projects under Alternative 1 would be implemented offshore of Tyndall AFB over state-owned submerged land. The projects would obtain authorization from DEP to use sovereign submerged lands through the ERP permit process. The offshore locations of the projects are used by the public for recreational boating and fishing. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary lasting only during the in-water construction period for each breakwater, which is estimated to be 3 months each for the living shoreline and oyster reef breakwaters in East Bay and approximately 6 months for the shoreline stabilization breakwater in St. Andrew Sound. Based on the size of the construction area and duration of the construction period, any associated impacts on public use of the offshore locations would not be significant. The Alternative 1 breakwaters have been designed to reduce the rate of coastal erosion in the project areas over time and are not expected to adversely affect any existing or future operations at Tyndall AFB. The breakwaters would have beneficial effects on existing and future base operations and land use by improving the coastal resilience of areas that contain critical assets. The combination of the NBS projects under Alternative 1 with the traditional flood defense strategies developed through the Tyndall AFB CRIP, as well as future NBS projects to improve coastal resilience would have beneficial cumulative impacts on existing and future land use at the base.	*Less-than-Significant Impact* The NBS projects under Alternative 2 would be implemented offshore of Tyndall AFB over state-owned submerged land. The projects would obtain authorization from DEP to use sovereign submerged lands through the ERP permit process. The offshore locations of the projects are used by the public for recreational boating and fishing. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary lasting only during the in-water construction period for each breakwater, which is estimated to be 3 months each for the living shoreline and oyster reef breakwaters in East Bay and approximately 6 months for the shoreline stabilization breakwater in St. Andrew Sound. Based on the size of the construction area and duration of the construction period, any associated impacts on public use of the offshore locations would not be significant. The Alternative 2 breakwaters have been designed to reduce the rate of coastal erosion in the project areas over time and are not expected to adversely affect any existing or future operations at Tyndall AFB. The breakwaters would have beneficial effects on existing and future base operations and land use by improving the coastal resilience of areas that contain critical assets. The combination of the NBS projects under Alternative 2 with the traditional flood defense strategies developed through the Tyndall AFB CRIP, as well as future NBS projects to improve coastal resilience would have beneficial cumulative impacts on existing and future land use at the base.	*No Effect* There would be no effect on land use.

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Public Health and Safety	*Less-than-Significant Impact* Construction of the Alternative 1 breakwaters would comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds OSHA standards. A health and safety plan would be developed and implemented by the construction contractor for each breakwater project. Each project would be required to obtain a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary, lasting only during the in-water construction period for each breakwater. All vessels associated with the construction would operate at idle speed/no wake at all times while in the construction area. Permanent in-water signage would be installed around each breakwater that alerts the public to the presence of the structure. The signage would require a Private Aids to Navigation permit from the U.S. Coast Guard. The Alternative 1 breakwaters have been designed to be submerged to not attract birds and increase the BASH risk at the base. The combination of the NBS projects under Alternative 1 with the traditional flood defense strategies developed through the Tyndall AFB CRIP, as well as future NBS projects to improve coastal resilience would have beneficial cumulative impacts on public health and safety.	*Less-than-Significant Impact* Construction of the Alternative 2 breakwaters would comply with Engineer Manual 385-1-1, *Safety and Health Requirements*, which meets or exceeds OSHA standards. A health and safety plan would be developed and implemented by the construction contractor for each breakwater project. Each project would be required to obtain a dig permit via AF Form 103, *Base Civil Engineering Work Clearance Request*, prior to initiation. Public access to the waters within the construction area would be restricted during the construction period for public safety. Such restrictions would be temporary, lasting only during the in-water construction period for each breakwater. All vessels associated with the construction would operate at idle speed/no wake at all times while in the construction area. Permanent in-water signage would be installed around each breakwater that alerts the public to the presence of the structure. The signage would require a Private Aids to Navigation permit from the U.S. Coast Guard. The Alternative 2 breakwaters have been designed to be submerged to not attract birds and increase the BASH risk at the base. The combination of the NBS projects under Alternative 2 with the traditional flood defense strategies developed through the Tyndall AFB CRIP, as well as future NBS projects to improve coastal resilience would have beneficial cumulative impacts on public health and safety.	*No Effect* There would be no effect on public health and safety.
Hazardous Materials and Wastes	*Less-than-Significant Impact* There are no IRP sites that include the offshore locations of the NBS projects and there is no evidence of past contamination in these offshore locations. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans. When combined with past, present, and reasonably foreseeable actions, implementation of the NBS projects under Alternative 1 would not have adverse cumulative impacts on hazardous materials and wastes.	*Less-than-Significant Impact* There are no IRP sites that include the offshore locations of the NBS projects and there is no evidence of past contamination in these offshore locations. Handling, storage, and disposal of hazardous materials/waste during construction activities, including measures to prevent releases, would be required to be conducted in accordance with all applicable environmental compliance regulations and Tyndall AFB environmental management plans. When combined with past, present, and reasonably foreseeable actions, implementation of the NBS projects under Alternative 2 would not have adverse cumulative impacts on hazardous materials and wastes.	*No Effect* There would be no effect on hazardous materials and wastes.
Socioeconomics	*Less-than-Significant Impact* Cost estimates for breakwater construction under Alternative 1 range from approximately $3.1 to $4.4 million for the living shoreline breakwater, $3.4 to $4.8 million for the oyster reef breakwater, and $5.1 to $7.2 million for the shoreline stabilization breakwater. Cost estimates have not been developed for the seagrass enhancement project. Direct and indirect expenditures associated with the construction of the Alternative 1 breakwaters would have temporary beneficial impacts on the local economy. Construction work would have no appreciable effect on the total labor force or employment in the region. Once constructed, maintenance of the breakwaters would not involve employee hires or otherwise change the number of persons working at Tyndall AFB or living in the local area. When combined with past, present, and reasonably foreseeable actions, implementation of the NBS projects under Alternative 1 would not have adverse cumulative impacts on socioeconomics.	*Less-than-Significant Impact* Cost estimates have not been developed for the Alternative 2 breakwaters or seagrass enhancement project. Direct and indirect expenditures associated with the construction of the Alternative 2 breakwaters would have temporary beneficial impacts on the local economy. Construction work would have no appreciable effect on the total labor force or employment in the region. Once constructed, maintenance of the breakwaters would not involve employee hires or otherwise change the number of persons working at Tyndall AFB or living in the local area. When combined with past, present, and reasonably foreseeable actions, implementation of the NBS projects under Alternative 2 would not have adverse cumulative impacts on socioeconomics.	

Resource Area	Alternative 1	Alternative 2	No Action Alternative
Environmental Justice and Protection of Children	*No Effect* Implementation of the NBS projects under Alternative 1 would not result in any adverse environmental or human health and safety risks to human populations; therefore, it would not have disproportionate environmental or human health effects on minority or low-income populations. This finding is based on the results of the analyses conducted in this EA, which indicate that Alternative 1 would have less-than-significant impacts associated with air quality, noise, public health and safety, and hazardous materials and wastes. Implementation of the NBS projects under Alternative 1 would not result in disproportionate environmental health or safety risks to children. Under EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," environmental health and safety risks refer to "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Children would not be allowed in the construction areas and based on the findings of this EA, there would be no potential for Alternative 1 to expose children outside these areas to any environmental health or safety risks.	*No Effect* Implementation of the NBS projects under Alternative 2 would not result in any adverse environmental or human health and safety risks to human populations; therefore, it would not have disproportionate environmental or human health effects on minority or low-income populations. This finding is based on the results of the analyses conducted in this EA, which indicate that Alternative 2 would have less-than-significant impacts associated with air quality, noise, public health and safety, and hazardous materials and wastes. Implementation of the NBS projects under Alternative 2 would not result in disproportionate environmental health or safety risks to children. Under EO 13045, "Protection of Children from Environmental Health Risks and Safety Risks," environmental health and safety risks refer to "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Children would not be allowed in the construction areas and based on the findings of this EA, there would be no potential for Alternative 2 to expose children outside these areas to any environmental health or safety risks.	*No Effect* There would be no disproportionate environmental or human health effects on minority or low-income populations. There would be no disproportionate environmental health or safety risks to children.
Cumulative Impacts	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, Alternative 1 would not have significantly adverse cumulative impacts on any resource.	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, Alternative 2 would not have significantly adverse cumulative impacts on any resource.	*Less-than-Significant Impact* When added to past, present, and reasonably foreseeable actions, the No Action Alternative would not have significantly adverse cumulative impacts on any resource.

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5. List of Preparers

Name	EA Role	Education and Experience
Tunch Orsoy	Technical Lead/Author	M.S., Marine Science Years of Experience: 30
David Bell	Project Manager	B.S., Environmental Studies Years of Experience: 16
Nicole Bentivegna	Water Resources, Socioeconomics	M.S., Environmental Science Years of Experience: 13
Caitlin Santinelli	Air Quality	B.S., Earth and Atmospheric Science Years of Experience: 13
Mitch Lindsay	Senior Technical Review	M.S., Civil Engineering Years of Experience: 38
Matt Sluder	Editor	B.A., English Years of Experience: 9
Eduardo Rendon	GIS and Graphics	M.S., Environmental Planning and Design Years of Experience: 17

Appendix A
Intergovernmental and Interagency Consultation

From: Section106
To: Orsoy, Tunch
Subject: [EXTERNAL] Re: Muscogee (Creek) Nation Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Thursday, May 4, 2023 2:50:55 PM

Good afternoon Mr. Orsoy,

Thank you for sending the correspondence regarding the proposed coastal resilience implementtion plan for four locations on the Tyndall Air Force Base in Bay County, Florida. Bay County is located within the Muscogee (Creek) Nation's historic area of interest and is of importance to us. After review, the Muscogee Nation is unaware of any Muscogee sacred sites, burial grounds, or significant cultural resources located within the immediate project area. However, the Muscogee Nation looks forward to receiving the cultural resource survey reports for the proposed coastal resilience projects and will send in our comments/response upon receipt. Please feel free to contact me if there are any questions or concerns.

Thank you,

Robin Soweka, Jr.
Cultural Resource Specialist, Historic and Cultural Preservation Department
The Muscogee Nation
[redacted]
MuscogeeNation.com
THE MUSCOGEE NATION

From: Orsoy, Tunch <[redacted]>
Sent: Thursday, April 6, 2023 4:05 PM
To: Section106 <[redacted]>; [redacted] <[redacted]>; Corain Lowe <[redacted]>
Cc: WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC <[redacted]>
Subject: Muscogee (Creek) Nation Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan

Dear Principal Chief Hill

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the

nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP. The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings of the surveys, the flood-defense strategies recommended in the CRIP, which include traditional land-based structural defenses such as floodwalls and levees, would have no effect on historic properties based on the types and locations of the proposed structures. All these land-based CRIP strategies will undergo subsequent cultural review when they are proposed to be implemented in the future. Underwater archaeological surveys will be conducted for the living shoreline, oyster reef, and shoreline stabilization project areas. The findings of these surveys will be used to avoid impacts to any maritime archaeological resources that may exist in the area. The survey findings will be presented in a report that will be provided to you for review and comment. The findings and associated consultation with your office will be documented in the EA that is being prepared for the Proposed Action.

Please let us know if you are aware of any properties of cultural and religious significance to Muscogee (Creek) Nation within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted] or via telephone at [redacted].

Sent on behalf of Tyndall AFB.

Tunch Orsoy
Jacobs Engineering Group
[redacted]

From: LaVere, Ashley
To: Orsoy, Tunch
Cc: [redacted]
Subject: [EXTERNAL] RE: FWC Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Monday, April 10, 2023 3:11:54 PM

Good afternoon,

Florida Fish and Wildlife Conservation Commission (FWC) staff have received this notification of the Proposed Action for the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP). This plan includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four (4) nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB, including the creation of a living shoreline, oyster reef, and shoreline stabilization structure, and enhancement of seagrass habitat.

FWC staff have no initial questions or concerns regarding this proposal and will provide additional comments for listed species and habitat protection during our review of the draft Environmental Assessment (EA) for this proposal.

FWC staff appreciate the opportunity to provide input on this Proposed Action and look forward to reviewing the draft EA. Please contact me at (850) 922-4330 or via email if you have any questions or require additional information.

Sincerely,

Ashley LaVere
Fish & Wildlife Biological Scientist IV
Imperiled Species Management Section
Florida Fish and Wildlife Conservation Commission

[redacted]

From: Orsoy, Tunch [redacted]
Sent: Monday, March 13, 2023 10:52 AM
To: Pepe, Diana [redacted]
Cc: [redacted] CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE
[redacted] WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
[redacted]
Subject: FWC Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan

[EXTERNAL SENDER] Use Caution opening links or attachments

Ms. Pepe,

The United States Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB Coastal Resilience Implementation Plan (CRIP), which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations

of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impact on any state or federally protected species. The Air Force is consulting separately with the U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) for species under their regulatory jurisdiction. Species protection measures for the pilot projects will be addressed in detail in the draft EA. The pilot projects will avoid impacts to seagrass to the greatest extent practicable. Our project team has conducted preliminary seagrass surveys at the pilot project sites and held calls with Florida Fish and Wildlife Conservation Commission (FWC) and Florida Department of Environmental Protection to discuss survey methodology and permitting requirements. The final results of the seagrass surveys will be included in an Essential Fish Habitat Assessment report that will be submitted to NMFS's Habitat Conservation Division. State and federal permitting requirements for the pilot projects will be satisfied after the EA is completed.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any fish or wildlife resources regulated by FWC.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the FWC for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Mr. Jose Cintron.

Tunch Orsoy
Jacobs Engineering Group

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
103 Mississippi Road (Building 36234)
Tyndall AFB FL 32403-5014

Alissa Slade Lotane, Division Director
State Historic Preservation Officer
Division of Historic Resources
R.A. Gray Building
500 South Bronough Street
Tallahassee FL 32399-0250

Re: Phase I Submerged Archaeological Resources Survey
Tyndall Air Force Base (AFB), Bay County, Florida (TY-23-0044)

Dear Ms. Lotane

Please find the following reports for your review and comment; "*Phase I Submerged Archaeological Resources Survey for the Tyndall Air Force Base Coastal Resilience Pilot Project Design, Bay County, Florida*" by SEARCH. SEARCH conducted a submerged archaeological resources assessment survey in three areas to support Jacobs Engineering Group toward an archaeological permitting of the proposed pilot project design. The survey identified 14 magnetic anomalies and four acoustic contacts within the project corridor. There were no submerged cultural resources of potential significance found and recommends no additional work based on current data.

Tyndall AFB respectfully requests your review. Any questions may be directed to our points of contact, Ms. Ilaria Harrach, AF Cultural Resources Program Manager, AFCEC CZOE,

ilaria.harrach@us.af.mil, 850-883-3350; or myself at jose.cintron.1@us.af.mil or 850-283-2713.

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2023.10.20 14:35:17 -05'00'

JOSÉ CINTRON, GS-13, DAF

Attachments:
Final Report
GIS Data
Raw Data

Sent via email to: Alissa.Lotane@dos.myflorida.com; Compliancepermits@dos.myflorida.com

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

Talbert Cypress, Chairman
Miccosukee Tribe of Indians of Florida Tamiami Station
[redacted]

Dear Chairman Cypress

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Based on the initial findings of the surveys, the flood-defense strategies recommended in the CRIP, which include traditional land-based structural defenses such as floodwalls and levees, would have no effect on historic properties based on the types and locations of the proposed structures. All these land-based CRIP strategies will undergo subsequent cultural review when they are proposed to be implemented in the future. Underwater archaeological surveys will be conducted for the living shoreline, oyster reef, and shoreline stabilization project areas.

The findings of these surveys will be used to avoid impacts to any maritime archaeological resources that may exist in the area. The survey findings will be presented in a report that will be provided to you for review and comment. The findings and associated consultation with your office will be documented in the EA that is being prepared for the Proposed Action.

Please let us know if you are aware of any properties of cultural and religious significance to Miccosukee Tribe of Indians of Florida within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:33:35 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Attachment:
Figure 1 – Location of In-Water Pilot Projects

Sent via email to:
[redacted]

From:	Orsoy, Tunch
To:	[redacted]
Cc:	WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject:	Miccosukee Tribe of Indians of Florida Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date:	Thursday, April 6, 2023 5:04:00 PM
Attachments:	Tab 1.1 Tyndall CRIP EA Miccosukee Scoping Letter.pdf Figure 1 Attachment.pdf

Dear Chairman Cypress

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP. The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings of the surveys, the flood-defense strategies recommended in the CRIP, which include traditional land-based structural defenses such as floodwalls and levees, would have no effect on historic properties based on the types and locations of the proposed structures. All these land-based CRIP strategies will undergo subsequent cultural review when they are proposed to be implemented in the future. Underwater archaeological surveys will be conducted for the living shoreline, oyster reef, and shoreline stabilization project areas. The findings of these surveys will be used to avoid impacts to any maritime archaeological resources that may exist in the area. The survey findings will be presented in a report that will be provided to you for review and comment. The findings and associated consultation with your office will be documented in the EA that is being prepared for the Proposed Action.

Please let us know if you are aware of any properties of cultural and religious significance to Miccosukee Tribe of Indians of Florida within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of

concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

David Hill, Principal Chief
Muscogee (Creek) Nation
[redacted]

Dear Principal Chief Hill

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Based on the initial findings of the surveys, the flood-defense strategies recommended in the CRIP, which include traditional land-based structural defenses such as floodwalls and levees, would have no effect on historic properties based on the types and locations of the proposed structures. All these land-based CRIP strategies will undergo subsequent cultural review when they are proposed to be implemented in the future. Underwater archaeological surveys will be conducted for the living shoreline, oyster reef, and shoreline stabilization project areas.

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Please let us know if you are aware of any properties of cultural and religious significance to Muscogee (Creek) Nation within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:33:59 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Attachment:
Figure 1 – Location of In-Water Pilot Projects

Sent via email to:
[redacted]

From:	Orsoy, Tunch
To:	[redacted]
Cc:	WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject:	Muscogee (Creek) Nation Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date:	Thursday, April 6, 2023 5:04:00 PM
Attachments:	Tab 1.2 Tyndall CRIP EA Muscogee Scoping Letter.pdf Figure 1 Attachment.pdf

Dear Principal Chief Hill

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Please let us know if you are aware of any properties of cultural and religious significance to Muscogee (Creek) Nation within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

Stephanie A. Bryan, Tribal Chair
Poarch Band of Creek Indians
[redacted]

Dear Tribal Chair Bryan

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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The findings of these surveys will be used to avoid impacts to any maritime archaeological resources that may exist in the area. The survey findings will be presented in a report that will be provided to you for review and comment. The findings and associated consultation with your office will be documented in the EA that is being prepared for the Proposed Action.

Please let us know if you are aware of any properties of cultural and religious significance to Poarch Band of Creek Indians within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:34:17 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Attachment:
Figure 1 – Location of In-Water Pilot Projects

Sent via email to:
[redacted]

From:	Orsoy, Tunch
To:	[redacted]
Cc:	WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject:	Poarch Band of Creek Indians Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date:	Thursday, April 6, 2023 5:05:00 PM
Attachments:	Tab 1.3 Tyndall CRIP EA Poarch Band Scoping Letter.pdf Figure 1 Attachment.pdf

Dear Tribal Chair Bryan

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Please let us know if you are aware of any properties of cultural and religious significance to Poarch Band of Creek Indians within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

Lewis J. Johnson, Principal Chief
Seminole Nation of Oklahoma
[redacted]

Dear Principal Chief Johnson

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Please let us know if you are aware of any properties of cultural and religious significance to Seminole Nation of Oklahoma within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:34:37 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Attachment:
Figure 1 – Location of In-Water Pilot Projects

Sent via email to:
[redacted]

From:	Orsoy, Tunch
To:	[redacted]
Cc:	WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject:	Seminole Nation of Oklahoma Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date:	Thursday, April 6, 2023 5:05:00 PM
Attachments:	Tab 1.4 Tyndall CRIP EA Seminole Nation Scoping Letter.pdf Figure 1 Attachment.pdf

Dear Principal Chief Johnson

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

Marcellus W. Osceola Jr, Chairman
Seminole Tribe of Florida
[redacted]

Dear Chairman Osceola

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:35:12 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Enclosures:
1. Figure 1 - In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: Seminole Tribe of Florida Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Thursday, April 6, 2023 5:05:00 PM
Attachments: Tab 1.5 Tyndall CRIP EA Seminole Tribe Scoping Letter.pdf
Figure 1 Attachment.pdf

Dear Chairman Osceola

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter (for consideration) during preparation of the draft EA and Section 106 consultation materials, though we will accept responses provided after 30 days. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH FIGHTER WING (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Colonel George R. Watkins
Commander
325th Fighter Wing
[redacted]

Mr. Galen Cloud
Tribal Historic Preservation Officer
Thlopthlocco Tribal Town
[redacted]

Dear Mr. Cloud

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Please let us know if you are aware of any properties of cultural and religious significance to Thlopthlocco Tribal Town within or in the vicinity of the project area you believe this undertaking might adversely affect. Additionally, as a stakeholder in the environmental analysis process, the Air Force requests your input in identifying any issues or areas of concern you feel should be addressed.

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Sincerely

WATKINS.GEORGE.R.1086349333 Digitally signed by WATKINS.GEORGE.R.1086349333 Date: 2023.03.28 09:34:55 -05'00'

GEORGE R. WATKINS, Colonel, USAF
Commander

Attachment:
Figure 1 – Location of In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: Thlopthlocco Tribal Town Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Thursday, April 6, 2023 5:05:00 PM
Attachments: Tab 1.6 Tyndall CRIP EA Thlopthlocco Scoping Letter.pdf
Figure 1 Attachment.pdf

Dear Mr. Cloud

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), developed to reduce the coastal flood risk through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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concern you feel should be addressed.

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Sent on behalf of Tyndall AFB.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
[redacted]

Ms. Alissa Slade Lotane, Director
Florida Division of Historical Resources
[redacted]

Re: Implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), Tyndall AFB, Florida

Dear Ms. Lotane

In accordance with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), the United States Air Force is initiating consultation with your office for the proposed implementation of the Tyndall AFB CRIP, which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP. The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act

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During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on historic properties including archaeological resources, architectural resources, traditional cultural properties, or other cultural resources. Separate consultation pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR 800.2(c)(2)(ii) will be initiated at a later date.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2023.03.10 10:28:46 -06'00'

JOSÉ CINTRON, GS-13, DAF

Enclosures:
1. Figure 1 - In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: [redacted] CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE; WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: SHPO Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Monday, March 13, 2023 10:52:00 AM
Attachments: Figure 1 Attachment.pdf
CRIP EA SHPO Scoping Letter.pdf

Ms. Lotane,

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The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA. When completed, the draft EA will be submitted to your office for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Mr. Jose Cintron.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

From: Mark Sramek - NOAA Federal <mark.sramek@noaa.gov>
Sent: Tuesday, July 16, 2024 9:43 AM
To: CINTRON, JOSE J CIV USAF ACC 325 CES/CEIE <jose.cintron.1@us.af.mil>
Cc: _NMFS ser HCDconsultations <nmfs.ser.hcdconsultations@noaa.gov>
Subject: [Non-DoD Source] Re: EFH Assessment for Tyndall AFB Coastal Resilience NBS Projects

Good morning Mr. Cintron,

Thank you for your email below and coordination efforts in accordance with the essential fish habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act. NOAA's National Marine Fisheries Service (NMFS), Southeast Region, Habitat Conservation Division (HCD) has reviewed Tyndall Air Force Base's proposed Coastal Resilience Nature Based Solutions EFH Assessment and supporting documentation. The proposed Nature Based Solutions' breakwater components have been designed to avoid and would be sited in areas devoid of submerged aquatic vegetation habitat. From our review of the information provided and

evaluation of the project area using the Florida Fish and Wildlife Conservation Commission's Seagrass Habitat in Florida website, we anticipate any adverse effects that might occur on marine and anadromous fishery resources would be minimal.

This satisfies the consultation procedures outlined in 50 CFR Section 600.920, of the regulation to implement the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act. Therefore, no further consultation with NMFS HCD is required for this action unless the proposed activities are modified.

I hope you are having a productive week.
Mark

Substrate (Sand/Shell, Estuarine)
30.09663 N
-085.59515 W

On Mon, Jul 15, 2024 at 10:46 AM CINTRON, JOSE J CIV USAF ACC 325 CES/CEIE <jose.cintron.1@us.af.mil> wrote:

> Dear Mr. Sramek:
>
> The Department of the Air Force (DAF) proposes to authorize and carry out four nature-based solutions (NBS) projects in the nearshore waters of Tyndall Air Force Base (AFB) under the Tyndall AFB Coastal Resilience Implementation Plan (CRIP). These projects include the creation of three submerged breakwaters and the enhancement of seagrass habitat. An Environmental Assessment is being prepared in accordance with the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of these proposed NBS projects.
>
> As part of the NEPA process, the DAF requests Essential Fish Habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act for the four proposed NBS projects. The DAF has determined that these projects would not adversely affect EFH or federally managed fisheries. We request your written concurrence with our determinations. Our EFH Assessment for the Proposed Action is attached for your review.
>
> V/r,
>
> JOSE J. CINTRON
> Chief, Environmental Element

325 CES/CEIE
(850)283-2713 DSN 523
Jose.cintron.1@us.af.mil

--

Mark Sramek
Fishery Biologist, Southeast Regional Office
NOAA Fisheries | U.S. Department of Commerce
Office: (727) 824-5311
www.fisheries.noaa.gov

From: nmfs ser esa consultations - NOAA Service Account <nmfs.ser.esa.consultations@noaa.gov>
Sent: Monday, July 15, 2024 9:50 AM
To: CINTRON, JOSE J CIV USAF ACC 325 CES/CEIE <jose.cintron.1@us.af.mil>
Subject: [Non-DoD Source] Your email has been received. Re: Request for Initiation of Expedited Informal Consultation under Section 7(a)(2) of the Endangered Species Act for Tyndall AFB Coastal Resilience NBS Projects

This auto reply confirms that we have received your email.

For all Endangered Species Act Section 7 Consultation requests, we are running about 10 weeks out from receiving the consultation request to assigning it. Our consultation delays are solely due to our incompatible workload and staffing levels.

We carry out all projects in the order in which they were received in order to be fair to all

applicants. Individual consultation completion times are impacted by the consultation type, complexity, completeness of information, and our consultation biologist's workload, and then further affected by the workload of the reviewers and other actions being handled in our office. Consultation timelines currently range between 2-5 months from the date we have all information necessary to complete the consultation, also known as the initiation date.

Once your consultation is logged in you will receive an email with the NMFS Tracking number. If you don't receive a tracking number within 10 days, please reply to this email asking for a status update.

Thank you.

From: FLESRegs, FW4 <FW4FLESRegs@fws.gov>
Sent: Tuesday, July 16, 2024 8:33 AM
To: CINTRON, JOSE J CIV USAF ACC 325 CES/CEIE <jose.cintron.1@us.af.mil>
Subject: [Non-DoD Source] Re: [EXTERNAL] Request for Informal Consultation under Section 7(a)(2) of the Endangered Species Act for Tyndall AFB Coastal Resilience NBS Projects; USFWS Project Code: 2024 0100597

Thank you for contacting the U.S. Fish and Wildlife Service, Florida Ecological Services Office. This message simply confirms that we received your request for consultation. The project has been entered into our system and has been assigned the ECOSphere Project Code number **2024-0100597.**

Please include your ECOSphere project code number, included in the top portion of this email, in all subsequent correspondence regarding this project.

A staff biologist will contact you directly should we require additional information. If you have not heard from us within **60 days**, please submit a status request via email to FW4FLESRegs@fws.gov.

Thank you.

From: CINTRON, JOSE J CIV USAF ACC 325 CES/CEIE <jose.cintron.1@us.af.mil>
Sent: Monday, July 15, 2024 10:54 AM
To: FLESRegs, FW4 <FW4FLESRegs@fws.gov>
Subject: [EXTERNAL] Request for Informal Consultation under Section 7(a)(2) of the Endangered Species Act for Tyndall AFB Coastal Resilience NBS Projects; USFWS Project Code: 2024 0100597

Good morning:

The Department of the Air Force (DAF) proposes to authorize and carry out four nature-based solutions (NBS) projects in the nearshore waters of Tyndall Air Force Base (AFB) under the Tyndall AFB Coastal Resilience Implementation Plan (CRIP). These projects include the creation of three submerged breakwaters and the enhancement of seagrass habitat. An Environmental Assessment (EA) is being prepared in accordance with the National Environmental Policy Act (NEPA) to assess the potential environmental impacts of these proposed NBS projects.

As part of the NEPA process, the DAF requests initiation of informal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7(a)(2) of the Endangered Species Act (ESA) for the four proposed NBS projects. The DAF has made effects determinations for the ESA-listed species potentially affected by the projects. We request your written concurrence with our determinations.

V/r,

JOSE J. CINTRON
Chief, Environmental Element
325 CES/CEIE

(850)283-2713 DSN 523
Jose.cintron.1@us.af.mil

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
[redacted]

Ms. Diana K. Pepe
Northwest Region Conservation Biologist
Florida Fish and Wildlife Conservation Commission
[redacted]

Re: Implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), Tyndall AFB, Florida

Dear Ms. Pepe

The United States Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP, which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impact on any state or federally protected species. The Air Force is consulting separately with the U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) for species under their regulatory jurisdiction. Species protection measures for the pilot projects will be addressed in detail in the draft EA. The pilot projects will avoid impacts to seagrass to the greatest extent practicable. Our project team has conducted preliminary seagrass surveys at the pilot project sites and held calls with Florida Fish and Wildlife Conservation Commission (FWC) and Florida Department of Environmental Protection to discuss survey methodology and permitting requirements. The final results of the seagrass surveys will be included in an Essential Fish Habitat Assessment report that will be submitted to NMFS's Habitat Conservation Division. State and federal permitting requirements for the pilot projects will be satisfied after the EA is completed.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any fish or wildlife resources regulated by FWC.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the FWC for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2023.03.10 09:18:01 -06'00'

JOSÉ CINTRON, GS-13, DAF

Enclosures:
Figure 1 - In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: [redacted]; CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE; WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: FWC Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Monday, March 13, 2023 10:52:00 AM
Attachments: CRIP EA FWC Scoping Letter.pdf
Figure 1 Attachment.pdf

Ms. Pepe,

The United States Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB Coastal Resilience Implementation Plan (CRIP), which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impact on any state or federally protected species. The Air Force is consulting separately with the U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) for species under their regulatory jurisdiction. Species protection measures for the pilot projects will be addressed in detail in the draft EA. The pilot projects will avoid impacts to seagrass to the greatest extent practicable. Our project team has conducted preliminary seagrass surveys at the pilot project sites and held calls with Florida Fish and Wildlife Conservation Commission (FWC) and Florida Department of Environmental Protection to discuss survey methodology and permitting requirements. The final results of the seagrass surveys will be included in an Essential Fish Habitat Assessment

report that will be submitted to NMFS's Habitat Conservation Division. State and federal permitting requirements for the pilot projects will be satisfied after the EA is completed.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any fish or wildlife resources regulated by FWC.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the FWC for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Mr. Jose Cintron.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
[redacted]

Ms. Catrina Martin
Supervisor, Environmental Review
U.S. Fish and Wildlife Service
[redacted]

Re: Implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), Tyndall AFB, Florida

Dear Ms. Martin

The United States Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP, which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1. Three stakeholder engagement meetings, to which representatives of the U.S. Fish and Wildlife Service (USFWS) were invited, have been held for the CRIP and pilot projects.

The flood-defense strategies recommended in the CRIP are conceptual at this stage and will be analyzed on a programmatic level in the EA. The proposed living shoreline, oyster reef, and shoreline stabilization pilot projects will be analyzed in detail in the EA. All these structures will be constructed by equipment on a barge; no construction activity will occur on land. The seagrass enhancement project will be analyzed either in detail or programmatically, depending on how well its scope is defined during the EA process. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations implementing NEPA, and Air Force NEPA regulations.

Based on the initial findings the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impacts on any species regulated by the USFWS that is currently listed as Threatened or Endangered under the Endangered Species Act (ESA), or on any species currently identified as a Candidate species or Petitioned species under the ESA. The Air Force is consulting separately with the National Marine Fisheries Service for species under their regulatory jurisdiction.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any fish or wildlife resources regulated by the U.S. Fish and Wildlife Service.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the USFWS for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2023.03.10 10:34:51 -06'00'

JOSÉ CINTRON, GS-13, DAF

Enclosures:
1. Figure 1 - In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE; WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: USFWS Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Monday, March 13, 2023 10:52:00 AM
Attachments: Figure 1 Attachment.pdf
CRIP EA USFWS Scoping Letter.pdf

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The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the USFWS for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Mr. Jose Cintron.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

DEPARTMENT OF THE AIR FORCE
325TH CIVIL ENGINEER SQUADRON (ACC)
TYNDALL AIR FORCE BASE FLORIDA

Mr. José J. Cintron
Chief, Environmental Element
325th Civil Engineer Squadron
[redacted]

Mr. Noah Silverman
NEPA Coordinator, Southeast Regional Office
NOAA Fisheries
[redacted]

Re: Implementation of the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), Tyndall AFB, Florida

Dear Mr. Silverman

The United States Air Force is currently preparing a Programmatic Environmental Assessment (EA) for the implementation of the Tyndall AFB CRIP, which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a living shoreline, oyster reef, and shoreline stabilization structure, which are being funded through a National Fish and Wildlife Foundation award to The Nature Conservancy, and enhancement of seagrass habitat, which is being funded by RESTORE Act funding through Bay County. The general locations of these in-water pilot projects offshore of Tyndall AFB are shown on Figure 1.

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Based on the initial findings of the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impacts on any species regulated by the National Marine Fisheries Service (NMFS) that is currently listed as Threatened or Endangered under the Endangered Species Act (ESA), or on any species currently identified as a Candidate species or Petitioned species under the ESA. The Air Force plans to satisfy ESA Section 7 consultation requirements with NMFS for the four in-water pilot projects by complying with all pertinent JAXBO protection measures for the relevant species in the project area, such as sea turtles and the Gulf sturgeon. These measures will be addressed in detail in the draft EA. The Air Force is consulting separately with the U.S. Fish and Wildlife Service for species under their regulatory jurisdiction. The pilot projects will avoid impacts to seagrass to the greatest extent practicable. Preliminary seagrass surveys have been conducted at the pilot project sites. The final results of the surveys will be included in an Essential Fish Habitat Assessment report that will be submitted to NMFS's Habitat Conservation Division.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any habitat or fisheries resources regulated by NOAA Fisheries.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the NOAA Fisheries for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sincerely

CINTRON.JOSE.J.1182275146 Digitally signed by CINTRON.JOSE.J.1182275146 Date: 2023.03.10 10:03:08 -06'00'

JOSÉ CINTRON, GS-13, DAF

Enclosures:
1. Figure 1 - In-Water Pilot Projects

Sent via email to:
[redacted]

From: Orsoy, Tunch
To: [redacted]
Cc: CINTRON, JOSE J GS-12 USAF ACC 325 CES/CEIE; WALLACE, EDWIN B GS-12 USAF ACC 325 CES/CEIEC
Subject: NMFS Scoping for Implementation of the Tyndall AFB Coastal Resilience Implementation Plan
Date: Monday, March 13, 2023 10:52:00 AM
Attachments: CRIP EA NMFS Scoping Letter.pdf
Figure 1 Attachment.pdf

Mr. Silverman,

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Based on the initial findings of the Proposed Action of implementing the Tyndall AFB CRIP and associated pilot projects would have no adverse impacts on any species regulated by the National Marine Fisheries Service (NMFS) that is currently listed as Threatened or Endangered under the Endangered Species Act (ESA), or on any species currently identified as a Candidate species or Petitioned species under the ESA. The Air Force plans to satisfy ESA Section 7 consultation requirements with NMFS for the four in-water pilot projects by complying with all pertinent JAXBO protection measures for the relevant species in the project area, such as sea turtles and the Gulf sturgeon. These measures will be addressed in detail in the draft EA. The Air Force is consulting separately with the U.S. Fish and Wildlife Service for species under their regulatory jurisdiction. The pilot projects will avoid impacts to seagrass to the greatest extent practicable. Preliminary seagrass surveys have been conducted at the pilot project sites. The

final results of the surveys will be included in an Essential Fish Habitat Assessment report that will be submitted to NMFS's Habitat Conservation Division.

During the EA process, the Air Force will determine whether the Proposed Action would have adverse impacts on any habitat or fisheries resources regulated by NOAA Fisheries.

The Air Force respectfully requests your written comments and other input on the Proposed Action within 30 days of receipt of this letter so they can be considered during preparation of the draft EA and Coastal Consistency Determination. When completed, the draft EA will also be submitted to the NOAA Fisheries for review and comment. If you have any questions or require additional information, please contact Tyndall AFB's Point of Contact, Mr. Edwin Wallace, via email at [redacted]

Sent on behalf of Mr. Jose Cintron.

Tunch Orsoy

Jacobs Engineering Group

[redacted]

[redacted]

Appendix B
Public Participation

LOCALiQ
The Gainesville Sun | The Ledger
Daily Commercial | Ocala StarBanner
News Chief | Herald-Tribune | News Herald
Northwest Florida Daily News

PO Box 631244 Cincinnati, OH 45263-1244

PROOF OF PUBLICATION

Tunch Orsoy tunch.orsoy@jacobs.com
Jacobs Engineering Group Inc
3161 Michelson DR # 500
Irvine CA 92612-4405

STATE OF FLORIDA, COUNTY OF BAY

The Panama City News Herald, a newspaper printed and published in the city of Panama City, and of general circulation in the County of Bay, State of Florida, and personal knowledge of the facts herein state and that the notice hereto annexed was Published in said newspapers in the issue dated or by publication on the newspaper's website, if authorized, on:

09/08/2022

and that the fees charged are legal.
Sworn to and subscribed before on 09/08/2022

Legal Clerk

Notary, State of WI, County of Brown

My commision expires

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VICKY FELTY
Notary Public
State of Wisconsin

Early Notice and Public Review of a Proposed Activity in a Wetland

To: All interested Agencies, Groups, and Individuals

The U.S. Air Force (USAF) proposes to implement the Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan (CRIP), which has been developed to reduce the coastal flood risk at Tyndall AFB through traditional and nature-based solutions. The CRIP includes flood risk assessments and recommendations of flood defense strategies to protect critical infrastructure at the Base. Four nature-based pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include creation of a living shoreline, oyster reef, and shoreline stabilization structure, and enhancement of seagrass habitat. This notice is required by Section 2(b) of Executive Order (EO) 11990, Protection of Wetlands and 44 Code of Federal Regulations, Part 9.8(c) to provide opportunity for early public review of proposed federal actions in wetlands. This notice specifically applies to the four in-water pilot projects proposed just offshore of Tyndall AFB. All other flood defense strategies presented in the CRIP are conceptual at this stage and would have their own public notice in the future if they are proposed to occur in wetlands and/or floodplains.

The purpose of the Proposed Action is to improve the resiliency of Tyndall AFB against storm-surge inundation and associated coastal flooding impacts. The Proposed Action is needed to 1) address Tyndall AFB's susceptibility to coastal flooding based on its low elevations and location in a hurricane-prone area and 2) to minimize disruptions to Tyndall AFB's military mission from storm-related flooding of critical Base infrastructure and operational areas. The USAF is preparing an Environmental Assessment in accordance with the National Environmental Policy Act to analyze the potential impacts of the Proposed Action.

The public review period is from September 8 to October 8, 2022. Comments should be provided to Mr. Edwin Wallace, 325 CES/CEIEC, 103 Mississippi Road, B36234, Tyndall AFB, FL, 32403. Comments must be received by October 10, 2022.

PRIVACY ADVISORY NOTICE

All written comments received during the comment period will be made available to the public and considered during preparation of the final Environmental Assessment. Providing private address information with your comment is voluntary and such personal information will be kept confidential unless release is required by law. However, address information will be used to compile the project mailing list and failure to provide it will result in your name not being included on the mailing list.

Appendix C
Federal Agency Coastal Zone Management Act Consistency Determination

Federal Agency Coastal Zone Management Act Consistency Determination

Programmatic Environmental Assessment for Implementation of Tyndall Air Force Base Coastal Resilience Implementation Plan

This document provides the State of Florida with the Department of the Air Force's Consistency Determination under Coastal Zone Management Act Section 307 and 15 *Code of Federal Regulations* (CFR) 930 Subpart C for the alternatives analyzed in the *Programmatic Environmental Assessment (EA) for Implementation of Tyndall Air Force Base (AFB) Coastal Resilience Implementation Plan*. Federal consistency with the statutes implemented under the Florida Coastal Zone Management Program is addressed in Table C-1. Pursuant to 15 CFR 930.41, the Florida State Clearinghouse has 60 days from receipt of this document to concur with, or object to, this Consistency Determination, or to request an extension, in writing, under 15 CFR 930.41(b). Florida's concurrence will be presumed if Tyndall AFB does not receive its response within 60 days from receipt of this document.

Table C-1. Florida Coastal Management Program Review

Statute	Federal Consistency	Scope
Chapter 161 *Beach and Shore Preservation*	None of the alternatives under the Proposed Action would affect the state's management or preservation of beaches and shores.	This statute provides policy for the regulation of construction, reconstruction, and other physical activities related to the beaches and shores of the state. Additionally, this statute requires the restoration and maintenance of critically eroding beaches.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	None of the alternatives under the Proposed Action would affect local government comprehensive plans.	Requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.
Chapter 186 *State and Regional Planning*	None of the alternatives under the Proposed Action would affect the state's plans for water use, land development, and transportation.	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.
Chapter 252 *Emergency Management*	None of the alternatives under the Proposed Action would affect the state's vulnerability to natural disasters or state emergency response and evacuation procedures.	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.
Chapter 253 *State Lands*	None of the alternatives under the Proposed Action would involve the use of state lands or restrict public access to state lands.	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.

Chapter 258 *State Parks and Preserves*	None of the alternatives under the Proposed Action would affect state parks or preserves.	Addresses administration and management of state parks and preserves.
Chapter 259 *Land Acquisition for Conservation or Recreation*	None of the alternatives under the Proposed Action would affect the state's acquisition of environmentally endangered lands or outdoor recreation lands.	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.
Chapter 260 *Florida Greenways and Trails Act*	None of the alternatives under the Proposed Action would affect the Florida Greenways and Trails Program.	Established in order to conserve, develop, and use the natural resources of Florida for healthful and recreational purposes.
Chapter 267 *Historical Resources*	Potential impacts on cultural resources are analyzed in Section 3.4 of the EA. Based on the analysis conducted, none of the alternatives under the Proposed Action would have a significant impact on cultural resources. Therefore, each alternative would be consistent with the management and preservation of the state's archaeological and historical resources.	Addresses management and preservation of the state's archaeological and historical resources.
Chapter 288 *Commercial Development and Capital Improvements*	None of the alternatives under the Proposed Action would affect current or future business, trade, or tourism in the region.	Promotes and develops general business, trade, and tourism components of the state economy.
Chapter 334 *Transportation Administration*	None of the alternatives under the Proposed Action would affect the state's administration of transportation.	Addresses the state's policy concerning transportation administration.
Chapter 339 *Transportation Finance and Planning*	None of the alternatives under the Proposed Action would affect the finance and planning needs of the state's transportation system.	Addresses the finance and planning needs of the state's transportation system.
Chapter 373 *Water Resources*	Potential impacts on water resources are analyzed in Section 3.2 of the EA. Based on the analysis conducted, none of the alternatives under the Proposed Action would have a significant impact on water resources. Therefore, each alternative would be consistent with the state's statutes and regulations regarding the water resources of the state.	Addresses sustainable water management; the conservation of surface and ground waters for full beneficial use; the preservation of natural resources, fish, and wildlife; protecting public land; and promoting the health and general welfare of Floridians.
Chapter 375 *Outdoor Recreation and Conservation Lands*	None of the alternatives under the Proposed Action would affect recreational opportunities on state lands.	Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describe current recreational opportunities, estimate need for additional recreational opportunities, and propose means to meet the identified needs.
Chapter 376 *Pollutant Discharge Prevention and Removal*	All of the alternatives under the Proposed Action would be consistent with the state's statutes and regulations regarding the transfer, storage, or transportation of pollutants.	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.

Chapter 377 *Energy Resources*	None of the alternatives under the Proposed Action would affect oil and gas resources of the state.	Addresses regulation, planning, and development of oil and gas resources of the state.
Chapter 379 *Fish and Wildlife Conservation*	Potential impacts on fish and wildlife are analyzed in Section 3.5 of the EA. Based on the analysis conducted, none of the alternatives under the Proposed Action would not have a significant impact on fish and wildlife, including protected species. Therefore, each alternative would be consistent with the state's policies concerning the protection of fish and wildlife resources.	Addresses the management and protection of the state's wide diversity of fish and wildlife resources.
Chapter 380 *Land and Water Management*	None of the alternatives under the Proposed Action would affect state management of land or water.	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.
Chapter 381 *Public Health, General Provisions*	None of the alternatives under the Proposed Action would affect the state's policy concerning the public health system.	Establishes public policy concerning the state's public health system.
Chapter 388 *Mosquito Control*	None of the alternatives under the Proposed Action would affect mosquito control efforts.	Addresses mosquito control effort in the state.
Chapter 403 *Environmental Control*	Potential impacts on air quality, water quality, and pollution control are analyzed in Sections 3.1, 3.2, and 3.10, respectively, of the EA. Based on the analysis conducted, none of the alternatives under the Proposed Action would have a significant impact on these resource areas. Therefore, each alternative would be consistent with the state's statutes and regulations regarding water quality, air quality, pollution control, solid waste management, and other environmental control efforts.	Establishes public policy concerning environmental control in the state.
Chapter 553 *Building Construction Standards*	All of the alternatives under the Proposed Action would comply with the state's regulations and standards pertaining to building construction.	Addresses the building construction standards established by the state.
Chapter 582 *Soil and Water Conservation*	None of the alternatives under the Proposed Action would affect the state's soil and water conservation efforts.	Provides for the control and prevention of soil erosion.
Chapter 597 *Aquaculture*	None of the alternatives under the Proposed Action would affect the state's policy pertaining to aquaculture.	Addresses enhancement and regulation of aquaculture in the state.

Appendix D
Detail Air Conformity Applicability Model Reports

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: TYNDALL AFB
State: Florida
County(s): Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Tyndall AFB Coastal Resilience Implementation Plan

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2026

- Action Purpose and Need:
The purpose of the Proposed Action is to improve the resilience of Tyndall AFB against storm-surge inundation and associated coastal flooding impacts through the implementation of the CRIP and proposed NBS pilot projects.

- Action Description:
The Proposed Action is to implement the Tyndall AFB CRIP (DAF 2022), which has been developed to guide coastal resilience planning and implementation at Tyndall AFB in concert with the mission of the base. Four NBS pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a submerged living shoreline, submerged oyster reef breakwater, and submerged shoreline stabilization structure.

- Point of Contact
Name: Caitlin Santinelli
Title: Scientist
Organization: Jacobs
Email: caitlin.santinelli@jacobs.com
Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

	Activity Type	Activity Title
2.	Construction / Demolition	CRIP Implementation – 7000 Area
3.	Construction / Demolition	CRIP Implementation - 7000 Area
4.	Construction / Demolition	CRIP Implementation - 7000 Area

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: CRIP Implementation - 7000 Area

- Activity Description:
Phase 1

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 6
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.038826
SO_x	0.001052
NO_x	0.571736
CO	0.541678

Pollutant	Total Emissions (TONs)
PM 10	10.690516
PM 2.5	0.012128
Pb	0.000000
NH_3	0.012295

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 4
Number of Days: 0

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 268329.6
Amount of Material to be Hauled On-Site (yd^3): 54497.2975
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20

Average Hauling Truck Round Trip Commute (mile): 60

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.39317	0.00542	3.40690	4.22083	0.09860	0.09071
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.45335	0.00542	3.58824	4.59368	0.11309	0.10404
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.18406	0.00489	1.88476	3.48102	0.06347	0.05839

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02381	0.00476	587.02896	589.04350
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02385	0.00477	587.87714	589.89459
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02149	0.00430	529.70686	531.52468

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.26860	0.00172	0.11494	4.59156	0.00364	0.00322	0.05129
LDGT	0.22958	0.00212	0.14451	3.87645	0.00408	0.00361	0.04304
HDGV	0.88395	0.00483	0.59039	11.06281	0.01969	0.01741	0.09480
LDDV	0.08708	0.00132	0.14749	6.56557	0.00364	0.00335	0.01705
LDDT	0.15078	0.00150	0.41118	5.60763	0.00583	0.00536	0.01751
HDDV	0.10944	0.00419	2.34024	1.60034	0.04742	0.04363	0.06571

MC	3.20770	0.00193	0.54558	12.49470	0.02291	0.02026	0.05171

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01351	0.00495	340.96759	342.77490
LDGT	0.01304	0.00715	419.83935	422.29139
HDGV	0.05499	0.02808	955.36623	965.09057
LDDV	0.04285	0.00073	393.05215	394.34113
LDDT	0.03067	0.00109	441.62237	442.71351
HDDV	0.01948	0.16187	1248.10200	1296.81517
MC	0.11230	0.00331	391.17366	394.96854

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

3. Construction / Demolition

3.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: CRIP Implementation - 7000 Area

- Activity Description:
Phase 2

- Activity Start Date
Start Month: 5
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 10
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.038826
SO_x	0.001052
NO_x	0.571736
CO	0.541678

Pollutant	Total Emissions (TONs)
PM 10	10.690516
PM 2.5	0.012128
Pb	0.000000
NH_3	0.012295

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

- Global Scale Activity Emissions for SCGHG:

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

3.1 Trenching/Excavating Phase

3.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 5
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 4
Number of Days: 0

3.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 268329.6
Amount of Material to be Hauled On-Site (yd^3): 54497.2975
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 60

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

3.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.39317	0.00542	3.40690	4.22083	0.09860	0.09071
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.45335	0.00542	3.58824	4.59368	0.11309	0.10404
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.18406	0.00489	1.88476	3.48102	0.06347	0.05839

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02381	0.00476	587.02896	589.04350
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02385	0.00477	587.87714	589.89459
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02149	0.00430	529.70686	531.52468

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.26860	0.00172	0.11494	4.59156	0.00364	0.00322	0.05129
LDGT	0.22958	0.00212	0.14451	3.87645	0.00408	0.00361	0.04304
HDGV	0.88395	0.00483	0.59039	11.06281	0.01969	0.01741	0.09480
LDDV	0.08708	0.00132	0.14749	6.56557	0.00364	0.00335	0.01705
LDDT	0.15078	0.00150	0.41118	5.60763	0.00583	0.00536	0.01751
HDDV	0.10944	0.00419	2.34024	1.60034	0.04742	0.04363	0.06571
MC	3.20770	0.00193	0.54558	12.49470	0.02291	0.02026	0.05171

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01351	0.00495	340.96759	342.77490
LDGT	0.01304	0.00715	419.83935	422.29139
HDGV	0.05499	0.02808	955.36623	965.09057
LDDV	0.04285	0.00073	393.05215	394.34113
LDDT	0.03067	0.00109	441.62237	442.71351
HDDV	0.01948	0.16187	1248.10200	1296.81517
MC	0.11230	0.00331	391.17366	394.96854

3.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

4. Construction / Demolition

4.1 General Information & Timeline Assumptions

- Activity Location

County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Title: CRIP Implementation - 7000 Area

- Activity Description:
Phase 3

- Activity Start Date
Start Month: 9
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 2
End Month: 2027

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.038826
SO_x	0.001052
NO_x	0.571736
CO	0.541678

Pollutant	Total Emissions (TONs)
PM 10	10.690516
PM 2.5	0.012128
Pb	0.000000
NH_3	0.012295

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.004864
N_2O	0.029480

Pollutant	Total Emissions (TONs)
CO_2	258.814100
CO_2e	267.718659

4.1 Trenching/Excavating Phase

4.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 9
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 4
Number of Days: 0

4.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 268329.6
Amount of Material to be Hauled On-Site (yd^3): 54497.2975
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipmen Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd^3): 20

Average Hauling Truck Round Trip Commute (mile): 60

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

4.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.39317	0.00542	3.40690	4.22083	0.09860	0.09071
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.45335	0.00542	3.58824	4.59368	0.11309	0.10404
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]						
	VOC	**SO_x**	**NO_x**	**CO**	**PM 10**	**PM 2.5**
Emission Factors	0.18406	0.00489	1.88476	3.48102	0.06347	0.05839

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02381	0.00476	587.02896	589.04350
Other General Industrial Equipmen Composite [HP: 35] [LF: 0.34]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02385	0.00477	587.87714	589.89459
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
	CH_4	**N_2O**	**CO_2**	**CO_2e**
Emission Factors	0.02149	0.00430	529.70686	531.52468

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.26860	0.00172	0.11494	4.59156	0.00364	0.00322	0.05129
LDGT	0.22958	0.00212	0.14451	3.87645	0.00408	0.00361	0.04304
HDGV	0.88395	0.00483	0.59039	11.06281	0.01969	0.01741	0.09480
LDDV	0.08708	0.00132	0.14749	6.56557	0.00364	0.00335	0.01705
LDDT	0.15078	0.00150	0.41118	5.60763	0.00583	0.00536	0.01751

HDDV	0.10944	0.00419	2.34024	1.60034	0.04742	0.04363	0.06571
MC	3.20770	0.00193	0.54558	12.49470	0.02291	0.02026	0.05171

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01351	0.00495	340.96759	342.77490
LDGT	0.01304	0.00715	419.83935	422.29139
HDGV	0.05499	0.02808	955.36623	965.09057
LDDV	0.04285	0.00073	393.05215	394.34113
LDDT	0.03067	0.00109	441.62237	442.71351
HDDV	0.01948	0.16187	1248.10200	1296.81517
MC	0.11230	0.00331	391.17366	394.96854

4.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to estimate GHG emissions and assess the theoretical Social Cost of Greenhouse Gases (SC GHG) associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide. This report provides a summary of GHG emissions and SC GHG analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: TYNDALL AFB
State: Florida
County(s): Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Tyndall AFB Coastal Resilience Implementation Plan

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2026

e. Action Description:

The Proposed Action is to implement the Tyndall AFB CRIP (DAF 2022), which has been developed to guide coastal resilience planning and implementation at Tyndall AFB in concert with the mission of the base. Four NBS pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a submerged living shoreline, submerged oyster reef breakwater, and submerged shoreline stabilization structure.

f. Point of Contact:

Name: Caitlin Santinelli
Title: Scientist
Organization: Jacobs
Email: caitlin.santinelli@jacobs.com
Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action start through the expected life cycle of the action. The life cycle for Air Force actions with "steady state" emissions (SS, net gain/loss in emission stabilized and the action is fully implemented) is assumed to be 10 years beyond the SS emissions year or 20 years beyond SS emissions year for aircraft operations related actions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO2), methane (CH4), and nitrous oxide (NO2). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO2 equivalents (CO2e). The CO2e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO2. All GHG emissions estimates were derived from various emission sources using the methods, algorithms,

emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO2e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO2e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO2e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected life cycle of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**	**Threshold**	**Exceedance**
2026	704	0.01323647	0.08023128	729	68,039	No
2027	0	0	0	0	68,039	No
2028 [SS Year]	0	0	0	0	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. https://statesummaries.ncics.org/downloads/).

State's Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2026	227,404,647	552,428	58,049	228,015,124
2027	227,404,647	552,428	58,049	228,015,124
2028 [SS Year]	0	0	0	0

U.S. Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2026	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2027	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2028 [SS Year]	0	0	0	0

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the degree (intensity) of the proposed action's effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative's annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action's surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area's ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only

potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action's GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action's net change in GHG emissions is compared relative to the state (where action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action's net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	CH4	N2O	CO2e
2026-2038	State Total	454,809,294	1,104,855	116,098	456,030,247
2026-2038	U.S. Total	10,272,908,358	51,253,823	3,001,415	10,327,163,597
2026-2038	Action	704	0.013236	0.080231	729
Percent of State Totals		0.00015487%	0.00000120%	0.00006911%	0.00015977%
Percent of U.S. Totals		0.00000686%	0.00000003%	0.00000267%	0.00000706%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00000095%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

Climate Change Assessment (as SC GHG):

On a global scale, the potential climate change effects of an action are indirectly addressed and put into context through providing the theoretical SC GHG associated with an action. The SC GHG is an administrative and theoretical tool intended to provide additional context to a GHG's potential impacts through approximating the long-term monetary damage that may result from GHG emissions affect on climate change. It is important to note that the SC GHG is a monetary quantification, in 2020 U.S. dollars, of the theoretical economic damages that could result from emitting GHGs into the atmosphere.

The SC GHG estimates are derived using the methodology and discount factors in the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC GHGs) in February 2021.

The speciated IWG Annual SC GHG Emission associated with an action (or alternative) are first estimated as annual unit cost (cost per metric ton, $/mton). Results of the annual IWG Annual SC GHG Emission Assessments are tabulated in the IWG Annual SC GHG Cost per Metric Ton Table below:

IWG SC GHG Discount Factor: 2.5%

IWG Annual SC GHG Cost per Metric Ton ($/mton [In 2020 $])			
YEAR	CO2	CH4	N2O
2026	$84.00	$2,300.00	$30,000.00
2027	$86.00	$2,300.00	$31,000.00

AIR CONFORMITY APPLICABILITY MODEL REPORT
GREENHOUSE GAS (GHG) EMISSIONS

2028 [SS Year]	$87.00	$2,400.00	$32,000.00

Action-related SC GHG were estimated by calendar-year for the projected action's lifecycle. Annual estimates were found by multiplying the annual emission for a given year by the corresponding IWG Annual SC GHG Emission value (see table above).

Action-Related Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$59.17	$0.03	$2.41	$61.61
2027	$0.00	$0.00	$0.00	$0.00
2028 [SS Year]	$0.00	$0.00	$0.00	$0.00

The following two tables summarize the U.S. and State's Annual SC GHG by calendar-year. The U.S. and State's Annual SC GHG are in 2020 dollars and were estimated by each year for the projected action lifecycle. Annual SC GHG estimates were found by multiplying the U.S. and State's annual five-year average GHG emissions for a given year by the corresponding IWG Annual SC GHG Cost per Metric Ton value.

State's Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$19,101,990.35	$1,270,583.74	$1,741,465.95	$22,114,040.04
2027	$19,556,799.65	$1,270,583.74	$1,799,514.81	$22,626,898.20
2028 [SS Year]	$0.00	$0.00	$0.00	$0.00

U.S. Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$431,462,151.04	$58,941,896.86	$45,021,229.08	$535,425,276.98
2027	$441,735,059.39	$58,941,896.86	$46,521,936.72	$547,198,892.97
2028 [SS Year]	$0.00	$0.00	$0.00	$0.00

Relative Comparison of SC GHG:

To provide additional real-world context to the potential climate change impact associate with an action, a Relative Comparison of SC GHG Assessment is also performed. While the SC GHG estimates capture an indirect approximation of global climate damages, the Relative Comparison of SC GHG Assessment provides a better perspective from a regional and global scale.

The Relative Comparison of SC GHG Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the SC GHG as the degree (intensity) of the proposed action's effects. The Relative Comparison Assessment provides real-world context and allows for a reasoned choice among alternatives through a relative contrast analysis which weighs each alternative's SC GHG proportionally against (or relative to) existing global, national, and regional SC GHG. The below table provides a relative comparison between an action's SC GHG vs. state and U.S. projected SC GHG for the same time period:

Total SC-GHG ($K [In 2020 $])					
		CO2	**CH4**	**N2O**	**GHG**
2026-2038	State Total	$38,658,790.00	$2,541,167.48	$3,540,980.76	$44,740,938.24
2026-2038	U.S. Total	$873,197,210.43	$117,883,793.73	$91,543,165.80	$1,082,624,169.95
2026-2038	Action	$59.17	$0.03	$2.41	$61.61
Percent of State Totals		0.00015305%	0.00000120%	0.00006797%	0.00013769%
Percent of U.S. Totals		0.00000678%	0.00000003%	0.00000263%	0.00000569%

AIR CONFORMITY APPLICABILITY MODEL REPORT
GREENHOUSE GAS (GHG) EMISSIONS

From a global context, the action's total SC GHG percentage of total global SC GHG for the same time period is: 0.00000076%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

Caitlin Santinelli, Scientist	Jun 06 2024
Name, Title	**Date**

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

1. General Information

- Action Location
Base: TYNDALL AFB
State: Florida
County(s): Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: Tyndall AFB Coastal Resilience Implementation Plan

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2026

- Action Purpose and Need:
The purpose of the Proposed Action is to improve the resilience of Tyndall AFB against storm-surge inundation and associated coastal flooding impacts through the implementation of the CRIP and proposed NBS pilot projects.

- Action Description:
The Proposed Action is to implement the Tyndall AFB CRIP (DAF 2022), which has been developed to guide coastal resilience planning and implementation at Tyndall AFB in concert with the mission of the base. Four NBS pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a submerged living shoreline, submerged oyster reef breakwater, and submerged shoreline stabilization structure.

- Point of Contact
Name: Caitlin Santinlli
Title: Scientist
Organization: Jacobs
Email: caitlin.santinelli@jacobs.com
Phone Number:

Report generated with ACAM version: 5.0.23a

- Activity List:

Activity Type		Activity Title
2.	Construction / Demolition	NBS Pilot Projects

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location
County: Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: NBS Pilot Projects

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

- Activity Description:
Barge-Mounted Excavator Work

- Activity Start Date
Start Month: 1
Start Month: 2026

- Activity End Date
Indefinite: False
End Month: 12
End Month: 2026

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.011036
SO_x	0.000141
NO_x	0.081088
CO	0.129651

Pollutant	Total Emissions (TONs)
PM 10	20.490348
PM 2.5	0.002159
Pb	0.000000
NH_3	0.000338

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)
CH_4	0.000655
N_2O	0.000155

Pollutant	Total Emissions (TONs)
CO_2	16.537820
CO_2e	16.600480

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)
CH_4	0.000655
N_2O	0.000155

Pollutant	Total Emissions (TONs)
CO_2	16.537820
CO_2e	16.600480

2.1 Trenching/Excavating Phase

2.1.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date
Start Month: 1
Start Quarter: 1
Start Year: 2026

- Phase Duration
Number of Month: 12
Number of Days: 0

2.1.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information
Area of Site to be Trenched/Excavated (ft^2): 171626.4
Amount of Material to be Hauled On-Site (yd^3): 0
Amount of Material to be Hauled Off-Site (yd^3): 0

- Trenching Default Settings
Default Settings Used: No
Average Day(s) worked per week: 5

- Construction Exhaust

Equipment Name	Number Of	Hours Per Day

	Equipment	
Excavators Composite	1	6

- Vehicle Exhaust
Average Hauling Truck Capacity (yd^3): 20
Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips
Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]						
	VOC	SO_x	NO_x	CO	PM 10	PM 2.5
Emission Factors	0.39317	0.00542	3.40690	4.22083	0.09860	0.09071

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Excavators Composite [HP: 36] [LF: 0.38]				
	CH_4	N_2O	CO_2	CO_2e
Emission Factors	0.02381	0.00476	587.02896	589.04350

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	NH_3
LDGV	0.26860	0.00172	0.11494	4.59156	0.00364	0.00322	0.05129
LDGT	0.22958	0.00212	0.14451	3.87645	0.00408	0.00361	0.04304
HDGV	0.88395	0.00483	0.59039	11.06281	0.01969	0.01741	0.09480
LDDV	0.08708	0.00132	0.14749	6.56557	0.00364	0.00335	0.01705
LDDT	0.15078	0.00150	0.41118	5.60763	0.00583	0.00536	0.01751
HDDV	0.10944	0.00419	2.34024	1.60034	0.04742	0.04363	0.06571
MC	3.20770	0.00193	0.54558	12.49470	0.02291	0.02026	0.05171

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

	CH_4	N_2O	CO_2	CO_2e
LDGV	0.01351	0.00495	340.96759	342.77490
LDGT	0.01304	0.00715	419.83935	422.29139
HDGV	0.05499	0.02808	955.36623	965.09057
LDDV	0.04285	0.00073	393.05215	394.34113
LDDT	0.03067	0.00109	441.62237	442.71351
HDDV	0.01948	0.16187	1248.10200	1296.81517
MC	0.11230	0.00331	391.17366	394.96854

2.1.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$

CEE_{POL}: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
HP: Equipment Horsepower
LF: Equipment Load Factor
EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
0.002205: Conversion Factor grams to pounds
2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
HA_{OnSite}: Amount of Material to be Hauled On-Site (yd^3)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site (yd^3)
HC: Average Hauling Truck Capacity (yd^3)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd^3)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$VMT_{WT} = WD * WT * 1.25 * NE$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

V_{POL}: Vehicle Emissions (TONs)
VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
EF_{POL}: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

DETAIL AIR CONFORMITY APPLICABILITY MODEL REPORT

2000: Conversion Factor pounds to tons

AIR CONFORMITY APPLICABILITY MODEL REPORT
GREENHOUSE GAS (GHG) EMISSIONS

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to estimate GHG emissions and assess the theoretical Social Cost of Greenhouse Gases (SC GHG) associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide. This report provides a summary of GHG emissions and SC GHG analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: TYNDALL AFB
State: Florida
County(s): Bay
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: Tyndall AFB Coastal Resilience Implementation Plan

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2026

e. Action Description:

The Proposed Action is to implement the Tyndall AFB CRIP (DAF 2022), which has been developed to guide coastal resilience planning and implementation at Tyndall AFB in concert with the mission of the base. Four NBS pilot projects are proposed in the nearshore waters of Tyndall AFB in association with the CRIP. These projects include the creation of a submerged living shoreline, submerged oyster reef breakwater, and submerged shoreline stabilization structure.

f. Point of Contact:

Name: Caitlin Santinlli
Title: Scientist
Organization: Jacobs
Email: caitlin.santinelli@jacobs.com
Phone Number:

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action start through the expected life cycle of the action. The life cycle for Air Force actions with "steady state" emissions (SS, net gain/loss in emission stabilized and the action is fully implemented) is assumed to be 10 years beyond the SS emissions year or 20 years beyond SS emissions year for aircraft operations related actions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO2), methane (CH4), and nitrous oxide (NO2). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO2 equivalents (CO2e). The CO2e takes into account the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows comparison of global warming impacts between different gases; the higher the GWP, the more that gas contributes to climate change in comparison to CO2. All GHG emissions estimates were derived from various emission sources using the methods, algorithms,

emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO2e (or 68,039 metric ton per year, mton/yr) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO2e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO2e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected life cycle of the action.

Action-Related Annual GHG Emissions (mton/yr)						
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**	**Threshold**	**Exceedance**
2026	15	0.00059451	0.00014093	15	68,039	No
2027 [SS Year]	0	0	0	0	68,039	No

The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. https://statesummaries.ncics.org/downloads/).

State's Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2026	227,404,647	552,428	58,049	228,015,124
2027 [SS Year]	0	0	0	0

U.S. Annual GHG Emissions (mton/yr)				
YEAR	**CO2**	**CH4**	**N2O**	**CO2e**
2026	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2027 [SS Year]	0	0	0	0

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the degree (intensity) of the proposed action's effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative's annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action's surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area's ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). GHGs are non-hazardous to health at normal ambient concentrations and, at a cumulative global scale, action-related GHG emissions can only potentially cause warming of the climatic system. Therefore, the action-related GHGs generally have an insignificant impact to local air quality.

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GREENHOUSE GAS (GHG) EMISSIONS

However, the affected area (context) of GHG/climate change is global. Therefore, the intensity or degree of the proposed action's GHG/climate change effects are gauged through the quantity of GHG associated with the action as compared to a baseline of the state, U.S., and global GHG inventories. Each action (or alternative) has significance, based on their annual net change in GHG emissions, in relation to or proportionally to the global, national, and regional annual GHG emissions.

To provide real-world context to the GHG and climate change effects on a global scale, an action's net change in GHG emissions is compared relative to the state (where action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action's net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

Total GHG Relative Significance (mton)					
		CO2	**CH4**	**N2O**	**CO2e**
2026-2037	State Total	227,404,647	552,428	58,049	228,015,124
2026-2037	U.S. Total	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2026-2037	Action	15	0.000595	0.000141	15
Percent of State Totals		0.00000660%	0.00000011%	0.00000024%	0.00000660%
Percent of U.S. Totals		0.00000029%	0.00000000%	0.00000001%	0.00000029%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00000004%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

Climate Change Assessment (as SC GHG):

On a global scale, the potential climate change effects of an action are indirectly addressed and put into context through providing the theoretical SC GHG associated with an action. The SC GHG is an administrative and theoretical tool intended to provide additional context to a GHG's potential impacts through approximating the long-term monetary damage that may result from GHG emissions affect on climate change. It is important to note that the SC GHG is a monetary quantification, in 2020 U.S. dollars, of the theoretical economic damages that could result from emitting GHGs into the atmosphere.

The SC GHG estimates are derived using the methodology and discount factors in the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC GHGs) in February 2021.

The speciated IWG Annual SC GHG Emission associated with an action (or alternative) are first estimated as annual unit cost (cost per metric ton, $/mton). Results of the annual IWG Annual SC GHG Emission Assessments are tabulated in the IWG Annual SC GHG Cost per Metric Ton Table below:

IWG SC GHG Discount Factor: 2.5%

IWG Annual SC GHG Cost per Metric Ton ($/mton [In 2020 $])			
YEAR	**CO2**	**CH4**	**N2O**
2026	$84.00	$2,300.00	$30,000.00
2027 [SS Year]	$86.00	$2,300.00	$31,000.00

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Action-related SC GHG were estimated by calendar-year for the projected action's lifecycle. Annual estimates were found by multiplying the annual emission for a given year by the corresponding IWG Annual SC GHG Emission value (see table above).

Action-Related Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$1.26	$0.00	$0.00	$1.27
2027 [SS Year]	$0.00	$0.00	$0.00	$0.00

The following two tables summarize the U.S. and State's Annual SC GHG by calendar-year. The U.S. and State's Annual SC GHG are in 2020 dollars and were estimated by each year for the projected action lifecycle. Annual SC GHG estimates were found by multiplying the U.S. and State's annual five-year average GHG emissions for a given year by the corresponding IWG Annual SC GHG Cost per Metric Ton value.

State's Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$19,101,990.35	$1,270,583.74	$1,741,465.95	$22,114,040.04
2027 [SS Year]	$0.00	$0.00	$0.00	$0.00

U.S. Annual SC GHG ($K/yr [In 2020 $])				
YEAR	**CO2**	**CH4**	**N2O**	**GHG**
2026	$431,462,151.04	$58,941,896.86	$45,021,229.08	$535,425,276.98
2027 [SS Year]	$0.00	$0.00	$0.00	$0.00

Relative Comparison of SC GHG:

To provide additional real-world context to the potential climate change impact associate with an action, a Relative Comparison of SC GHG Assessment is also performed. While the SC GHG estimates capture an indirect approximation of global climate damages, the Relative Comparison of SC GHG Assessment provides a better perspective from a regional and global scale.

The Relative Comparison of SC GHG Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the SC GHG as the degree (intensity) of the proposed action's effects. The Relative Comparison Assessment provides real-world context and allows for a reasoned choice among alternatives through a relative contrast analysis which weighs each alternative's SC GHG proportionally against (or relative to) existing global, national, and regional SC GHG. The below table provides a relative comparison between an action's SC GHG vs. state and U.S. projected SC GHG for the same time period:

Total SC-GHG ($K [In 2020 $])					
		CO2	**CH4**	**N2O**	**GHG**
2026-2037	State Total	$19,101,990.35	$1,270,583.74	$1,741,465.95	$22,114,040.04
2026-2037	U.S. Total	$431,462,151.04	$58,941,896.86	$45,021,229.08	$535,425,276.98
2026-2037	Action	$1.26	$0.00	$0.00	$1.27
Percent of State Totals		0.00000660%	0.00000011%	0.00000024%	0.00000572%
Percent of U.S. Totals		0.00000029%	0.00000000%	0.00000001%	0.00000024%

From a global context, the action's total SC GHG percentage of total global SC GHG for the same time period is: 0.00000003%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, https://www.c2es.org/content/international-emissions).

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GREENHOUSE GAS (GHG) EMISSIONS

Caitlin Santinlli, Scientist	Jun 06 2024
Name, Title	**Date**

Internal Metrics

Partner: Tyndall EA

Tool: Barge

Display Option #2: By Fleet

Report generated on: 06/06/2024

Data Year: 2023

CO2	Total Emissions (Short Tons)	Grams per Barge-Mile	Grams per Loaded Barge-Mile	Grams per Ton-Mile
Tyndall EA: Barge Ops	143.63557	2,714.66667	5,429.33333	2.71467

NOx	Total Emissions (Short Tons)	Grams per Barge-Mile	Grams per Loaded Barge-Mile	Grams per Ton-Mile
Tyndall EA: Barge Ops	4.09963	77.48172	154.96344	0.07748

PM2.5	Total Emissions (Short Tons)	Grams per Barge-Mile	Grams per Loaded Barge-Mile	Grams per Ton-Mile
Tyndall EA: Barge Ops	0.07472	1.41214	2.82428	0.00141

PM10	Total Emissions (Short Tons)	Grams per Barge-Mile	Grams per Loaded Barge-Mile	Grams per Ton-Mile
Tyndall EA: Barge Ops	0.07703	1.45582	2.91163	0.00146

Black Carbon	Total Emissions (Short Tons)	Grams per Barge-Mile	Grams per Loaded Barge-Mile	Grams per Ton-Mile
Tyndall EA: Barge Ops	0.0576	1.0882	2.1764	0.0011

? This tool has been reviewed by The World Resources Institute for conformance with the GHG Protocol Corporate Standard

Public Disclosure Report
Partner: Tyndall EA
Tool: Barge

Report generated on: 06/06/2024
Data Year: 2023

Inventory Period: **January 1, 2023 to December 31, 2023**

Source	CO_2 Emissions (metric tons)	CO_2e Emissions (metric tons)
Scope 1	130	144

Emissions of biogenic CO_2 (metric tons): **0**

Emissions of non-GHGs:

Pollutant	Amount (metric tons)
NOx	3.72
PM10	0.07
PM2.5	0.07

Notes:
- Emissions from CH4, N2O, HFC's, PFC's, SF6 and NF3 have been deemed immaterial, comprising less than 5% of overall fleet GHG emissions and are therefore excluded for reporting purposes.
- For purposes of developing a corporate inventory, operational control should also be used for non-fleet sources.
- All Scope 1 and Scope 2 emissions, included those associated with corporate facilities, must be included in corporate GHG inventory.