DRAFT FINAL

ENVIRONMENTAL ASSESSMENT FOR SHORELINE STABILIZATION AND AIRFIELD PROTECTION

DEPARTMENT OF THE AIR FORCE
45TH SPACE WING
PATRICK AIR FORCE BASE, FLORIDA

AIR FORCE
CIVIL ENGINEERING CENTER

MARCH 2017

ACRONYMS

°F	degrees Fahrenheit
45 SW	45th Space Wing
AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos-Containing Material
AFB	Air Force Base
AFI	Air Force Instruction
AFS	Air Force Station
AFSPC	Air Force Space Command
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
AOC	Area of Concern
APZ	Accident Potential Zone
AST	aboveground storage tank
AT/FP	Anti-Terrorism/Force Protection
BASH	Bird Aircraft Strike Hazard
BMP	best management practice
CAA	Clean Air Act
CCAFS	Cape Canaveral Air Force Station
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
CZ	Clear Zone
CZMA	Coastal Zone Management Act
dB	Decibel
dBA	A-weighted decibels
DNL	day-night sound level
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIAP	Environmental Impact Analysis Process
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESMC	Eastern Space and Missile Center
ESQD	Explosive Safety Quantity Distance
F.S.	Florida Statutes
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FCMP	Florida Coastal Management Program
FDEP	Florida Department of Environmental Protection
FDHR	Florida Division of Historic Resources
FDOS	Florida Department of State
FEMA	Federal Emergency Management Agency
FICUN	Federal Interagency Committee on Urban Noise
FIRM	Federal Insurance Rate Map
FMO	Fishery Management Official
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FWC	Florida Fish and Wildlife Conservation Commission
GHG	greenhouse gas
HABS	Historic American Buildings Survey
HAP	Hazardous Air Pollutants
HAPC	Habitat Area of Particular Concern
IICEP	Interagency/Intergovernmental Coordination for Environmental Planning
ILS	Instrument Landing System
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
KSC	Kennedy Space Center
LOS	Level of Service
MBTA	Migratory Bird Treaty Act
mg/L	milligram per litter
MHTL	mean high tide line
MSL	mean sea level
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical miles
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	Notice of Availability
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O_3	ozone
OHWM	Ordinary High Water Mark
OPLAN	Operations Plan
Pb	lead
PM	particulate matter
PM_{10}	particulate matter equal to or less than 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in aerodynamic diameter
POL	Petroleum, Oil, Lubricant
RCRA	Resource Conservation and Recovery Act
RV	recreational vehicle
SAFMC	South Atlantic Fishery Management Council
SCTPO	Space Coast Transportation Planning Organization
SHPO	State Historic Preservation Office
SJRWMD	St. Johns River Water Management District
SO_2	sulfur dioxide
SOP	Standard Operating Procedures
SWMU	Solid Waste Management Unit
TDS	Total dissolved solids
TMDL	Total Daily Maximum Load
tpy	tons per year
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	U.S. Code
USCCSP	U.S. Climate Change Science Program
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOC	Volatile Organic Compound
WMD	Water Management District

DRAFT
FINDING OF NO SIGNIFICANT IMPACT & FINDING OF NO PRACTICABLE ALTERNATIVE

SHORELINE STABILIZATION AND AIRFIELD PROTECTION PATRICK AIR FORCE BASE, FLORIDA

Pursuant to provisions of the National Environmental Policy Act (NEPA), 42 U.S. Code (USC) 4321 *et seq.*, implementing Council on Environmental Quality (CEQ) Regulations, 40 Code of Federal Regulations (CFR) 1500-1508, and 32 CFR Part 989, *Environmental Impact Analysis Process* (EIAP), the U.S. Air Force (USAF) conducted an assessment of potential environmental consequences of shoreline stabilization measures at Patrick Air Force Base (AFB) proposed by the 45th Space Wing (45 SW). This Environmental Assessment (EA), *EA for Shoreline Stabilization and Airfield Protection*, considers potential impacts of the Proposed Action on the natural and human environments.

Proposed Action and Alternatives

The Banana River is part of the Indian River Lagoon System and extends from Eau Gallie Causeway at the southern end, where it intercepts the Indian River, and terminates approximately 17 nautical miles (NM) to the north within the Merritt Island National Wildlife Refuge (NWR) and Kennedy Space Center (KSC) properties. Over the past 20 years, certain areas of the Banana River shoreline along Patrick AFB have eroded dramatically, including more than 100 feet of shoreline loss in the vicinity of Rescue Road and Runway 11 just within the last 5 years. The subject erosion west of Rescue Road and Runway 11 has exposed a sewer main and water reuse line, requiring emergency repairs that were temporarily permitted by St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE). Additionally, erosion along the glide slope west of Runway 03/21 has exposed existing gabion baskets in this location and threatens the continued functionality of the Instrument Landing System (ILS) at Patrick AFB. The purpose of the Proposed Action is two-fold: 1) to stabilize the shoreline and protect the exposed sewer and water reuse lines fronting Rescue Road and Runway 11; and 2) to re-establish the shoreline along the glide slope west of Runway 03/21, approximately 1.25 miles south of Rescue Road site. Implementation of the Proposed Action would result in establishment of a long-term solution to the erosion issues in these areas. The need for the proposed fill actions at Patrick AFB are driven by the substantial shoreline erosion which has occurred over recent years and which currently threatens utility lines, roadways, and aircraft runways adjacent to the Banana River shoreline.

Alternative A (Preferred Alternative)

Rescue Road and Runway 11

The Preferred Alternative at this location would be to stabilize the shoreline west of Rescue Road by armoring and extending the existing shoreline waterward by approximately 40 feet. The conceptual design includes the construction of a concrete rubble rip-rap revetment, extending approximately 788 linear feet from the drainage ditch to the north to the existing mangrove vegetation to the south. The proposed revetment would incorporate the existing 213 linear foot emergency revetment, which would remain in place, and would be constructed from an elevation of approximately 2.5 feet above the Ordinary High Water Mark (OHWM) to -0.5 feet OHWM at a slope of 1:4, covering a total footprint of approximately 0.251 acres. Clean sand fill from local sources would be purchased and transported by the selected contractor and would be placed in front of the revetment from an elevation of approximately 0.75 feet OHWM to approximately -1.8 feet OHWM at a 1:14 slope. The fill would cover a total footprint of approximately 0.631 acres (requiring approximately 1,017 cubic yards of clean fill). In order to provide long-term stabilization of the shoreline, the fill would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) and armored by Coquina rock breakwaters fronting the entire length of the revetment. The breakwaters would include two rows of 18-inch diameter boulders forming an alternating 3-foot wide breakwater above woven geotextile fabric.

Glide Slope West of Runway 03/21

The Preferred Alternative at this location would add clean sand fill to the glide slope west of Runway 03/21 in order to cover and backfill the exposed gabion baskets in this area, which would remain in place. Similar to the Rescue Road and Runway 11 site, this fill area may be planted with salt-tolerant native vegetation; however, this area would not be armored by breakwaters or any other proposed feature along the toe of the fill.

No-Action Alternative

Under the No-Action Alternative, the proposed shoreline stabilization and airfield protection projects identified for the Rescue Road and Runway 11 site and the glide slope west of Runway 03/21 would not be implemented and existing erosion-related risks to utility lines and airfield integrity would continue. Because CEQ regulations stipulate that the No-Action Alternative be analyzed to assess any environmental consequences that may occur if the Proposed Action is not implemented, this alternative has been carried forward for analysis in the EA. The No-Action Alternative also provides a baseline against which the Proposed Action can be compared.

Summary of Findings

The analyses of the affected environment and environmental consequences of implementing the Proposed Action presented in the EA concluded that no significant adverse effects would result. In addition, no cumulative adverse impacts would result from activities associated with the Proposed Action when considered in conjunction with recent, past, and future projects at Patrick AFB.

Ten areas of environmental consequences evaluated in detail in the EA were determined to have the potential to result in less than significant impacts as described below.

- **Air Quality.** Under the Preferred Alternative, temporary, short-term construction emissions associated with construction of the proposed revetment and Coquina rock breakwater as well as deposition of clean sand fill would not exceed *de minimis* threshold values and would result in a less than significant short-term impact. Construction-related greenhouse gas (GHG) emissions associated with construction activities would remain well below 25,000 tons per year (tpy). There would be no changes to operations at Patrick AFB and consequently there would be no long-term air quality impacts.
- **Noise.** Implementation of the Preferred Alternative would have minor, temporary effects on the noise environment in the immediate vicinity of the affected areas adjacent to Rescue Road and Runway 11 as well as the glide slope west of Runway 03/21. However, noise generation would be short-term and typical of construction activities. While short-term construction activities would introduce additional day-time noise, these impacts would be less than significant given the context of the noise environment in this location. Implementation of the Preferred Alternative would not impact operations at Patrick AFB, including aircraft operations. Consequently, the implementation of the Preferred Alternative would have no impact on the long-term noise environment at the base.
- **Land Use.** The USAF entered into pre-application coordination with the Florida Department of Environmental Protection (FDEP) and SJRWMD regarding permitting authority and real property issues surrounding the proposed fill. The 45 SW elected to use 1.1 feet OHWM as the landward extent of the described lands, from the waterward face of the breakwater to the natural shore, which FDEP confirmed would be sufficient for proceeding through the permitting/state land authorization process with the SJRWMD as the lead. During construction activities associated with the Preferred Alternative, a temporary airfield construction waiver(s) would be required for activities that would occur within the Clear Zone (CZ) or otherwise affect the

airfield (e.g., potentially interfere with the ILS). Overall impacts to land use at Patrick AFB would be short-term and less than significant.

- **Geology and Soils.** Potential impacts to geological resources associated with implementation of the Preferred Alternative at Patrick AFB would be limited to ground-disturbing construction activities related to the proposed construction of the revetment adjacent to Rescue Road and Runway 11 as well as the deposition of clean sand fill in this area and along the glide slope west of Runway 03/21. Neither of these components of the Preferred Alternative would result in substantial impacts to topography at the base. Further, the proposed improvements along the two sites would make Patrick AFB facilities more resilient to coastal processes as well as geologic hazards (e.g., slope failure), which would accomplish the purpose and need of the Proposed Action and result in beneficial impacts to geology and soils.

- **Biological Resources.** Under the Preferred Alternative, the proposed shoreline stabilization measures would include the removal of minor amounts of mangroves and other wetlands trees as well as the burial of small patches of seagrass (*Halodule wrightii*); however, the proposed fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) that would compensate for potential impacts to aquatic vegetation and wetland habitats. Due to the limited size of the proposed fill footprints relative to the area of shoreline along the western boundary of Patrick AFB, potential impacts related to infauna mortality and turbidity associated with the proposed fill would be minor. The 45 SW would coordinate with USACE prior to the implementation of any construction-related activities associated with shoreline stabilization adjacent to Rescue Road and Runway 11 or along the glide slope west of Runway 03/21 and a Section 404 Individual Permit(s) would be obtained pursuant to the Clean Water Act (CWA). During construction activities associated with the Preferred Alternative, there would be a potential for impacts to sensitive species in the Banana River; however, sensitive species that have potential to occur within the project area are mobile and the 45 SW would adhere to FDEP *Standard Manatee Conditions for In-water Work* (2011) and *Sea Turtle and Smalltooth Sawfish Construction Conditions* (2006) to protect manatees and sea turtles. With the implementation of these conditions, impacts to sensitive species as a result of the Preferred Alternative would be less than significant.

- **Water Resources.** The proposed shoreline stabilization activities, including the deposition of clean sand fill within localized areas along the western boundaries of Patrick AFB would generate turbidity in the Banana River and could result in the increased potential for accidental release from heavy construction equipment and associated contamination of the Banana River. However, all standard best management practices (BMPs) to reduce turbidity and limit the potential for accidental release would be implemented during

construction. Any potential minor spills or releases would be handled according to procedures outlined in the base's Spill Prevention and Emergency Response Plan. Implementation of the Preferred Alternative would not result in the development of additional paved surfaces that could result in measurable long-term impacts to groundwater percolation or groundwater quality. The proposed shoreline stabilization measures would introduce clean sand fill within the 100-year floodplain; however, implementation of the Preferred Alternative would be intended to protect existing landward facilities (e.g., utilities, roadways, airfield, etc.) and would not introduce any new habitable structures or obstructions that would impede or divert overland floodwater flow or alter the existing hydrologic regime at Patrick AFB such that downstream flood hazards would be increased or newly created. Therefore, the Preferred Alternative would result in less than significant impacts to water resources.

- **Cultural Resources.** There are no known historic structures or archaeological resources located in the vicinity of Rescue Road and Runway 11 or the glide slope west of Runway 03/21. The Florida State historic Preservation Office (SHPO) reviewed the Proposed Action for possible effects on historic proprieties listed, or eligible for listing on the NRHP and concurred with the determination that the Proposed Action would have no effect. However, in the event that buried human remains or historic artifacts are uncovered during construction, all activities would be suspended until a qualified archaeologist could recover and determine the significance of the resource(s), in compliance with Section 106 of the National Historic Preservation Act (NHPA). Therefore, the implementation of the Preferred Alternative would have less than significant impacts on cultural resources at Patrick AFB.

- **Hazardous Materials and Wastes.** Implementation of shoreline stabilization activities under the Preferred Alternative would result in a short-term increase in hazardous materials associated with heavy construction vehicles (e.g., fuel and other petroleum, oils, and lubricants [POLs]). However, the Preferred Alternative would have no long-term impacts to storage, transport, use, or disposal of hazardous materials at Patrick AFB. Additionally, implementation of the Preferred Alternative would not affect any facilities at the base (including facilities with known Asbestos Containing Material [ACM] or Lead-based Paint) or result in any increase in the use or long-term generation of hazardous materials or hazardous wastes. Further, the affected areas under the Preferred Alternative would not occur within any Solid Waste Management Unit (SWMU), Environmental Restoration Program (ERP) site, or Area of Concern (AOC). Consequently, impacts to hazardous materials and wastes would be less than significant.

- **Transportation and Circulation.** During the period of construction activities associated with the proposed shoreline stabilization, heavy haul trucks, heavy

construction equipment, and laborers would generate increased vehicle trips along the Patrick AFB circulation network. Additionally, construction activity adjacent to Rescue Road and Runway 11 may result in temporary closure of Rescue Road. However, as construction under the Preferred Alternative would be short-term, traffic impacts would similarly be short-term and minor. Further, by providing shoreline stabilization at both sites, the Preferred Alternative may prevent potential long-term impacts of road damage as a result of continued shoreline erosion at Rescue Road and Runway 11. Consequently, implementation of the Preferred Alternative would result in less than significant short-term impacts as well as beneficial long-term impacts to transportation and circulation at the base.

- **Safety.** During construction activities associated with the Preferred Alternative, a temporary airfield construction waiver(s) would be required for activities that would occur within a CZ or otherwise affect the airfield (e.g., potentially interfere with the ILS). Additionally, depending on the type of equipment, Runway 11 may need to be closed for certain periods during construction. However, Runway 11 is not frequently used due to its length (e.g., primary activities generally include training flights conducted by a reserve unit). Implementation of the Preferred Alternative would not result in the construction or demolition of any facilities at Patrick AFB and therefore would have no impact on Anti-Terrorism/Force Protection (AT/FP) setbacks or Explosive Safety Quantity Distance (ESQD) arcs.

Mitigation Measures

During construction activities associated with the proposed shoreline stabilization measures adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21, the 45 SW would implement standard BMPs (e.g., dust minimization). In addition to standard construction BMPs, additional standard mitigation measures for impacts to jurisdictional wetlands would be specified in associated permit requirements. These permit conditions would require that the Proposed Action:

- Avoid wetland and water impacts where practicable;
- Minimize potential impacts to wetlands and waters; and
- Compensate for any remaining, unavoidable impacts to wetlands or waters through activities to enhance or create wetlands and/or waters (e.g., by planting cordgrass within the clean sand fill).

Possible mitigation or compensation associated with the implementation of the Preferred Alternative could require the use of existing wetland mitigation credits banked through estuarine habitat enhancement at Cape Canaveral Air Force Station (CCAFS), where construction of culverts opened up old mosquito

impoundments, allowing fish migrations and improving water quality for seagrass health. These conceptual mitigations have been discussed with the National Marine Fisheries Service (NMFS), USACE, FDEP, and SJRWMD. A formal mitigation plan consistent with the requirements of 32 CFR 989.15 and 32 CFR 989.22(d) will be developed during the permitting process prior to the implementation of any construction-related activities. It is anticipated that NMFS will also be working with the USACE to determine permit conditions and possible mitigation.

Finding of No Significant Impact & Finding of No Practicable Alternative

Based upon my review of the facts and analyses contained in the attached EA, conducted in accordance with the provisions of NEPA, CEQ Regulations, and 32 CFR Part 989, I conclude that the Proposed Action will not have a significant environmental impact, either by itself or cumulatively with other ongoing training and projects at Patrick AFB; will not involve an element of high risk or uncertainty on the human environment; and that its effects on the quality of the human environment will not be highly controversial.

Pursuant to Executive Order (EO) 11988, *Floodplain Management*, as amended by EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, and the authority delegated by the Secretary of the Air Force Order 791.1, I find there is no practicable alternative to shoreline stabilization measures associated with the Proposed Action, and that any effective solution would require activities within floodplains. Also, pursuant to EO 11990, *Protection of Wetlands,* I find there is no practicable alternative for implementing the Proposed Action that would similarly achieve protection of the shoreline adjacent to Rescue Road and Runway 11 as well as the glide slope west of Runway 03/21. The USAF further finds all practicable measures have been taken to minimize harm to the floodplain and wetlands, and BMPs that will minimize impacts are documented in the EA. This finding fulfills both the requirements of the referenced EOs and 32 CFR 989.14 requirements for a Finding of No Practicable Alternative. Accordingly, an Environmental Impact Statement is not required. The signing of this Finding of No Significant Impact and Finding of No Practicable Alternative completes the EIAP.

Approved by:

_____ _____

MICHELLE A. LINN, GS-15, DAFC DATE
Chief, Civil Engineer Division
Command Civil Engineer

ENVIRONMENTAL ASSESSMENT
FOR SHORELINE STABILIZATION AND AIRFIELD PROTECTION
DEPARTMENT OF THE AIR FORCE
45TH SPACE WING
PATRICK AIR FORCE BASE, FLORIDA

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SECTION 1
PURPOSE AND NEED

In response to recently accelerated shoreline erosion along the Banana River, the U.S. Air Force (USAF) proposes shoreline stabilization measures at Patrick Air Force Base (AFB) that would protect the exposed sewer main and water reuse line fronting Rescue Road and would ensure the long-term functionality of the Instrument Landing System (ILS) at the glide slope just west of Runway 03/21, approximately 1.25 miles south of the Rescue Road site (see Figure 1-1). This Environmental Assessment (EA) identifies, describes, and evaluates potential environmental impacts associated with the implementation of the proposed shoreline stabilization at Patrick AFB. This EA has been prepared in accordance with regulations issued by the Department of Defense (DoD), 32 Code of Federal Regulations (CFR) Part 989, *Environmental Impact Analysis Process* (EIAP). Consistent with Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (NEPA) (40 CFR Parts 1500-1508, Section 1502.13), this section specifies the *purpose* of and *need* for the Proposed Action for the 45th Space Wing (45 SW).

1.1 LOCATION AND BACKGROUND

Patrick AFB is located on a barrier island in Brevard County on the central east coast of Florida. The base encompasses approximately 1,972 acres and is bounded by the Atlantic Ocean on the east, the Banana River to the west, the City of Cocoa to the north, and the unincorporated area of South Patrick Shores to the south.

In 1940, the U.S. Navy activated the installation as the Banana River Naval Air Station. The installation initially served as a base for World War II anti-submarine patrol planes. In 1947, the installation was deactivated and subsequently transferred to the USAF in 1948 and renamed Patrick AFB in 1950. Today, the base serves as the headquarters for 45 SW operations. The 45 SW provides spacecraft processing, launch, tracking, safety, security, and data services as well as managing launch operations for all DoD missions. The 45 SW supports civil and commercial spacelift operations licensed by the Federal Aviation Administration (FAA), and other space launch activities in accordance with the National Space

EA

Regional Location Map

FIGURE 1-1

Policy and within provisions of public law. There are more than 35 major mission partners and tenants at Patrick AFB; approximately 3,100 military personnel, 1,700 civilian personnel, and 5,700 contractor personnel work at Patrick AFB and Cape Canaveral Air Force Station (CCAFS).

Base operational areas at Patrick AFB include the airfield, with 9,000-foot primary and 3,700-foot crosswind runways and related apron and taxiways serving military and governmental tenants, as well as an administrative center, three residential areas, base operational and maintenance support areas, a retail/medical community support area, and numerous recreational facilities including a golf course, marina, campground, beach facilities, and trails.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

Purpose. The *purpose* of the Proposed Action is two-fold: 1) to stabilize the shoreline and protect the exposed sewer and water lines fronting Rescue Road and Runway 11 (see Figure 2-1); and 2) to re-establish the shoreline along the glide slope west of Runway 03/21, approximately 1.25 miles south of Rescue Road site (see Figure 2-3).

Need. The *need* for the proposed fill action adjacent to Rescue Road and Runway 11 is driven by the substantial erosion that has occurred during the past 20 years, and the recently accelerated rate of erosion, with more than 100 feet of shoreline width lost in the last 5 years. These coastal processes along the Banana River shoreline may have been intensified by armoring of the canal, approximately 400 feet to the north, with repurposed concrete rip-rap (Patrick AFB 2015). The subject erosion west of Rescue Road and Runway 11 has exposed a sewer main and water reuse line, requiring emergency repairs that were temporarily permitted by St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE). These emergency repairs covered the exposed utilities and temporarily stabilized Rescue Road and the airfield. Implementation of the Proposed Action would result in establishment of a long-term solution to the erosion in this area west of Rescue Road and Runway 11.

The *need* for the proposed fill action at the glide slope west of Runway 03/21 is driven by the need for the continued functionality of the ILS at this location.

Gabion baskets were installed at the glide slope – approximately 1.25 miles south of the Rescue Road site – in 2009 to maintain the shoreline in this area and to prevent reflection of the ILS signal off of the surface of the Banana River. Since that time, the gabion baskets have become exposed in this area. The Proposed Action would cover and backfill the exposed gabion baskets in this area in order to ensure continued long-term viability of the ILS serving the Patrick AFB airfield.

1.3 SUMMARY OF ENVIRONMENTAL STUDY REQUIREMENTS

The proposed activities addressed within this document constitute a Federal action and, therefore, must be assessed in accordance with NEPA, which requires Federal agencies to consider the environmental consequences of proposed actions in the decision-making process (42 U.S. Code [USC] §4321 et seq.). The intent of NEPA is to protect, restore, or enhance the environment through well-informed decisions by the Federal decision maker. The CEQ was established under NEPA, 42 USC §4342 et seq., to implement and oversee Federal policy in this process. In 1978, the CEQ issued regulations implementing the NEPA process under 40 CFR Parts 1500–1508. The USAF EIAP for meeting CEQ requirements is accomplished via procedures set forth in CEQ regulations and 32 CFR Part 989.

1.4 COASTAL ZONE CONSISTENCY DETERMINATION

The Federal Coastal Zone Management Act (CZMA) (16 USC §1451 et seq.), creates a state-Federal partnership to ensure the protection of coastal resources. The Federal CZMA requires each Federal agency activity within or outside the coastal zone, which affects any land or water use or natural resources of the coastal zone to be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of the applicable State Coastal Management Program. The geography of Florida and the CZMA dictate that the entire state of Florida be designated as a Coastal Zone and be subject to the Florida Coastal Management Program (FCMP), codified as Chapter 380, Part II, Florida Statutes (F.S.). The FCMP consists of a network of 24 Florida Statutes administered by eight state agencies and five Water Management Districts (WMDs).

The Federal CZMA requires Federal agencies carrying out activities subject to the Act to provide a "consistency determination" to the relevant state agency. The

Federal regulations implementing the Act then require the state agency to inform the Federal agency of its agreement or disagreement with the Federal agency's consistency determination. Therefore, the Proposed Action and alternatives to the Proposed Action analyzed in this EA require the USAF to submit a consistency determination to the Florida State Clearinghouse, administered by the Florida Department of Environmental Protection (FDEP) Office of Intergovernmental Programs. The USAF's Consistency Determination is contained in the Consistency Statement in Appendix D.

1.5 INTERGOVERNMENTAL COORDINATION AND CONSULTATION

Interagency/Intergovernmental Coordination for Environmental Planning (IICEP) is a federally mandated process for informing and coordinating with other governmental agencies regarding proposed actions. Through the IICEP process, the USAF has notified the U.S. Fish and Wildlife Service (USFWS), the State Office of Historic Preservation (SHPO), and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) regarding the Proposed Action (see Appendix E). The FDEP utilizes the Florida State Clearinghouse to route applications for Federal activities, such as EAs, to the appropriate state, regional, and local reviewers for them to provide comments and recommendations to the Clearinghouse based on their statutory authorities (see Appendix A).

1.6 PUBLIC INVOLVEMENT

NEPA, 40 CFR §§1500-1508, and 32 CFR Part 989 requires public review of the EA before approval of a Finding of No Significant Impact (FONSI) / Finding of No Practicable Alternative (FONPA) and implementation of the Proposed Action. Further, because a FONPA is anticipated and in accordance with Executive Orders (EOs) 11988 (*Floodplain Management*) and 13690 (*Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*), early notification was accomplished by the 45 SW via public press releases in May 2016 and government-to-government consultation involving the 45 SW, SJRWMD, FDEP, and USACE was initiated in early 2015, with pre-application guidance provided by SJRWMD and FDEP in February 2016. A Notice of Availability (NOA) for public review of the Draft EA was published in the *Florida*

Today on 12 March 2017 and the Draft EA was made available for public review at the Cocoa Beach Public Library, located at 550 North Brevard Avenue, Cocoa Beach, Florida. The review period for public and agency comments was 30 days, ending on 11 April 2017. All public, agency, and Tribal government comments received on the Draft EA will be incorporated into the Final EA.

SECTION 2
PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This section of the Environmental Assessment (EA) provides a description of the Proposed Action and its alternatives, including the No-Action Alternative. This section also describes alternatives considered but not carried forward for further analysis.

2.2 PROJECT AREA HISTORY

As described in Section 1.1, *Location and Background* Patrick Air Force Base (AFB) is located on a barrier island with the Atlantic Ocean on the east and the Banana River to the west (refer to Figure 1-1). As a result of its geographic location, the base is subject to shoreline erosion, which can be particularly serve following large storm events. In order to fortify and protect the shoreline surrounding the base a number of Federal actions have been undertaken over the last 20 years to address substantial short-term and long-term erosion impacts.

Gabion baskets were installed along the Banana River in 2001 to address long-term erosion and protect the Fam Camp facility at Patrick AFB.

For example, in 2001, in response to long-term erosion impacts along the Banana River that threatened the Family Camping "Fam Camp" facility at Patrick AFB, 2,000 linear feet of stainless steel gabion baskets were buried below the existing grade parallel to the shoreline, landward of the Banana River. The installation site was prefitted with filter fabric, gabion baskets were placed and filled with locally quarried Coquina stone, and a 6-inch thick layer of sand was placed over the gabions and planted with mangroves to provide long-term stabilization. Similar actions were taken along the glide slope west of Runway 03/21 in 2009 (see Section 2.2.2, *Glide Slope West of Runway 03/21*). More recently in 2012 an EA was prepared for the issuance of a negotiated agreement with the Bureau of Ocean and Energy Management authorize the use of Canaveral Shoals II so that Patrick AFB could obtain 350,000 cubic yards of sand resources for a beach nourishment project

The shoreline adjacent to Rescue Road and Runway 11 at Patrick AFB has eroded substantially over the last 20 years, including more than 100 feet of shoreline loss in the last 5 years (1994 left and 2014 right).

needed to provide storm protection along the base's boundary with the Atlantic coastline (U.S. Air Force [USAF] 2012).

Erosion along Patrick AFB generally occurs during and following large storm events, after which the St. Johns River Water Management District (SJRWMD) and U.S. Army Corps of Engineers (USACE) allow for a one-year window within which the USAF can restore and re-establish the eroded shoreline. However, during the periods following the most recent substantial storm events, Patrick AFB was not able to secure funding quickly enough to restore the shoreline at the Rescue Road and Runway 11 site or the Runway 03/21 site, approximately 1.25 miles to the south. Consequently, the subject erosion west of Rescue Road and west of Runway 03/21 has resulted in substantial landward retreat of the shoreline, which threatens airfield operations and mission capabilities at Patrick AFB.

2.2.1 Rescue Road and Runway 11

A 12-inch sewer force main and a 16-inch water reuse line, which extends from the City of Cocoa Beach along the shoreline to the Patrick AFB golf course, are located waterward of Rescue Road within the project area. In 2013, these utilities were exposed by erosion following a large storm event. While no leaks were associated with the exposed lines, emergency repairs were approved by SJRWMD

The shoreline fronting Rescue Road and Runway 11 was repaired under temporary emergency permits to protect exposed utilities as well as the road and airfield.

and USACE in 2014 to cover these utilities and to protect Rescue Road as well as the airfield, located approximately 175 feet east of the road. The emergency repair totaled 196 linear feet of reinforced shoreline and consisted of geotextiles and rip-rap with repurposed concrete; the total area of this repair measured 0.096 acres. An airfield construction waiver was required for the construction equipment that was used to implement the repair but a permanent airfield waiver was not required as the installation of the rip-rap was considered an emergency project.

2.2.2 Glide Slope West of Runway 03/21

In 2009, gabion baskets were installed at the glide slope west of Runway 03/21 – approximately 1.25 miles south of the Rescue Road and Runway 11 site – to maintain the shoreline in this area and prevent reflection of the Instrument Landing System (ILS) signal off of the surface of the Banana River. The gabion baskets were buried landward of the shoreline, allowing the beach to retain its natural appearance. During a severe storm event, the gabion baskets protect the beach and the upland in two ways: (1) if overtopped, the gabion baskets act as a retaining wall, preventing soil from behind the structure from washing into the river; and (2) if a storm event causes erosion of the frontal beach, the gabion baskets absorb the energy from the storm waves, thereby impeding beach loss.

Gabion baskets, filled with Coquina rocks, were installed fronting the glide slope west of Runway 03/21 in order to prevent landward movement of the shoreline in this area as it threatens the functionality of the ILS signal.

Similar baskets were used at the Fam Camp site where the shoreline was experiencing severe erosion that was threatening some of the campsites. However, unlike the Fam Camp site, mangrove trees were not established along the glide slope due to the inherent risks associated with Bird Aircraft Strike Hazard (BASH).

Consequently, while the gabion baskets in this location have impeded beach erosion behind the baskets, the beach fronting the baskets has been lost during erosion events.

2.3 PROPOSED ACTION

The Proposed Action would implement a long-term solution to address coastal erosion along the Banana River shoreline at Patrick AFB, meeting the purpose and need described in Section 1.2, *Purpose and Need for the Proposed Action*. Conceptual shoreline stabilization methods and configurations were evaluated by SJRWMD and Florida Department of Environmental Protection (FDEP) during the pre-application process. Following approval of a conceptual alternative and project footprint, engineering drawings were drafted for the proposed stabilization method at the Rescue Road and Runway 11 site. Shoreline stabilization measures proposed for the Runway 03/21 site would require approval from SJRWMD and/or FDEP prior to implementation.

2.3.1 Alternative A (Preferred Alternative)

The Preferred Alternative consists of two components: (1) deposition of clean sand fill and the establishment of offshore coquina rock wave breaks fronting Rescue Road and Runway 11; and (2) deposition of clean sand fill along the glide slope west of Runway 03/21. The proposed shoreline stabilization activities are described in further detail below and are depicted conceptually in Figures 2-1, 2-2, and 2-3.

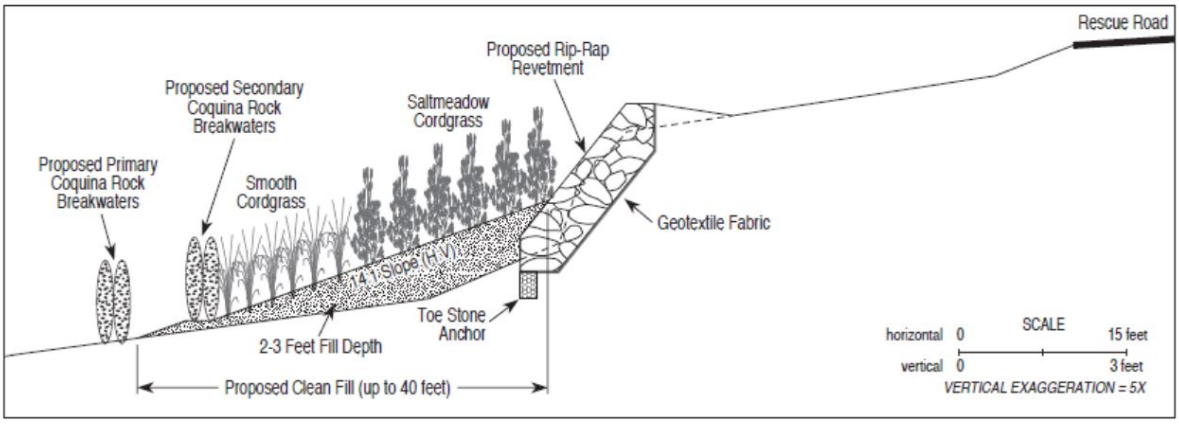
2.3.1.1 Rescue Road and Runway 11

The Preferred Alternative at this location would be to stabilize the shoreline west of Rescue Road by armoring and extending the existing shoreline waterward by approximately 40 feet (i.e., still inland of the extent that it reached during 2009). The conceptual design includes the construction of a concrete rubble rip-rap revetment, extending approximately 788 linear feet from the drainage ditch to the existing mangrove vegetation to the south (see Figure 2-2). The proposed revetment would incorporate the existing 213 linear foot emergency revetment,

EA

Preferred Alternative
Rescue Road and Runway 11 Location

FIGURE 2-1



EA **Proposed Fill Diagram** FIGURE 2-2

which would remain in place, and would be constructed from an elevation of approximately 2.5 feet above the Ordinary High Water Mark (OHWM) to -0.5 feet OHWM at a slope of 1:4, covering a total footprint of approximately 0.251 acres. The material used for the construction of the revetment would be free of rebar and all other foreign constituents. The size of the boulders or rubble would be similar to those used for the emergency repair action, with most averaging approximately 100 pounds and none larger than 500 pounds. The rip-rap would be curved back and trenched into the upland bank of the restored shoreline at each end and along the entire toe. Woven geotextile filter cloth would be placed on the bank with the bottom and sides of the cloth trenched in along the entire length of the fill area. The landward area behind the proposed revetment would be backfilled as necessary to match the existing grade and planted with weed-free Bahia sod.

Clean sand fill from local sources would be purchased and transported by the selected contractor and would be placed in front of the revetment from an elevation of approximately 0.75 feet OHWM to approximately -1.8 feet OHWM at a 1:14 slope. The fill would cover a total footprint of approximately 0.631 acres (requiring approximately 1,017 cubic yards of clean fill). In order to provide long-term stabilization of the shoreline, the fill would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) and armored by Coquina rock breakwaters fronting the entire length of the revetment (see Figure 2-1). The breakwaters would include two rows of 18-inch diameter boulders forming an alternating 3-foot wide breakwater above woven geotextile

fabric. The primary (i.e., waterward) breakwater would extend a length of 70 linear feet with 5-foot gaps, while the secondary breakwater would be set back approximately 5 feet inland, immediately behind these gaps and extending approximately 15 linear feet.

Implementation of the proposed fill action at Rescue Road and Runway 11 would occur from the landside utilizing heavy equipment (e.g., bulldozer, grader, dump truck). Upland vegetation in this area consists of airfield grasses surrounding Runway 11. Floating turbidity blankets and coir logs would be installed to control turbidity and minimize wave break in the work area. The turbidity blankets would have weighted bottoms and would be staked to ensure water quality protection within the Banana River.

Additionally, the floating turbidity blankets would serve as temporary barriers to prevent Indian manatee (*Trichechus manatus*) and Smalltooth sawfish (*Pristis pectinate*) from entering the work area. The USAF would also comply with Standard Manatee Conditions for In-Water Work (Florida Fish and Wildlife Conservation Commission [FWC] 2011) as well as Sea Turtle and Smalltooth Sawfish Construction Conditions (SJRWMD 2006).

2.3.1.2 Glide Slope West of Runway 03/21

The Preferred Alternative at this location would add clean sand fill to the glide slope west of Runway 03/21 in order to cover and backfill the exposed gabion baskets in this area, which would remain in place (see Figure 2-3). Similar to the Rescue Road and Runway 11 site, this fill area may be planted with salt-tolerant native grasses; however, this area would not be armored by breakwater or any other proposed feature along the toe of the fill.

Similar to the fill action at Rescue Road and Runway 11, installation of the fill along the glide slope would occur from the landside, utilizing heavy equipment (e.g., bulldozer, grader, dump truck). Upland vegetation in this area consists of airfield grasses surrounding Runway 03/21. Floating turbidity blankets and coir logs would be installed at the fill site to control turbidity and minimize wave break in the work area. The turbidity blankets would have weighted bottoms and would be staked to ensure water quality protection within the Banana River.

EA

Preferred Alternative
Runway 03/21 Location

FIGURE 2-3

Additionally, the floating turbidity blankets would serve as a temporary barrier to prevent Indian manatee and Smalltooth sawfish from entering the work area. USAF would also comply with Standard Manatee Conditions for In-Water Work (FWC 2011) as well as Sea Turtle and Smalltooth Sawfish Construction Conditions (SJRWMD 2006).

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED

2.4.1 Relocation of the Existing Utilities

One potential alternative that was identified during the initial planning process included relocation of the existing sewer main and water reuse line landward of Rescue Road; however, due to the location of these utilities, which extend up the shoreline from the Patrick AFB golf course to the City of Cocoa Beach, this scenario would include major construction work that would substantially restrict access along Rescue Road and interrupt airfield operations at Patrick AFB. Further, relocation of the existing utilities would not address the threat that shoreline erosion poses to Rescue Road and the Patrick AFB airfield. Consequently, this alternative was eliminated from further consideration as it would not accomplish the purpose and need described for the Proposed Action.

2.4.2 Alternative Shoreline Protection Methods and Configurations

Alternative methods and configurations for stabilizing the shoreline along Rescue Road and Runway 11 were discussed with the FDEP and SJRWMD, including the use of concrete rip-rap, gabion baskets, and living shorelines along the toe of the clean sand fill. For example, the use of gabion baskets with Coquina rocks was proposed to protect the toe of the fill at the Rescue Road and Runway 11 site. These gabion baskets would be similar to the gabion baskets that were installed at the Runway 03/21 site in 2009. Shoreline protection using gabion baskets would include additional fill to cover the steel modular baskets, but would otherwise include the same components as described for the Preferred Alternative, including identical fill footprints at the Rescue Road and Runway 11 site as well as the Runway 03/21 site. However, during the pre-application meeting with SJRWMD it was determined that, similar to the existing conditions at Runway 03/21, installation of gabion baskets, as well as other potential shoreline protection

methods, would leave the shoreline susceptible to future erosion events and would not be as effective as breakwaters in addressing long-term issues related to shoreline erosion.

Additionally, the original shoreline stabilization designs included waterward extension of the existing shoreline by 100 feet or more to the 2009 mean high tide line (MHTL). However, based on communication and coordination with FDEP it was determined that an easement as well as a legal description would be required to describe the affected areas waterward of the 1.1 foot OHWM in this area. Consequently, the 45th Space Wing (45 SW) elected to use 1.1 feet OHWM as the landward extent of the described lands, from the waterward face of the breakwater to the natural shore, which FDEP confirmed would be sufficient for proceeding through the permitting/state land authorization process with the SJRWMD as the lead. Additionally, the reduced project footprint would result in a reduced potential for in-water impacts (e.g., biological resources, water quality, etc.).

2.5 ALTERNATIVES CARRIED FORWARD FOR FURTHER EVALUATION

2.5.1 No-Action Alternative

Under the No-Action Alternative, the proposed shoreline stabilization and airfield protection projects identified for the Rescue Road and Runway 11 site and the Runway 03/21 site would not be implemented and existing erosion-related risks to utility lines and airfield integrity would continue. Because Council on Environmental Quality (CEQ) regulations stipulate that the No-Action Alternative be analyzed to assess any environmental consequences that may occur if the Proposed Action is not implemented, this alternative will be carried forward for analysis in the EA. The No-Action Alternative also provides a baseline against which the Proposed Action can be compared.

2.6 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA evaluates potential environmental impacts to the following resources that would likely be affected by implementation of the Proposed Action or its alternatives:

- Air Quality

- Noise
- Land Use
- Geologic Resources
- Biological Resources
- Water Resources
- Cultural Resources
- Hazardous Material and Wastes
- Transportation and Circulation
- Safety

Per NEPA, those environmental resource areas that are anticipated to experience either no or negligible environmental impact under implementation of the Proposed Action or its alternatives are not examined in detail in this EA. These environmental resources include:

- Visual Resources
- Socioeconomics
- Environmental Justice
- Utilities

A brief summary of the reasons for not undergoing detailed analyses of these resources is provided below.

Visual Resources. The deposition of clean fill at the Rescue Road site and along the glide slope west of Runway 03/21 would cover and backfill the existing gabion baskets, and therefore would restore the historic visual character of the surrounding areas included as part of the Proposed Action. The Proposed Action would result in minor construction-related visual impacts during fill deposition; however, construction activities would be temporary and these areas are located within an airfield Clear Zone (CZ) away from the Fam Camp and other recreation areas at Patrick AFB. Implementation of the Proposed Action would therefore result in negligible impacts to visual resources.

Socioeconomics. The Proposed Action would not result in any long-term change in employment or staffing levels at Patrick AFB. Further, the Proposed Action would not result in long-term changes in employment levels or regional economic activity in communities surrounding Patrick AFB. Implementation of the Proposed Action would therefore not result in socioeconomic impacts.

Environmental Justice. With regard to environmental justice issues, no major, adverse environmental impacts associated with the Proposed Action are anticipated to effect on- or off-base communities and any realized impacts (e.g., with regard to noise) are expected to be minor and contained within the boundaries of Patrick AFB. Therefore, no populations (minority, low-income, or otherwise) would be disproportionately adversely impacted and no adverse impact with regard to environmental justice would result. Further, implementation of the Proposed Action would not result in increased exposure of children to environmental health risks or safety risks such as the generation, use, or storage of hazardous materials.

Utilities. With regard to utilities, implementation of the Proposed Action would not result in any operational impacts to the total capacity or use of utility systems present on the base or within adjacent land use areas. Rather, the Proposed Action would address long-term erosion issues by preventing the exposure and potential rupture of existing utility lines resulting in beneficial long-term impacts. A summary of these impacts is provided in Section 4.6, *Water Resources* and Section 4.8, *Hazardous Materials and Wastes*.

SECTION 3
AFFECTED ENVIRONMENT

This section describes relevant existing environmental conditions within the vicinity of Patrick Air Force Base (AFB) and the Banana River. This information will be used to identify the anticipated environmental impacts associated with implementation of the Proposed Action (see Section 4, *Environmental Consequences*).

Per guidelines established by the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, Title 32, Code of Federal Regulations (CFR) Part 989 (32 CFR 989), *Environmental Impact Analysis Process*, and the Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process*, the description of the affected environments and the associated impact analyses in this Environmental Assessment (EA) focus on only those aspects of the environment potentially subject to impacts that could occur under the Proposed Action. Section 2.6, *Scope of the Environmental Assessment*, provides an explanation and a summary of resource areas eliminated from detailed analysis.

This EA addresses the environmental conditions and impact analyses for the following environmental resources that would likely be affected by the implementation of the Proposed Action or its alternatives at Patrick AFB for the 45th Space Wing (45 SW):

- Air Quality
- Noise
- Land Use
- Geologic Resources
- Biological Resources
- Water Resources
- Cultural Resources
- Hazardous Material and Wastes
- Transportation and Circulation
- Safety

3.1 AIR QUALITY

3.1.1 Definition of Resource

Air quality is affected by stationary sources (e.g., industrial development), mobile sources (e.g., motor vehicles), and area sources (e.g., dry cleaners, gas stations, auto body paint shops). Air quality at a given location is a function of several factors including the quantity and type of pollutants emitted locally and regionally, as well as the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion include wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography.

3.1.1.1 Criteria Pollutants

Air quality in a given location is determined by the concentration of various pollutants and particulates in the atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the U.S. Environmental Protection Agency (USEPA) under the Clean Air Act (CAA) amendments for six criteria pollutants, including: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) and 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$), and lead (Pb). NAAQS represent maximum levels of background pollution considered safe for public health and the environment, with an adequate margin of safety.

The State of Florida has instituted state ambient air quality standards pursuant to Florida Administrative Code (FAC) 62-204. These state standards, however, were repealed in 2012 (Florida Department of State [FDOS] 2013).

3.1.1.2 Greenhouse Gases

Global climate change is a transformation in the average weather of the Earth, which is measured by changes in temperature, wind patterns, and precipitation. Scientific consensus has identified human-related emission of greenhouse gases above natural levels as a significant contributor to global climate change (U.S. Climate Change Science Program [USCCSP] 2009). Greenhouse gases trap heat in

the atmosphere and regulate the Earth's temperature. These gases include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ground-level O_3, and fluorinated gases such as chlorofluorocarbons and hydrochlorofluorocarbons.

3.1.2 Existing Conditions

3.1.2.1 Climate

All of the areas associated with the Proposed Action are located along the central Atlantic coast of Florida. Although microclimates between the coastal and inland areas may vary slightly, the region generally has a humid subtropical climate characterized by hot, humid summers and mild to cool winters. Average temperatures in this region range from approximately 53.8 degrees Fahrenheit (°F) in December to approximately 90.3 °F in July (National Climatic Data Center [NCDC] 2015). Mean annual rainfall is approximately 52 inches. Precipitation peaks in August and September but is fairly evenly distributed throughout the year (NCDC 2015).

3.1.2.2 Local Air Quality

Under the CAA, a geographic area with air quality that is cleaner than the primary ambient air quality standard is an *attainment* area; areas that do not meet the primary standard are *nonattainment* areas. *Maintenance* areas include areas previously classified as nonattainment, but are now in compliance with the NAAQS as a result of implementation of the state air quality management plan.

Air quality in Florida is monitored by the Florida Department of Environmental Protection (FDEP) with monitoring sites for the six criteria pollutants widely dispersed throughout the state, typically near urban areas. Patrick AFB and the Banana River are located within Brevard County within the Central Florida Intrastate Air Quality Control Region (USEPA 1972). Two active FDEP monitoring stations are located in Brevard County (FDEP 2016a). Brevard County is designated as *attainment* areas for all NAAQS pollutants (USEPA 2016a). Table 3-1 presents the most recently available baseline emissions inventory of criteria pollutants (except for ozone) in Brevard County.

Table 3-1. 2011 Baseline Emissions Inventory for Brevard County, Florida

Location and Emission Type	CO (tpy)	SO_x (tpy)	NO_x (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	VOC (tpy)
Brevard County						
Point and Mobile Source Emissions	115,578	2,828	20,029	10,685	5,653	25,508

Note: Criteria pollutants measured in tons per year (tpy).
Source: USEPA 2015.

3.1.2.3 Emissions at Patrick AFB

Patrick AFB operates under Title V Operating Permit #0090021-016-AV, which was issued on 2 February 2016 and expires in 17 August 2016 (FDEP 2016b). Patrick AFB is a major source of criteria pollutants under the Title V program as it has the potential to exceed the thresholds for various criteria pollutants. The permit, issued by FDEP, identifies the facility's air emission sources along with the conditions and requirements of operation pursuant to the Patrick AFB Title V Air Operating Permit.

Patrick AFB also currently emits Hazardous Air Pollutants (HAPs) during the course of operational activities; however, Patrick AFB is not a major source of HAPs. Total HAP and individual HAP emissions in 2013 were below the minor threshold limits. The most recent available summary for air emissions at Patrick AFB is presented below in Table 3-2.

Table 3-2. 2013 Emissions Inventory at Patrick AFB

Emissions Type	Criteria Pollutant Emissions (tpy)						
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs	Total HAPs
Stationary Source	1.76	6.28	233.71	0.06	0.20	5.75	0.01
Mobile Source	17.46	15.77	1.01	0.70	1.25	5.71	0.02
Total	**19.22**	**22.05**	**234.72**	**0.76**	**1.45**	**11.46**	**0.03**

Source: USAF 2014a.
Note: This Air Emissions Inventory covers the 2013 calendar year emissions.
Automated Program Management Information System (APIMS) utilizes emission factor sets taken from a variety of sources including AP-42, Air Quality Utility Information System (AQUIS) User's Manual, Institute for Environmental, Safety & Occupational Health Risk Analysis (IERA), Air Emission Inventory Guidance Document for Stationary Sources at Air Force Installations, and FIRE.

3.2 NOISE

3.2.1 Definition of Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or otherwise results in an adverse human response. Actual response to noise can vary according to the type and characteristics of the noise source, distance between the noise source and receptor, sensitivity of the receptor, and time of day. Sensitive noise receptors are identified facilities or land uses that would be most sensitive to the effects of noise, such as residences, schools, patient care facilities, and child care centers.

The unit used to measure the loudness of noise is the *decibel* (dB). The majority of community noise standards utilize *A-weighted decibels* (dBA) as the measure of noise, as it provides a high degree of correlation with human annoyance and health effects. A-weighting a sound de-emphasizes the very low and very high frequencies of sound in a manner similar to the functioning of the human ear. Day-night sound level (DNL) is a noise metric that averages A-weighted sound levels over a 24-hour period, with an additional 10-dB penalty added to noise events occurring between 10:00 PM and 7:00 AM. This penalty is intended to compensate for generally lower background noise levels at night and the additional annoyance of nighttime noise events.

The *Air Installation Compatible Use Zone* (AICUZ) program was established by the DoD in response to the Noise Control Act of 1972 to promote an environment free from noise that jeopardizes public health and welfare. Patrick AFB has adopted an AICUZ program which is consistent with U.S. Air Force (USAF) policy of promoting public health, safety, and general welfare in areas surrounding the installation (USAF 2001).

3.2.2 Existing Conditions

3.2.2.1 Land Use Guidelines

In June 1980, the Federal Interagency Committee on Urban Noise (FICUN) published guidelines (FICUN 1980) relating day-night average sound level (DNL)

values to compatible land uses.[1] Since their issuance, Federal agencies have generally adopted their guidelines for noise analysis. Land use categories most sensitive to ambient noise are residential, institutional, cultural, and some recreational uses. Industrial land uses are the least sensitive to surrounding noise, largely due to the inherently high levels of ambient noise associated with industrial activities.

3.2.2.2 Patrick AFB

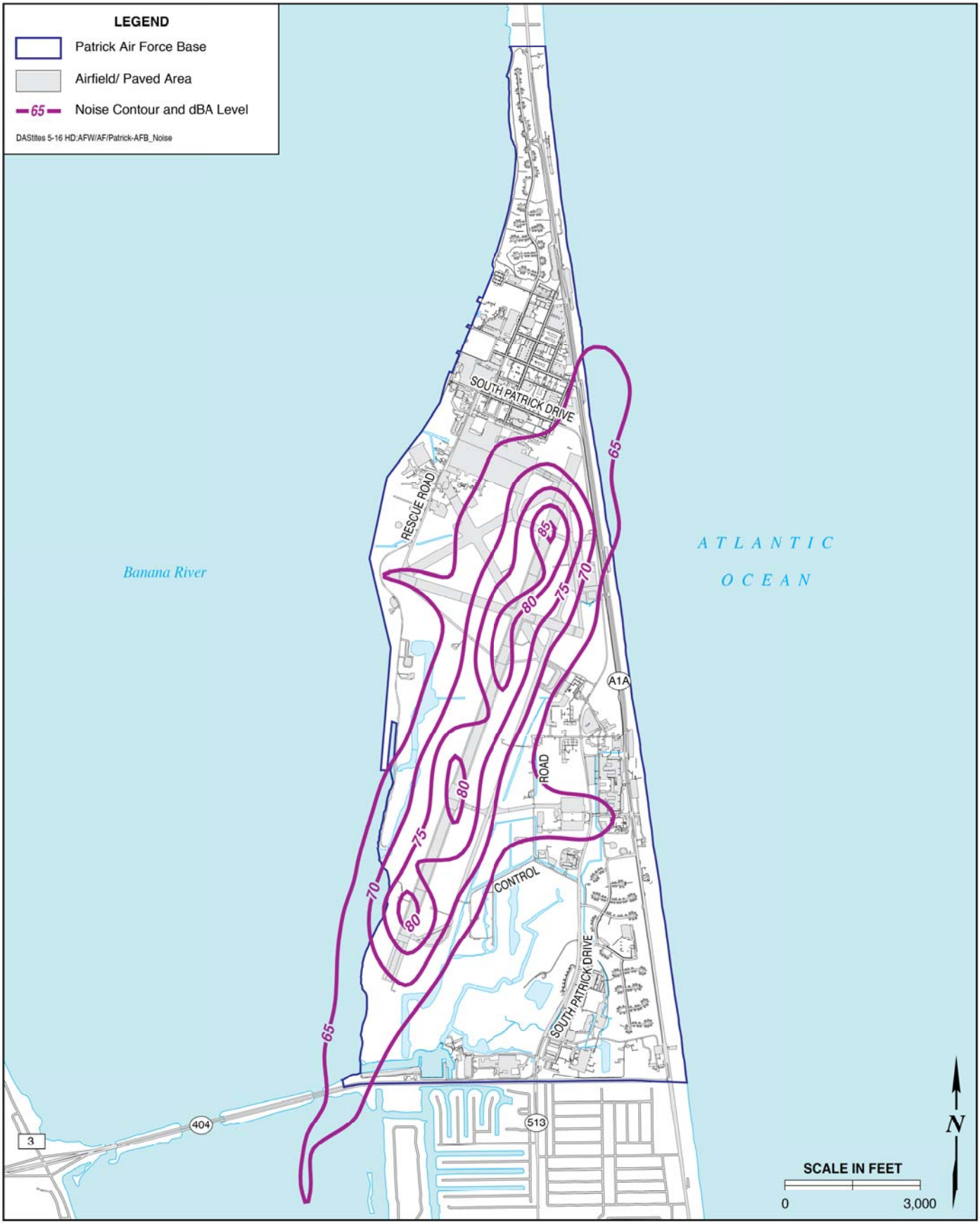
Flight operations remain the dominant source of noise generation at Patrick AFB. The AICUZ plotted noise levels from 65 to 80 DNL for a representative day at Patrick AFB (see Figure 3-1). Due to the type of aircraft and the frequency of aircraft operations, the noise contours at the Patrick AFB are a substantial factor to the surrounding community. The majority of noise exposure occurs on base or over water, with reduced levels over the Atlantic Ocean and Banana River. The properties most severely affected are in the very northern areas of Tortoise Island, which is within the DNL 59-65 dB noise level contour (USAF 2001).

3.2.2.3 Noise Sensitive Receptors

The 2001 AICUZ study identified Tortoise Island and Merritt Island as primary areas where development should be restricted for noise and safety (i.e., accident potential) due to their proximity to the Patrick AFB airfield (USAF 2001). While there are no county or city building codes requiring noise reduction measures, some subdivisions, such as Tortoise Island, have established standards. New construction on Tortoise Island is required to incorporate noise reduction measures to reduce interior noise levels to at least 50 dB (USAF 2001).

With the exception of the 45th Medical Group Medical Center, which is located on Patrick AFB and operated by the 45 SW, the only sensitive receptor in the vicinity include Sea Park Elementary School to the south. All other hospitals, churches, and schools in the vicinity of Patrick AFB are located more than 1 mile from the base's boundaries (USEPA 2016b).

[1] For specific FICUN noise compatibility by land use classification, refer to Table 1 and Table 2 in the *FICUN Guidelines for Considering Noise in Land Use Planning and Control*, available at http://www.rosemonteis.us/files/references/federal-interagency-committee-1980.pdf.



EA

Noise Contours at Patrick AFB

FIGURE 3-1

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.3 LAND USE

3.3.1 Definition of Resource

Land use generally refers to human modification of land, often for residential or economic purposes. It also refers to the use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. Human land uses include residential, commercial, industrial, agricultural, and recreational uses, while unique natural features are often designated as national parks, national forests, wilderness areas, or national wildlife refuges. Attributes of land use include general land use and ownership, land management plans, and special use areas. Land ownership is a categorization of land according to type of owner. The major land ownership categories include federal, Indian, state, and private.

Federal lands are further described by the managing agency, which may include the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service, or DoD. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of allowable activities or protect specially designated or environmentally sensitive uses (i.e., Class III waters, etc.). Special Use Land Management Areas are identified by agencies as being worthy of more rigorous management. The following sections briefly discuss the land use at Patrick AFB that could be affected by the Proposed Action.

3.3.2 Existing Conditions

3.3.2.1 Patrick AFB

Patrick AFB encompasses approximately 1,972 acres of developed lands as well as coastal dune and estuarine habitat (USAF 2014b). Patrick AFB is bordered to the east by the Atlantic Ocean and to the west by the Banana River, which serve as natural buffers to the installation. Patrick AFB borders unincorporated portions of Brevard County to both the north and south of the installation. The primary land use characterization of these unincorporated areas adjacent to Patrick AFB is urban. There is little vacant land adjacent to the northern and southern boundaries of the installation (USAF 2014b).

Land use at Patrick AFB is dominated by the 387-acre airfield. The airfield is bounded by the main base to the north and a golf course and wooded area to the south and west (USAF 2011). Administrative facilities and some industrial functions are located in the north base area. Three privatized housing and lodging complexes are located in the north and southeast sections of the base. Other facilities including a medical clinic and child development center are located in the south base area (USAF 2011).

A concentration of recreational areas providing improved quality of life and health opportunities for base personnel and their families are distributed near water resources including the marina, family pool, beach access, picnic/playground areas, golf course, family campground, beachside rental lodging, and walking/jogging trails. Other recreation amenities include a bowling center, theater, arts and crafts center, fitness and sports center, and a library (USAF 2011).

Table 3-3. Land Use at Patrick AFB

Land Use Category	Approximate Acreage
Administrative	76
Airfield Operations	204
Airfield Support	538
Community Service/Support	108
Fuel/Munitions and Commodity Storage	23
Housing	194
Open Space	353
Recreation	258
Security/Entry Gate	7
Shop/Maintenance/Industrial/Warehouse	180

Notes: Acreages have been estimated based on GIS and are not necessarily reflective of real property holdings.
Source: USAF 2011.

EA

Land Use Categorizations at Patrick AFB

FIGURE 3-2

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.4 GEOLOGY AND SOILS

3.4.1 Definition of Resource

Geological resources consist of surface and subsurface materials and their properties. Principal geologic factors affecting the ability to support structural development include seismic properties (i.e., the potential for subsurface shifting, faulting, or crustal disturbance), soil stability, and topography. The term *soil*, in general, refers to unconsolidated materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility all determine the ability for the ground to support man-made structures. Soils typically are described in terms of their complex type, slope, physical characteristics, and relative compatibility or constraining properties with regard to particular construction activities and types of land use. *Topography* is the change in elevation over the surface of a land area. An area's topography is influenced by many factors, including human activity, underlying geologic material, seismic activity, climatic conditions, and erosion. A discussion of topography typically encompasses a description of surface elevations, slope, and distinct physiographic features (e.g., mountains) and their influence on human activities. Subsurface geologic and soil resources within the Banana River adjacent to the areas proposed for shoreline stabilization under the Proposed Action would not be potentially affected and are therefore not discussed further.

3.4.2 Existing Conditions

3.4.2.1 Geology

In Florida, Mesozoic and Cenozoic sediments overlie an eroded basement rock complex ranging from Precambrian to Jurassic. The Peninsular Arch, the dominant structural feature of Florida, is a northwest-southwest trending positive basement element cored by a large block of Precambrian rock covered by Paleozoic strata. The Floridian aquifer system is characterized by Paleocene to Upper Eocene limestones and dolostones that form part of an extensive carbonate platform that existed from late Cretaceous through late Oligocene. The Intermediate aquifer system is known to encompass Miocene to early Pliocene formations. The shallowest aquifer, the surficial aquifer system, contains formations present from the Pliocene to the Holocene epochs (Duncan et al. 1994).

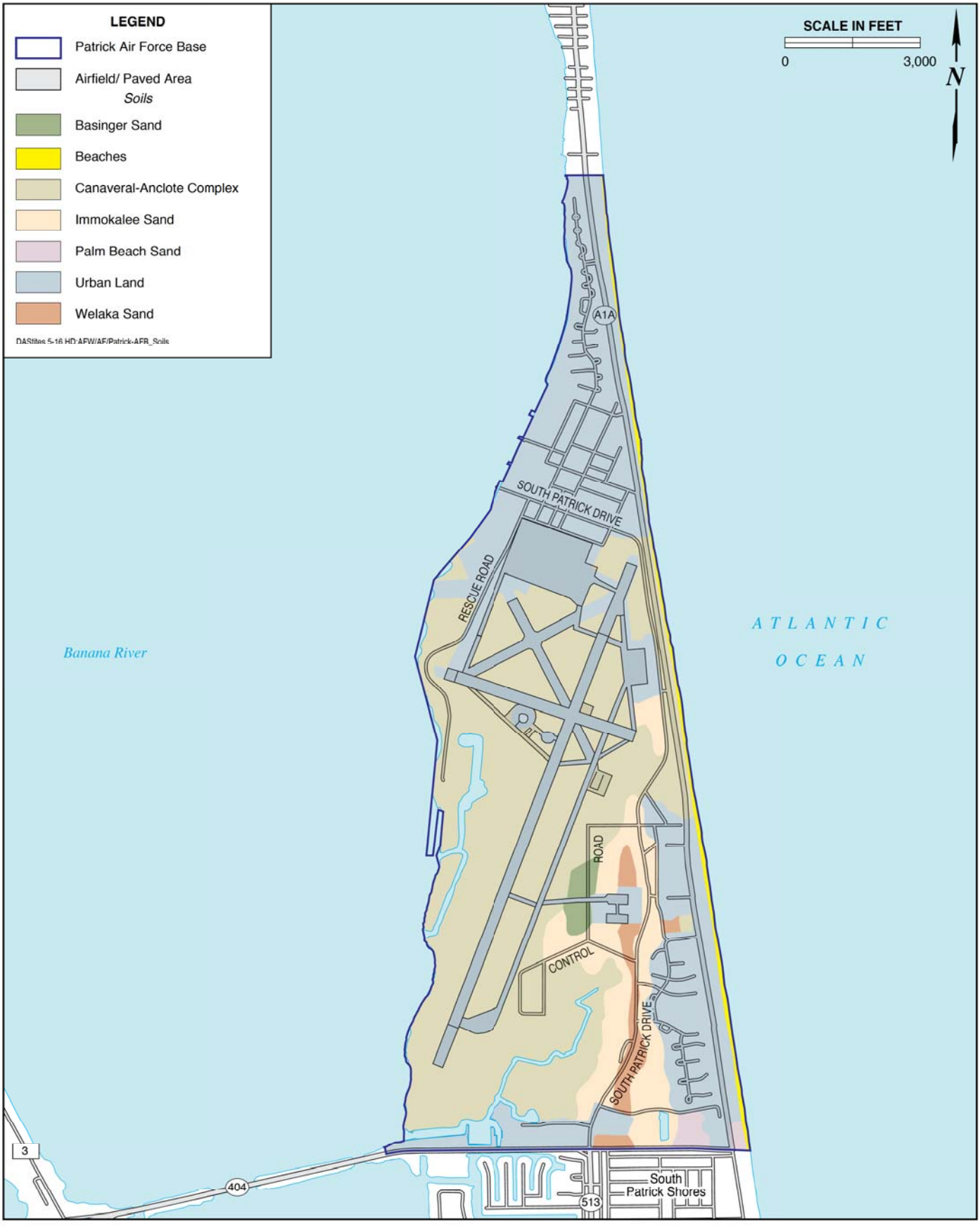
There are several different lithostratigraphic units from different epochs in the area. The Cedar Keys Formation is the sole formation from the Paleocene. This sequence of interbedded dolostones and evaporites underlies the Oldsmar formation, which is one of three formations that constitute the Eocene Epoch. The other two strata that are part of the Eocene layer are the Avon Park Formation and the Ocala Limestone Group. Overlying these is the Suwannee Limestone, which characterizes the Oligocene Epoch. On top of the Suwannee Limestone is the Hawthorn Group, which constitutes the Miocene Series. Meanwhile, the Pleistocene to the most recent sedimentation is characterized by undifferentiated sediments (Duncan et al. 1994; Campbell 1986).

3.4.2.2 Topography

Patrick AFB is located on a barrier island in Brevard County. Barrier islands are linear islands of sand that parallel many gently sloping coastlines around the world. There is little topographic relief across Patrick AFB, with elevations ranging from 0 to 20 feet above mean sea level (MSL), and the highest elevation corresponding to sand dunes along the Atlantic Ocean (Berger 1993).

3.4.2.3 Soils

The two soil classifications with the largest areas at Patrick AFB are Canaveral-Anclote complex, gently undulating and urban land (U.S. Department of Agriculture [USDA] 2016). The soil at Patrick AFB is sandy to depths of 60 inches or more. Soil permeability is greater than 20 inches per hour. The available water capacity is 0.02 – 0.05 inches per inch of soil. Tests of representative samples indicate Patrick AFB soils have a high pH (USAF 2014b).



EA

Soil Types at Patrick AFB

FIGURE 3-3

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.5 BIOLOGICAL RESOURCES

3.5.1 Definition of Resource

Biological resources include native or naturalized plants, fish, wildlife, and the habitats in which they occur. Sensitive biological resources are defined as those plant, fish, and wildlife species, and their habitat that are federally and state listed as threatened, endangered, of special concern, or candidate. The USFWS identifies and lists federally protected species and habitats; states also identify and list protected species and habitat. The Florida Fish and Wildlife Conservation Commission (FWC) identify and list state protected species and habitat for the state. The Federal Endangered Species Act (ESA) of 1973 protects listed species against killing, harming, harassment, or any action that may damage their habitat. Federal Species of Concern are not protected under the ESA; however, these species could become listed and protected at any time. Florida state listed species and their habitats are protected in accordance with Florida Statutes §379.2291-379.231. In addition, the State of Florida has identified the sensitive and ecologically important role of mangroves and mangrove ecosystems. As such, Sections 403.9321-403.9333, Florida Statues, cited as the "Mangrove Trimming and Preservation Act", establishes regulations for the protection and preservation of mangroves and mangrove resources. Actions which may adversely affect mangroves through their trimming or alteration are subject to permit requirements of the Mangrove Trimming and Preservation Act, issued by the FDEP. Under this permitting program, mangrove trimming and alterations can be incorporated into an Environmental Resources Permit.

Migratory birds, as listed in 50 CFR 10.13, are protected by the Migratory Bird Treaty Act (MBTA), as amended, was enacted to protect migratory birds from capture, pursuit, hunting, or removal from natural habitat. Over 800 bird species are currently protected under the MBTA. In 2001, Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, was issued to ensure that Federal agencies consider environmental effects on migratory bird species and, where feasible, implement policies and programs supporting the conservation and protection of migratory birds.

Sensitive habitats include those areas designated by the USFWS and/or the National Marine Fisheries Service (NMFS) as critical habitat protected by the ESA and sensitive ecological areas as designated by state or Federal rulings. Sensitive habitats also include wetlands, sensitive upland communities, plant communities that are unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, feeding/forage areas, crucial summer/winter habitats).

Federally funded projects are required to address Essential Fish Habitat (EFH) requirements as mandated by the 1998 amendments to the Magnuson-Steven Fishery Conservation and Management Act. EFH can generally be defined as waters and substrates necessary to fish for any or all stages of their life cycle. Estuarine emergent vegetated wetlands, submerged aquatic vegetation, tidal creeks, estuarine scrub/shrub, oyster reefs and shell banks, unconsolidated bottom (soft sediments), sandy offshore shoals/bars, artificial reefs, coral reefs, coastal inlets, and live/hard bottom habitats are also EFH for specific life stages of estuarine dependent and near shore managed species. Regional Fishery Management Officials are responsible for designating EFH in their management plans for all managed species. The South Atlantic Fishery Management Council (SAFMC) is responsible for managing waters extending from 3 to 200 nautical miles (NM) off the coast of Florida, while the State of Florida is responsible for managing state waters, extending from 0 to 3 NM offshore. Therefore, the State of Florida is responsible for managing surface waters within the immediate vicinity of Patrick AFB.

Jurisdictional wetlands are those subject to regulatory authority under Section 404 of the Clean Water Act (CWA) and EO 11990, *Protection of Wetlands*. Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and the USEPA as, "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3[b]). The USACE has authority to regulate jurisdictional wetlands as *Waters of the U.S.* under Section 404 of the CWA; however, EO 11990, *Protection of Wetlands* and the related DoD Instruction (DoDI) 4715.3*, Natural Resources Conservation Program* provides guidance concerning how to mitigate or minimize any net loss of both jurisdictional and non-jurisdictional wetlands.

3.5.2 Existing Conditions

3.5.2.1 Vegetation

Patrick AFB

Patrick AFB is heavily developed and the majority of vegetation (i.e., 43 percent), consists of turf and landscaping. Mowed grass and landscaped vegetation surrounds developed areas (i.e., golf course and facilities), roadways, and the airfield. The two natural vegetation communities that can be found on site include beach dunes and estuarine wetlands, which are comprised of mangrove and salt marsh communities (USAF 2014b). However, the beach and associated dune vegetation represent less than 4 percent of Patrick AFB's total land area.

Mangrove communities occur in discontinuous segments along the Banana River shoreline bordering Patrick AFB's west side and along edges of some canals connected to the river. While the Patrick AFB mangrove communities are healthy and provide ecological value, they are of isolated functionality (USAF 2014b). Additionally, these communities are fragile and easily altered by dredging, flooding, impounding and clearing, and the establishment of the exotic species, the Brazilian pepper along the shoreline further threatens their vitality (USAF 2014b).

The salt marsh community on site is protected by the barrier island. Characteristic species of a salt marsh may include saltmarsh cordgrass (*Spartina alterniflora*), needle rush (*Juncus roemerianus*), perennial glasswort (*Sarcocornia ambigua*), saltmeadow corgrass (*Spartina patens*), marsh elder (*Iva frutescens*), and christmasberry (*Lycium carolinianum*). Other vegetation along the Banana River, include wetland herbaceous and woody species, with minimal exotics due to the 45 SW extensive invasive removal program.

As of 2014 federally or state listed species include shell mound prickly-pear cactus (*Opuntia stricta*), beach star (*Remirea maritime*), and inkberry (*Scaevola plumieri*) (USAF 2014b). State law also affords some protection to the black mangrove (*Avicennia germinans*), red mangrove (*Rhizophora mangle*), and white mangrove (*Laguncularia racemosa*). These species occur along the Banana River shoreline and the edges of some canals (FDEP 2015).

Banana River

The Banana River area offshore of Patrick AFB includes several patchy seagrass beds with at least three species (*Halodule wrightii, Syringodium* sp., *Rupia maritima*) being identified mixed with several species of macroalgae (USAF 2014b). Recent algal blooms in 2011 and 2012 have substantially reduced seagrass populations in the Indian River Lagoon, including the Banana River (SJRWMD 2013). After nearly a decade of regular increase in seagrass coverage in the Indian River Lagoon, almost 50,000 acres of seagrass, or approximately 60 percent of the lagoon's total coverage, died between 2009 and 2012. Unusual pelican, dolphin, and manatee die-offs occurred subsequently; however, the causes of these mortalities remain uncertain (SJRWMD 2013).

3.5.2.2 Wildlife

Patrick AFB

Patrick AFB is largely developed and consists primarily of turf and landscaped areas. However, the base contains two natural communities which include beach dune and estuarine wetlands. These two natural communities comprise approximately 32 acres of the base's land area and provide habitat to various wildlife species, including 6 mammalian species, 8 amphibian and reptile species, and 42 bird species which are known to occur on or in within the vicinity of the base. A detailed list of vegetation and wildlife species which have been documented on Patrick AFB is provided in the Integrated Natural Resources Management Plan (INRMP) for the 45 SW (USAF 2014b).

3.5.2.3 Special Status Species

Patrick AFB

Patrick AFB is located on a barrier island, which provides important natural areas to support many plants, wildlife, and natural communities. Barrier islands along the Atlantic Coast are especially important for nesting sea turtles, populations of small mammals, and as foraging and habitat for a variety of resident and migratory shorebirds, wading birds, and song birds. Patrick AFB is located along

Table 3-4. Federal and State Special Status Species with the Potential to Occur on Patrick AFB

Scientific Name	Common Name	Federal Status	State Status
PLANTS			
Opuntia stricta	Shell Mound Prickly-Pear Cactus	-	T
Remirea maritime	Beach Star	-	E
Scaevola plumieri	Scaevola, Inkberry	-	T
FISH			
Pristis pectinata	Smalltooth Sawfish	E	E
AMPHIBIANS			
Rana capito aesopus	Florida Gopher Frog	-	SC
REPTILES			
Alligator mississippiensis	American Alligator	SC	T (S/A)
Caretta caretta	Atlantic Loggerhead Turtle	T	T
Chelonia mydas	Atlantic Green Turtle	E	E
Dermochelys coriacea	Leatherback Turtle	E	E
Lepidochelys kempi	Atlantic Ridley Sea Turtle*	E	E
Eretmochelys imbricata	Hawksbill Turtle *	E	E
Gopherus polyphemus	Gopher Tortoise	-	T
Drymarchon corais couperi	Eastern Indigo Snake	T	T
BIRDS			
Ajaia ajaja	Roseate Spoonbill*	-	SC
Charadrius melodus	Piping Plover*	T	T
Egretta caerulea	Little Blue Heron	-	SC
Egretta rufescens	Reddish Egret*	-	SC
Egretta thula	Snowy Egret	-	SC
Egretta tricolor	Tricolored Heron	-	SC
Eudocimus albus	White Ibis	-	SC
Falco sparverius paulus	Southeastern American Kestrel	-	T
Falco peregrinus tundris	Arctic Peregrine Falcon	-	E
Haematopus palliatus	American Oystercatcher	-	SC
Mycteria americana	Wood Stork	E	E
Pelecanus occidentalis	Brown Pelican	-	SC
Rynchops niger	Black Skimmer	-	SC
Sterna antillarum	Least Tern	-	T
Athene cunicularia	Burrowing Owl	-	SC

Table 3-4. Federal and State Special Status Species with the Potential to Occur on Patrick AFB (Continued)

Scientific Name	Common Name	Federal Status	State Status
MAMMALS			
Balaena glacialis	Right Whale *	E	E
Balaenoptera borealis	Sei Whale *	E	E
Balaenoptera physalus	Finback Whale *	E	E
Megaptera novaeangliae	Humpback Whale *	E	E
Trichechus manatus	Florida Manatee	E	T

SC = Species of Special Concern
T = Threatened
E = Endangered
S/A = Similar in Appearance
* Not observed on Patrick AFB, but known to occur in the vicinity
Sources: USFWS 2015a; FWC 2013; USAF 2014b.

one of the major migratory pathways for neotropical migratory birds that breed in eastern North America. Various species of wildlife inhabit, utilize, or frequent Patrick AFB. The beach at Patrick AFB is used by protected marine turtles for nesting/hatching historically from March to November. Threatened and endangered loggerhead (*Caretta caretta*) and green turtles (*Chelonia mydas*) are the most common species found nesting along the Patrick AFB eastern shore. The endangered leatherback sea turtle (*Dermochelys coriacea*) has also been known to nest at Patrick AFB intermittently. Sea turtles are impacted by artificial lighting and may become disoriented (loss of bearing). A Biological Opinion (BO) has been issued to the 45 SW for light management and re-initiation is required if the amount or extent of incidental take exceeds the allotted amount provided. The USFWS is working on designation of terrestrial critical habitat for the Northwest Atlantic population of loggerhead sea turtle. A proposed rule is still under review. The NMFS is also proposing designation of nearshore and offshore water critical habitat for the Northwest Atlantic Ocean loggerhead distinct population segment. The NMFS proposed rule is also still under review.

Additionally, while there are no federally designated critical habitat areas located on Patrick AFB, critical habitat for West Indian manatees and the North Atlantic right whale is mapped within the Banana River and along the Atlantic Coast (USAF 2014b).

3.5.2.4 Essential Fish Habitat

EFH can be defined as the waters and substrates necessary to fish for all or any stages of their life cycle. Regional Fishery Management Officials (FMOs) are responsible for designating EFH in their management plans for all managed species within the Exclusive Economic Zone (EEZ), which is an area of managed fisheries that extends from the shoreline to 200 miles offshore along the coastline. The SAFMC and Secretarial Management Council are the managing bodies for the marine area surrounding Patrick AFB (NMFS 2015). Within the vicinity of Patrick AFB the SAFMC currently manages EFH for several species including the South Atlantic snapper-grouper complex, South Atlantic shrimps, coastal migratory pelagic species, highly migratory species, red drum (*Sciaenops ocellatus*), spiny lobster, golden crab (*Chaceon fenneri*), calico scallop (*Argopecten gibbus*), and sargassum (*Sargassum* spp.). Substrates designated as EFH and Habitat Areas of Particular Concern (HAPCs), include live/hard bottom, coral reefs, submerged aquatic vegetation (e.g., seagrasses), outcroppings around the shelf break zone, estuarine nursery areas, oyster reefs or shell banks, unconsolidated bottom (i.e., soft sediments), estuarine scrub/shrub (e.g., mangrove fringe), shelf current systems, sandy offshore shoals/bars, tidal creeks, coral, and coastal inlet (see Table 3-5).

In addition to EFH designations, HAPCs have been identified within EFHs. HAPCs are localized areas that are vulnerable to degradation or are especially important ecologically. Identification of HAPCs and management of conservation priorities are also the responsibility of fishery management councils. The SAFMC has designated areas within the vicinity of Patrick AFB as EFH-HAPCs for the species within its jurisdiction: penaeid and rock shrimps, wahoo, snapper and grouper species complex, coastal migratory pelagic species, sargassum, golden crab, and live/hard bottom habitat (USAF 2014b).

Table 3-5. Essential Fish Habitat in the Vicinity of Patrick AFB

Species / Management Unit	Lifestage(s) Found at Location	Management Council	FMP
Bull shark	Neonate, juvenile, adult	Secretarial	HMS
Spinner shark	Neonate, juvenile, adult	Secretarial	HMS
Sand tiger shark	Neonate, adult	Secretarial	HMS
Scalloped hammerhead shark	Neonate, juvenile, adult	Secretarial	HMS
Bonnethead shark	Neonate, juvenile, adult	Secretarial	HMS
Finetooth shark	Juvenile, adult	Secretarial	HMS
Lemon shark	Neonate	Secretarial	HMS
Nurse shark	Juvenile, adult	Secretarial	HMS
Sailfish	Juvenile, adult	Secretarial	HMS
Atlantic sharpnose shark	Neonate, juvenile, adult	Secretarial	HMS
Blacknose shark	Juvenile, adult	Secretarial	HMS
Blacktip shark	Juvenile, adult	Secretarial	HMS
White shark	Neonate, juvenile, adult	Secretarial	HMS
Spiny lobster	Neonate, juvenile, adult	South Atlantic	Spiny lobster
Slippery lobster	Neonate, juvenile, adult	South Atlantic	Spiny lobster
Snapper grouper	Neonate, juvenile, adult	South Atlantic	Snapper grouper
Sandbar shark	Adult	Secretarial	HMS
Great hammerhead shark	Neonate, juvenile, adult	Secretarial	HMS
Tiger shark	Juvenile	Secretarial	HMS
Silky shark	Neonate, juvenile, adult	Secretarial	HMS
Yellowfin tuna	Juvenile	Secretarial	HMS

FMP = Fishery Management Plan
HMS = Highly Migratory Species
Source: USAF 2014b.

Snapper-Grouper Complex. EFH for snapper-grouper complex species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs, and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including sargassum, required for larval survival and growth (SAFMC 1998). HAPC for species within the snapper-grouper complex include: medium to high profile offshore hard bottoms where spawning normally occurs; nearshore hard bottom areas; mangrove habitat; submerged aquatic vegetation; oyster/shell habitat; all

coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper; pelagic and benthic sargassum; the Oculina Bank HAPC; and all hermatypic coral habitats and reefs (SAFMC 1998).

South Atlantic Shrimp. EFH for penaeid shrimp includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation; and subtidal and intertidal non-vegetated flats. HAPC for penaeid shrimp is designated as tidal inlets and state nursery and overwintering habitats (SAFMC 1998). In addition, submerged aquatic vegetation has been designated as HAPCs for postlarval/juvenile and subadult pink shrimp (*Pandalus borealis*). For rock shrimp, EFH consists of offshore terrigenous and biogenic sand bottom habitats from 60 to 600 feet in depth with highest concentrations occurring between 360 and 590 feet. EFH includes the shelf current systems near Cape Canaveral, which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring (SAFMC 1998). EFH for royal red shrimp include the upper regions of the continental slope from 590 feet to approximately 2,395 feet, with concentrations found at depths of between 820 feet and 1,558 feet over blue/black mud, sand, muddy sand, or white calcareous mud (SAFMC 1998).

Coastal Migratory Pelagic Species. The SAFMC managed species in the Coastal Migratory Pelagics Fishery Management Plan include cobia (*Rachycentron canadum*), little tunny (*Euthynnus alletteratus*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel, and cero (*Scomberomorus regalis*) (SAFMC 2009). EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars; high profile rocky bottom and barrier island ocean-side waters, and from the surf to the shelf break zone, and from the Gulf stream shoreward, including sargassum (SAFMC 1998).

Highly Migratory Pelagic Species. Highly migratory pelagic species including the tuna (*Thunnus* spp.), billfish, sharks, and swordfish use pelagic habitats identified

as EFH in the South Atlantic including off the coast of Patrick AFB and Cape Canaveral Air Force Station (CCAFS) (SAFMC 1998).

Red Drum. EFH for red drum includes the following offshore habitats to a depth of 160 feet: tidal freshwater; estuarine emergent vegetated wetlands; estuarine scrub/shrub (mangrove fringe); submerged aquatic vegetation; oyster reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial reefs. In addition, submerged aquatic vegetation has been designated as HAPCs for red drum (SAFMC 1998).

Spiny Lobster. EFH for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities; and mangrove habitat (prop roots). EFH for spiny lobster applies to coastal waters to the landward most influence of the tide from the Virginia/North Carolina border to the Dry Tortugas in the Florida Keys (SAFMC 1998).

Golden Crab. EFH for golden crab includes the U.S. continental shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). EFH types for golden crab include: a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat (SAFMC 1998).

Calico Scallop. EFH for calico scallops is the unconsolidated sediments including hard sand bottoms, sand and shell hash, quartz sand, smooth sand-shell-gravel, and sand and dead shell in at depths ranging from 43 to 308 feet (SAFMC 1998).

Sargassum. EFH for pelagic sargassum is designated wherever this species occurs, including state waters (SAFMC 1998).

3.5.2.5 Wetlands

Patrick AFB

A jurisdictional wetland determination within Patrick AFB was conducted by USACE in 2006. USACE provided this wetland delineation to USAF, but the determination expired in 2011. However, USACE still identifies the canals that

directly connect with the Banana River as jurisdictional. Other isolated wetlands exist on Patrick AFB, but are assessed by 45 CES/CEIE-C and regulators based on potential project site boundaries and permitting requirements due to variable hydrography (USAF 2014). According to the USFWS National Wetlands Inventory (NWI) potential wetlands on Patrick AFB are concentrated along the coast and include estuarine and marine habitats (USFWS 2015b). Data from the NWI identifies numerous surface water features on Patrick AFB; however, these features are resultant primarily from excavated canals used for storm water drainage (see Figure 3-4). The NWI aerial imagery data as well as a wetland survey in the 1990's both indicate that no natural wetlands occur on Patrick AFB, only wetlands associated with the Banana River. Additionally, the findings from the 2006 USACE jurisdictional wetland survey only included waterways that had a direct connection with the Banana River (USAF 2014b). Consequently, while some isolated wetlands do exist on Patrick AFB, these would be identified on case by case basis based on potential project site boundaries, permitting requirements and SJRWMD wetland delineation.

3.6 WATER RESOURCES

3.6.1 Definition of Resource

Water resources analyzed in this EA include surface water and groundwater. Natural surface water resources include lakes, rivers, and streams that collect and distribute water from precipitation and runoff from the land. Human-created water collection systems include ditches, canals, and stormwater systems. Groundwater can be defined as subsurface water resources that are interlaid in layers of rock and soil and recharged by surface water seepage. Other issues relevant to water resources include watershed areas affected by existing and potential hazards related to floodplains. Additionally, this EA includes analysis of coastal resources for consistency with the Federal Coastal Zone Management Act (CZMA).

3.6.2 Existing Conditions

3.6.2.1 Surface Water

Patrick AFB

Patrick AFB is located within the Indian River Lagoon watershed and is bordered to the east by the Atlantic Ocean and to the west by the Banana River. These two water bodies represent the major surface water resources at Patrick AFB. In addition to these two resources, Patrick AFB contains five man-made ponds (totaling 31.3 acres), 4.1 miles of drainage ditches, and 40.2 acres of canals. Most of the drainage ditches contain water throughout the year because they intersect the shallow water table aquifer. Several canals are interconnected with the Banana River and are brackish, but do not have significant tidal influences because ocean inlets are far from Patrick AFB (USAF 2005).

Banana River

The State of Florida designates the Banana River as Class III waters (recreation, fish and wildlife management). The Banana River is an integral part of the Indian River Lagoon Estuary, which includes the Mosquito Lagoon, Banana River Lagoon, and North and South Indian River Lagoons. The entire Banana River is also designated as an Aquatic Preserve (FAC 62-302.700) and categorized as

Florida Outstanding Waters. Because Aquatic Preserves are considered exceptional in terms of aesthetic, scientific, and biological value, they have substantial restrictions regarding various activities, including effluent discharges and drilling (FDEP 2013b). Use of the Banana River is predominantly for wildlife habitat and recreational boating.

3.6.2.2 Water Quality

FDEP uses water quality data from a wide variety of sources, including its own monitoring programs, to regularly assess Florida's rivers, lakes, springs and estuaries to determine whether they meet publicly adopted water quality standards. These standards are established to protect public health, preserve aquatic habitat and wildlife, and assure safe and healthy fishing and recreational uses. Surface waters that do not meet the standards set for them are determined to be "impaired" and in need of restoration. Impaired waters in the vicinity of 45 SW are provided in Table 3-6.

Table 3-6. Florida 303(d) List of Impaired Waters

Project Area and Water Body Name	NPDES I.D.	Location	Cause of Impairment	Cycles Listed	TMDL (lbs/yr)
Patrick AFB					
Banana River Below 520 Causeway*	FL3057a	Banana River	Dissolved Oxygen, Mercury in Fish Tissue, Other Cause	1998, 2002, 2010	144,780
Newfound Harbor*	FL3044a	Banana River	Dissolved Oxygen, Mercury in Fish Tissue, Other Cause	1998, 2002, 2010	30,661

Note: * = designated as an Outstanding Florida Water
Sources: USEPA 2010; FDEP 2006; FDEP 2013c.

Surface water quality management protocols are developed and implemented within each installation. These measures limit impacts associated with training and construction activities to surface waterways located within and in the vicinity of these areas. Impaired waters of the Banana River are managed under the Banana River Lagoon Basin Management Action Plan (BMAP) to address Total Daily Maximum Loads (TMDLs).

3.6.2.3 Groundwater

The project site is located within Brevard County which overlies two continuous aquifer systems, the surficial aquifer and the Floridan aquifer. The surficial aquifer system is contained in undifferentiated Late Miocene, Pliocene, and Recent Pleistocene deposits. These deposits are composed primarily of medium to coarse quartz sands, with coquina and shell occurring more frequently at depth (USAF 2014b). The surficial aquifer is hydrologically separated from the underlying Floridan aquifer by sediments of the Hawthorn Group of Miocene Age. The low permeability clays, silts, and marls of the Hawthorn Group are considered the aquitard between the non-artesian surficial and the artesian Floridan aquifer system. The Floridan aquifer system consists of a series of highly permeable limestone formations including the Ocala Group and the Avon Park Limestone, both of Eocene age. Water enters the surficial aquifer through direct infiltration from the percolation of rainwater. Groundwater deeper than the surficial aquifer is affected more by regional boundaries such as the Atlantic Ocean and the Banana River. Rates of groundwater movement are generally substantially less than one foot per day. The surficial aquifer is typically classified by FDEP as a Class G-II aquifer (less than 10,000 milligrams per liter [mg/L] total dissolved solids [TDS]). Class G-II is defined as able to supply water treatable for human consumption (USAF 2014b). Potable water supplied to the base is provided by the City of Cocoa and the City of Melbourne, with committed capacities of 2.6 million gallons per day and 1.0 million gallons per day, respectively (USAF 2011). The water supplies for each of these cities comprise well fields, reservoirs, and tertiary water treatment plants.

3.6.2.4 Floodplains

Floodplains generally are areas of low, level ground present on one or both sides of a stream channel that are subject to periodic or infrequent inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. The porous material that composes the floodplain is conducive to retaining water that enters the soil during flooding events and at times when the groundwater table is elevated. Floodplains in their natural form are beneficial in reducing the number and severity of floods, minimizing non-point source water pollution, filtering storm water, providing

habitat for plants and animals, and providing aesthetic appeal and outdoor recreation benefits. Inundation dangers associated with development of floodplains have prompted Federal, state, and local legislation to limit floodplain development to recreation, agriculture, and preservation activities (USAF 2014b). EO 11988, *Floodplain Management* requires Federal agencies to protect the values and benefits of floodplains and to reduce risks of flood losses by not conducting or allowing activities within floodplains, unless there is no other practicable alternative. EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input* amends EO 11988 with the intent of improving the resilience of communities and Federal assets against the impacts of flooding, which is anticipated to intensify over time due to the effects of climate change and other threats. EO 13690 creates a new Federal Flood Risk Management Standard (FFRMS) and requires agencies to expand analysis of floodplains impacts from the base elevation (100-year floodplain) to a higher vertical flood elevation for federally funded projects. The western portion of Patrick AFB along the Banana River occurs within the 100-year flood zone (i.e., 1 percent annual chance of flood), while other portions of the base are located the 500-year flood zone (Federal Emergency Management Agency [FEMA] 2015). The eastern boundary of the base along the Atlantic Coast is located within a coastal flood zone with velocity hazard (i.e., wave action) (FEMA 2015).

3.6.2.5 Coastal Zone Management Act Consistency

In 1972, the U.S. Congress enacted the CZMA (16 U.S. Code [USC] 1451-1464) to assist coastal states, Great Lakes states, and U.S. territories to develop coastal management programs, and comprehensively manage and balance competing uses of and impacts to coastal resources. The Florida Coastal Management Program (FCMP) was approved by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) in 1981 and is codified as Florida Statutes, Chapter 380, Part II (FDEP 2013a). The geography of Florida and the CZMA dictate that the entire State of Florida, including Patrick AFB, be designated as a Coastal Zone and be subject to the FCMP. The FCMP consists of a network of 24 Florida Statutes administered by eight state agencies and five Water Management Districts (WMDs). Under provisions of the CZMA, any Federal activity that has the potential to affect Florida's coastal resources is reviewed for consistency with the FCMP, which is administered by FDEP.

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Water Resources at Patrick AFB

FIGURE 3-4

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

3.7 CULTURAL RESOURCES

3.7.1 Definition of Resource

Several Federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (NHPA) of 1966, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archaeological Resource Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. In addition, DoDI 4710.02, *Department of Defense Interactions with Federally-Recognized Tribes* (2006) governs DoD interactions with federally-recognized tribes and EO 13175, *Consultation and Coordination with Indian Tribal Governments* (2000), charges Federal departments and agencies with regular and meaningful consultation with Native American tribal officials in the development of policies that have tribal implications. In order for a cultural resource to be considered significant, it must meet one or more of the following criteria for inclusion on the National Register of Historic Places (NRHP):

> "The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and: 1) that are associated with events that have made a significant contribution to the broad patterns of our history; or 2) that are associated with the lives or persons significant in our past; or 3) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or 4) that have yielded, or may be likely to yield, information important in prehistory or history" (36 CFR § 60:4).

3.7.2 Existing Conditions

3.7.2.1 Regional Archaeological Setting

Within the State of Florida archaeological sites are located in an area of overlap between the historic territories belonging to the Timucua and Ais Native American tribes.

The Timucua tribe was known to have relatively permanent villages. The men of the tribe made tools for hunting and fishing, including spears, clubs, bows and arrows, and blowguns, use to kill game. The women would clean and prepare the animal hides and use them for clothing. Farming was another important means of obtaining food for the Timucua. The main crops that they harvested were maize (corn), beans, squash, pumpkins, and melons. The women cooked and gathered roots, nuts, and wild berries to eat. The women also made pottery to use for cooking (Florida Center for Instructional Technology 2002).

The Ais were primarily foragers; hunting, fishing, and gathering for subsistence. They made use of both the freshwater marshes and swamps and the saltwater coastal lagoons. Because they were able to access and abundance of foodstuffs from their immediate environment, they were able to sustain a highly developed cultural system. Turkeys, ducks, deer, raccoons, opossums, rabbits and other small game made up about 15 percent of their diet. At least 80 percent of their diet consisted of fish, reptiles and shellfish such as oysters and clams. They left behind large midden mounds of shell as well as dirt burial mounds (Heritage of the Ancient Ones 2013).

This part of the eastern coast of Florida was reputed for causing shipwrecks. As such, there are many accounts of shipwreck survivors making contact with these tribes. Succession of primary European influence included rotating periods of Spanish, French, and English dominance until 1821, when Florida was added as a territory of the United States (Blackman 1973).

3.7.2.2 Archaeological Resources at Patrick AFB

Early settlement of the peninsula where Patrick AFB is located was focused within the Banana River Lagoon salt marsh area; however, archaeological evidence

suggests that the entire peninsula was exploited for a wide variety of marine, estuarine, and terrestrial resources. At the time of European contact, the peninsula was populated by the Ais tribe (USAF 2015a).

The U.S. Navy established the installation in 1940 as the Banana River Naval Air Station. The Naval Air Station served as an active base for anti-submarine sea-patrol planes during World War II. After the installation's deactivation in 1947, it was transferred to the USAF in 1948. It was renamed Patrick AFB in 1950 in honor of the chief of the U.S. Army Air Service from 1921 to 1927, Major General Mason M. Patrick. At this time the USAF began developing the Eastern Test Range. From 1950 to present, the 45 SW, formerly the Eastern Space and Missile Center (ESMC), has been responsible for launch, test and support operations associated with the cruise missile program, ballistic missiles, the Apollo and Space Shuttle programs, and the Delta, Atlas, and Titan programs (USAF 2015a).

Patrick AFB is thought to have low potential for on-site archaeological resources. As described in further detail within the Integrated Cultural Resources Management Plan (ICRMP) (USAF 2015a), during World War II the relic dune and swale system common on the barrier island was completely flattened. Historic research has found that 30 percent of the existing base was created using dredged fill during construction of Banana River Naval Air Station in the 1940s. Consequently, any sites that existed prior to 1940 were either destroyed or were so deeply buried the likelihood of finding them is next to impossible. In addition, subsequent development at Patrick AFB resulted in substantial land alteration to the remaining areas within the base boundaries (USAF 2015a). However, while it remains a low probability, there is still potential for buried World War II resources in the form of evidence of former facilities, buried cisterns or wells, and landfills. Archaeological remnants of a World War II Lighter-than-Air (Blimp) Facility (8BR2477) were identified within the airfield at Patrick AFB in August 2011 and is awaiting additional analysis. All inadvertent discoveries of buried cultural material are addressed in Standard Operating Procedures (SOPs) 1 and 3 in the ICRMP (USAF 2015a).

3.7.2.3 Historic Built Resources at Patrick AFB

Patrick AFB has only recently been the subject of intensive cultural resource investigations. In 1993, 18 buildings at Patrick AFB were documented with Historic American Buildings Survey (HABS) Level IV standards as part of mitigation measures in compliance with Section 106 of the NHPA. Of these 18 buildings, three (Buildings 800, 400, and 430) were further documented at HABS Level II, and Building 993 was documented at HABS Level III (Jenkins et al. 1993). The *Historical and Architectural Documentation Reports of Patrick Air Force Base, Cocoa Beach, Florida* (Temme et al. 1994) completed HABS Level IV reports on all extant World War II buildings and structures and all post-1945 buildings and structures related to Patrick AFB's Cold War mission. Each of these 150 buildings or structures was described, photographed, and assessed for NRHP eligibility and current condition. However, this study was never submitted to the State Historic Preservation Office (SHPO) for review. From 2001 to 2011, facilities were addressed on a case-by-case basis when an undertaking involved any building or structure on Patrick AFB. In 2009 the 45 SW entered into consultation with the SHPO to rectify the issues with previous inventory. The previous surveys at Patrick AFB were submitted to the SHPO along with an update.

The updated report and proposed status of all buildings at Patrick AFB 45 years and older was accepted by the SHPO in November 2011 (Florida Department of Historic Resources [FDHR] Project File No. 2011 3861). It was agreed that most of the buildings no longer retained the original characteristics which made them individually NRHP eligible. However, many were eligible for the NRHP as contributing elements (see Table 3-7). A small number of the facilities date to the World War II naval station with the majority dating to the Cold War Period. Almost every building at Patrick AFB has undergone renovations since their construction and in some cases several changes.

Table 3-7. Historic Districts on Patrick AFB

FMSF No.	Facility No.	Site Name	Year Built	SHPO Concurrence
Banana River Naval Air Station Seaplane Historic District (8BR1975)				
8BR1970	302	Seaplane Ramp	1940	Y
8BR1971	303	Seaplane Ramp	1940	Y
8BR2026	304	Seawall	1940	N
8BR1972	305	Seaplane Ramp	1940	Y
8BR1974	313	A&R Shop	1943	Y
Patrick Air Force Base Administrative Historic District (8BR2440)				
8BR2044	408	Administrative Building	1955	N
8BR2045	423	45th Space Wing Headquarters	1959	Y
8BR2046	425	Administrative Building	1957	Y
8BR2047	431	Base Theatre	1942	Y
8BR2025	439	Seaside Chapel	1945	N
8BR2061	530	Professional Development Center	1942	N
8BR2048	534	Administrative Building	1942	N
8BR2049	535	Administrative Building	1942	N
8BR2050	536	Administrative Building	1942	N
8BR2056	537	Administrative Building	1942	N
8BR2063	545	Gymnasium	1943	N
8BR2142	556	Administrative Offices	1945	N
8BR1837	557	Administrative Offices	1944	N
8BR2064	559	Administrative Offices	1944	N
8BR2065	560	Administrative Offices	1945	N
8BR2066	561	Administrative Offices	1945	N
8BR2067	562	Administrative Offices	1945	N
8BR2152	926	Abandoned in Place	1968	Y
8BR2162	978	Antenna Testing Facility	1965	Y
Patrick Air Force Base Facilities Landplane Historic District (8BR2438)				
8BR2462	630	Aircraft Maintenance Hangar	1964	Y
8BR2463	632	Jet Engine Maintenance Shop	1965	Y
8BR2464	637	Test Stand	1967	N
8BR2465	647	Aircraft Maintenance	1970	Y
8BR2069	685	MARS Station	1954	N
8BR2137	750	920th Maintenance Group Hangar	1944	Y
8BR2138	751	NASA Aircraft Hangar	1945	N
8BR2476	810	Firehouse	1952	N
8BR2155	985	DOS Aircraft Maintenance Hangar	1953	N
8BR2136	989	AFTAC	1959	Y
8BR2499	20610	Aircraft apron	1941	N
8BR2439	N/A	Landplane Airfield	940	N

Table 3-7. Historic Districts on Patrick AFB (Continued)

FMSF No.	Facility No.	Site Name	Year Built	SHPO Concurrence
Patrick Air Force Base Missile Instrumentation Station Historic District (8BR2170)				
8BR2150	965	Mail Distribution Building	1957	Y
8BR2140	969	Guided Missile Data Collection Station	1963	Y
8BR 2141	970	Radar Station Antenna	1963	Y
Bomarc-SAGE Tracking Facility Historic District (8BR2181)				
8BR2179	990	Squadron Operations Building	1941	N
8BR2158	991	Florida Air National Guard Facility	1956	N
8BR2159	996	Aeromedical Squadron Logistics Fac.	1954	N
Inert Storage Facility Historic District (8BR2075)				
8BR2034	1322	Inert Storage Magazine	1941	N
8BR2035	1327	Inert Storage Magazine	1941	N
8BR2036	1330	Inert Storage Magazine	1941	N
High Explosive Storage Facility Historic District (8BR2076)				
8BR2037	1425	High Explosive Magazine	1941	N
8BR2038	1432	High Explosive Magazine	1941	N
8BR2039	1435	High Explosive Magazine	1941	N
8BR2040	1437	High Explosive Magazine	1941	N
8BR2041	1440	High Explosive Magazine	1941	N

FMSF = Florida Division of Historic Resources Florida Master Site File
SHPO Concurrence: Y = SHPO concurred with individual NRHP determination; N= SHPO determined not individually eligible for NRHP.
Source: USAF 2015a.

3.8 HAZARDOUS MATERIALS AND WASTES

3.8.1 Definition of Resource

Hazardous wastes are defined by the *Resource Conservation and Recovery Act* (RCRA), as amended, as any solid, liquid, contained gaseous, or semisolid waste, or any combination of wastes that pose a substantial present or potential hazard to human health or the environment. Hazardous materials are defined by the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as amended, as any substance with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality, serious irreversible illness, or incapacitating reversible illness; or pose a substantial threat to human health or the environment. Issues associated with hazardous materials and wastes typically center on underground storage tanks (USTs); aboveground storage tanks (ASTs); and the storage, transport, and use of pesticides, fuels and other petroleum-based products, lubricants, antifreeze, and paint solvents. When such resources are improperly used in any way, they can threaten the health and well-being of wildlife species, vegetation communities, soil systems, water resources, and people.

To protect habitats and people from inadvertent and potentially harmful releases of hazardous substances, USAF, through AFI 10-2510 and 32-7086, has dictated that all facilities develop and implement *Hazardous Materials Management Plans, Hazardous Waste Management Plans*, and/or *Spill Prevention, Control, and Countermeasure Plans*. In addition, the DoD has developed the ERP to facilitate the thorough investigation and cleanup of contaminated sites located at military installations. These plans and programs, in addition to established legislation (e.g., CERCLA, RCRA, etc.), effectively form the "safety net" intended to protect the ecosystems on which most living organisms depend.

3.8.2 Existing Conditions

3.8.2.1 Hazardous Materials and Wastes

Patrick AFB

A wide variety of hazardous materials ranging from paint, solvents, adhesives, cleaners, metal treatments, and fuels are used on Patrick AFB. The collection, management, transportation, and disposition of hazardous wastes are defined and strictly regulated by the RCRA, as amended, and by applicable Federal and state regulations. All hazardous material purchases are required to be authorized. The materials are required to be tracked through the HAZMART Pharmacy. 45 SW Operations Plan (OPLAN) 19-14, *Petroleum Products and Hazardous Waste Management Plan*, describes waste management procedures on Patrick AFB. This plan also procedures for remediation of the Solid Waste Management Units (SWMUs), ERP sites, and Areas of Concern (AOCs) at Patrick AFB (USAF 2014b).[2]

FDEP defines SWMUs as areas where a release to the environment occurred. SWMUs are listed on the Patrick AFB RCRA Corrective Action permit and activities follow the RCRA corrective process. SWMUs range in size from less than one to more than 50 acres (e.g., either a single isolated tank or an entire launch complex might be designated as a SWMU). Common contaminants include the industrial solvents historically used for parts washing and equipment cleaning, polychlorinated biphenyls from old transformers and paints, metal from lead based paint, pesticides from pest control activities, and petroleum products related to fueling and other operations. Depending on the chemical and physical characteristics of the contaminant, as well as site features, contaminants may be bound up in soil or sediment, may migrate into groundwater and form a "plume," or may enter local surface water. As of 2008, 112 SWMUs were identified at Patrick AFB (USAF 2014b).

The ERP was developed by the DoD to identify and address environmental contamination from past military operations. Future development of sites identified through the ERP program may be constrained depending on the severity of the contamination or the extent of the remedial action required. The

[2] ERP is the updated title for the previous Installation Restoration Program (IRP)

overall objective of the ERP is to identify potential environmental problems and provide timely remedies to protect public health and the environment. As of 2008, 30 ERP sites were identified at Patrick AFB (USAF 2014b). Additionally, clean-up activities have been initiated at all 30 ERP sites, 21 of which were approved for No Further Action, seven have ongoing remedial action and must continue to be operated, and two have Land Use Controls as the only remaining requirement. Additionally, eight other AOCs (i.e., potentially contaminated sites that have not been formally designated as ERP sites) have also been identified at Patrick AFB. As of 2008, all but one of the AOC sites has been successfully assessed, remediated, and approved for No Further Action (USAF 2014b).

3.8.2.2 Asbestos and Lead-based Paint

Asbestos is a mineral fiber that was historically added to products to strengthen them and provide heat insulation and fire resistance. Breathing high levels of asbestos has been associated with some types of cancer. Many building products contained asbestos prior to the 1970s. Consequently, as many of the buildings at Patrick AFB were constructed before this period and therefore, there is a potential for these facilities to contain asbestos. AFI 32-1052, *Facility Asbestos Management*, provides direction for the management of asbestos-containing material on USAF installations. Prior to work being accomplished in any building on Patrick AFB, protocol requires that the 45 CES/CEIE Environmental Office be contacted to locate any asbestos that may be present.

Lead-based paints are also considered hazardous materials. Although these paints are no longer used at the installation, many of the buildings on Patrick AFB were constructed prior to 1978 and therefore may contain lead-based paint. Lead based paint removal and disposal at Patrick AFB is conducted in accordance with Federal, state, and local regulations. All paint waste generated from paint removal operations at Patrick AFB is containerized, sampled, and analyzed to determine whether the waste meets the definition of hazardous waste.

Implementation of the Proposed Action or its alternatives would not result in construction or demolition of structures and would therefore not result in the potential for hazards related to asbestos or lead-based paint. Consequently, asbestos and lead-based paint are not discussed in further detail within this EA.

3.9 TRANSPORTATION AND CIRCULATION

3.9.1 Definition of Resource

Transportation and circulation refers to the movement of vehicles throughout a road and highway network. *Primary roads* include major interstates and other principal arterials designed to move traffic but not necessarily to provide access to all adjacent areas. *Secondary roads* include rural routes and major surface streets that provide access to residential and commercial areas, hospitals, and schools. The capacity of transportation networks and quality of circulation may be described in *annual average daily traffic* (AADT) volumes or *level of service* (LOS).

3.9.2 Existing Conditions

3.9.2.1 Patrick AFB

Patrick AFB is accessed from two main roadways. The first roadway, the Pineda Causeway, connects Patrick AFB with the Florida mainland to the west. This causeway has an AADT of approximately 20,000 to 28,000 vehicles (Space Coast Transportation Planning Organization [SCTPO] 2011). The Pineda Causeway stretches approximately 3 miles across the Banana River channel to connect Patrick AFB to the mainland. The Pineda Causeway merges with the A1A State Highway at the eastern edge of the barrier island. State Highway A1A (South Atlantic Avenue) abuts the eastern boundary of Patrick AFB and runs in the north-south direction. It brings traffic from Cape Canaveral Air Force Station (AFS), Cape Canaveral, and Cocoa Beach to the north and from Satellite Beach as well as the mainland (through Pineda Causeway) to the South. The AADT for the A1A north of Patrick AFB ranges between approximately 10,000 and 17,000. Meanwhile, the AADT along this highway from the south is approximately 20,000 (SCTPO 2011).

3.9.2.2 Marine Traffic

Boating is a very important characteristic of Florida's coastal lifestyle and culture. The state has one of the highest numbers of boat registrations and is one of the most popular destinations in the U.S. for marine recreation (Sidman et al. 2010). As such, the Banana River lagoon system and the Atlantic Ocean are important waterways that facilitate a large amount of marine transportation.

A study of Brevard County recreational marine traffic revealed a peak boating season during the months of May, June, and July. June was the busiest month for Brevard County, while December was the slowest month for recreational boating (Sidman et al. 2010). In addition, the study reported that more than 80 percent of recreational boaters surveyed departed in the morning, with an average morning departure time of approximately 7:52 AM. Median trip durations ranged from 4 to 7 hours, depending on the user category and season (Sidman et al. 2010).

3.10 SAFETY

3.10.1 Definition of Resource

The primary safety concern at facilities with aircraft operations is the potential for aircraft mishaps (i.e., crashes), which may be caused by mid-air collisions with other aircraft or objects, weather difficulties, pilot error, equipment malfunction, or bird-aircraft strikes. The USAF has defined aircraft mishap classifications based upon personal injury and property damage. These mishap classifications range from Class A (i.e., total cost in excess of $2 million or more, fatality, or permanent disability, destruction of DoD aircraft) to Class D (i.e., total cost to $20,000 or more but less than $50,000). Bird/Wildlife Aircraft Strike Hazard (BASH) is defined as the threat of aircraft collision with birds and other wildlife during aircraft operations.

The USAF regulates airfield clearances under Air Force Manual (AFM) 32-1123, *Airfield and Heliport Planning Criteria*. Accident Potential Zones (APZs) are rectangular zones extending outward from the ends of active runways at military bases, which delineate those areas recognized as having the greatest risk of aircraft mishaps, most of which occur during takeoff or landing. Clear Zones (CZs) are the areas closest to the end of the runway, which are considered the most hazardous areas.

3.10.1.1 Explosive Safety Quantity Distance

Siting requirements for explosive materials storage (e.g., munitions) and handling facilities are based on safety and security criteria. AFM 91-201, *Explosives Safety Standards*, requires that defined distances be maintained between these and a variety of other types of facilities. These explosive safety quantity-distance (ESQD) arcs are determined by the type and quantity of explosive materials to be stored; each explosive material storage or handling facility has ESQD arcs extending outward from its sides and corners for a prescribed distance. Within ESQD arcs, development is either restricted or altogether prohibited in order to maintain safety of personnel and minimize the potential for damage to other facilities in the event of an accident. ESQD arcs for multiple facilities at a single site may overlap,

leaving a series of arcs as edges of the safety zone. Explosive materials storage and build-up facilities must be located in areas where security can be assured.

3.10.1.2 Anti-terrorism/Force Protection

The DoD has developed Anti-terrorism/Force Protection Standards (AT/FP) standards, which are designed to reduce the likelihood of casualties from potential terrorist attacks. Requirements include mandated setbacks of parking areas from buildings, increased security measures such as barricades at military facility entrances and exits, and AT/FP-compliant perimeter fences. Requirements also include mandates regarding emergency notification systems and procedures. The *United States Air Force Installation Force Protection Guide* contains information on installation planning, engineering design, and construction techniques that can preclude or minimize the effects of terrorist attacks upon existing and future facilities. It addresses the comprehensive planning process, facility site design, and building systems design. Additional criteria are available in Unified Facilities Criteria (UFC) 4-010-01 *DoD Minimum Antiterrorism Standards for Buildings*.

3.10.2 Existing Conditions

3.10.2.1 BASH and Other Wildlife Hazards

BASH is defined as the threat of aircraft collision with birds during flight operations and is a safety concern at all airfields due to the frequency of aircraft operations and the possibility of encountering birds at virtually all altitudes. Most birds fly close to ground level, and more than 95 percent of all reported bird-strikes occur below 3,000 feet above ground level (AGL). At most military bases, approximately half of reported bird-strikes occur in the immediate vicinity of the airfield and another 25 percent occur during low-altitude local training exercises. Because migratory bird species are considered of special ecological value, EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds,* was introduced in 2001 to ensure that Federal agencies focus attention on the environmental effects to migratory bird species and, where feasible, implement policies and programs, which support the conservation and protection of migratory birds.

Waterfowl present the greatest BASH potential due to their congregational flight patterns and because, when migrating, they can be encountered at altitudes up to

20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during April and May and from August through November due to migratory activity. Patrick AFB is located within the Atlantic Migratory Flyway. The 45 SW BASH Operations Plan 91-212 addresses measures that must be followed when bird-strike conditions are deemed moderate to severe. Reported BASH incidents at Patrick AFB between 2007 and 2012 are enumerated in Table 3-8 below.

Table 3-8. Reported BASH Incidents at Patrick AFB 2007-2012

Year	Number of Incidents	Species Reportedly Involved
2007	8	Egret, Dunlin (*Calidris alpina*), Blackpoll Warbler (*Setophaga striata*), Blue-Winged Teal (*Anas discors*), Killdeer (*Charadrius vociferous*), Osprey (*Pandion haliaetus*), Unknown Species
2008	7	Mourning Dove (*Zenaida macroura*), Rock Dove/Pigeon (*Columba livia*), Turkey Vulture (*Cathartes aura*), White-Winged Dove (*Zenaida asiatica*), Black-Breasted Boatbill (*Machaerirhynchus nigripectus*), Unknown Species
2009	3	Osprey, Blue-Winged Teal, Unknown Species
2010	3	Free-tailed Bat, Palm Warbler, Unknown Perching Bird
2011	7	Sanderling (*Calidris alba*), Gray Catbird (*Dumetella carolinensis*), Eastern Meadowlark (*Sturnella magna*), Bat, American Kestrel (*Falco sparverius*), Savannah Sparrow (*Passerculus sandwichensis*), Unknown Species
2012	3	Cattle Egret (*Bubulcus ibis*), Brazilian Free-Tailed Bat (*Tadarida brasiliensis*), Unknown Species

Source: USAF 2015b.

3.10.2.2 Clear Zones and Accident Potential Zones

Patrick AFB has two active runways, with associated APZs and CZs. Runway 03/21, the primary runway is a Class B runway that is approximately 9,000 feet long and 200 feet wide. It accommodates all high performance, large, and heavy aircraft operating at the base. The north overrun for this runway is approximately 1,100 feet and the south overrun is 1,000 feet. The CZ to the north of Runway 03/21 has numerous obstructions, all currently waived by Air Force Space Command (AFSPC) Explosives Safety (USAF 2011). The secondary runway, Runway 11/29, crosses northwest to southeast, and is approximately 4,000 feet long and 200 feet

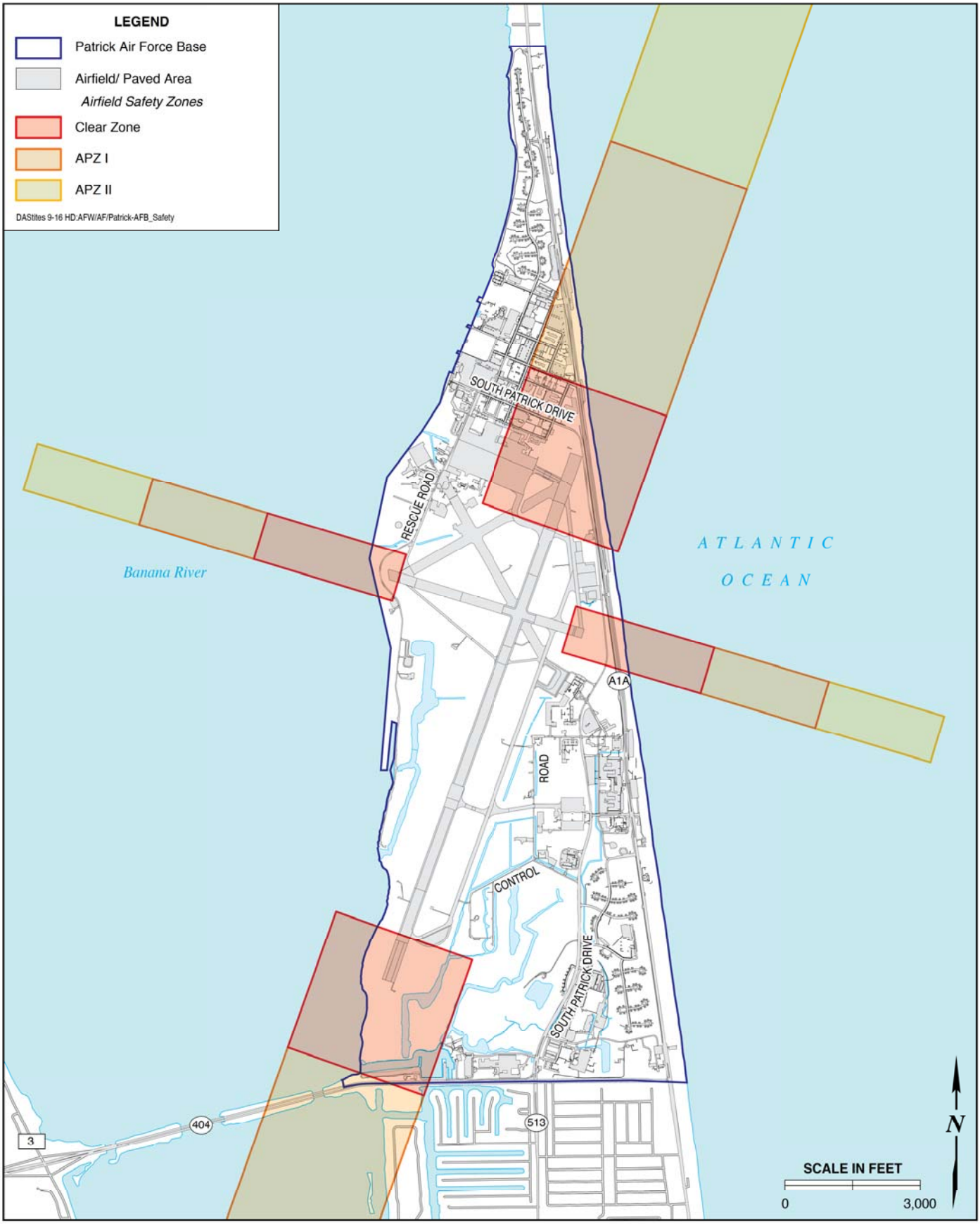
wide. This runway is a Class A runway primarily intended for small, lighter aircraft such as fighter jets (AirNav 2016; USAF 2011).

3.10.2.3 Explosives Safety Quantity Distance

There are nine explosive storage areas and four "hot" cargo loading areas at Patrick AFB. The areas, including their respective ESQD arcs, comprise approximately 180 acres at Patrick AFB. Generally, development in the area of the ESQD arcs is limited to functions directly related to munitions operations. Two Munitions Storage Areas with related ESQD restrictions are currently located on Control Road, north of the Air Traffic Control Tower. These storage areas are planned for relocation to the munitions storage complex located adjacent to the golf course. The existing ESQD zones will be eliminated, thereby facilitating development of new Fire Crash Rescue and Air Force Technical Applications Center facilities as well as making additional land developable in the future for airfield–related uses (USAF 2011).

3.10.2.4 Anti-terrorism/Force Protection

AT/FP measures are a critical component of development projects at Patrick AFB (USAF 2011). All roadway, parking, and facility construction projects at the base must comply with UFC 4-010-1, *Department of Defense Minimum Antiterrorist Standards for Buildings*. These guidelines detail the standoff distances between facilities, roadways, parking and the installation boundary and can limit the development potential of areas within the installation. The 45 SW has also placed a renewed emphasis on the configuration and operation of the entry control facilities at Patrick AFB. Site specific barrier plans are also developed and utilized as needed to protect assets from AT/FP threats (USAF 2011).



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Airfield and Explosives Safety

FIGURE 3-5

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

SECTION 4
ENVIRONMENTAL CONSEQUENCES

Air Force Instruction (AFI) 32-7061 directs U.S. Air Force (USAF) officials to follow 32 Code of Federal Regulations (CFR) 989 which specifies the procedural requirements for the implementation of National Environmental Policy Act (NEPA) and requires consideration of environmental consequences as part of the planning and decision-making process. Environmental impacts that are anticipated to result from implementation of the USAF Proposed Action and No Action Alternative described in Section 2, *Proposed Action and Alternatives*, are identified and evaluated in this section. Issues studied are presented by resource area and location, as described in Section 3, *Affected Environment*.

Guidelines established by the Council on Environmental Quality (CEQ) (40 CFR 1508.27) specify that significance should be determined in relationship to both context and intensity (severity). The assessment of potential impacts and the determination of their significance are based on the requirements of 40 CFR 1508.27. Three levels of impact can be identified:

- *No impact* – No impact is predicted;
- *Less than significant impact* – An impact is predicted, but the impact does not meet the intensity/context significance criteria for the specific resource;
- *Significant impact* – An impact is predicted that meets the intensity/context significance criteria for the specific resource.

The Proposed Action at Patrick Air Force Base (AFB) would implement a long–term solution to address coastal erosion along the Banana River shoreline at Patrick AFB, meeting the purpose and need described in Section 1.2, *Purpose and Need for the Proposed Action*. Potential impacts associated with the shoreline stabilization proposals adjacent Rescue Road and Runway 11 site and the glide slope west of Runway 03/21, as described in Section 2, *Proposed Action and Alternatives*, are described in detail below.

4.1 AIR QUALITY

4.1.1 Approach to Analysis

AFI 32-7040, *Air Quality Compliance and Resource Management*, provides a framework for ensuring that USAF actions conform to appropriate implementation plans and requirements. Section 3.4 of AFI 32-7040, *Conformity Rule Planning*, ensures that such actions conform to the applicable implementation plan through the U.S. Environmental Protection Agency (USEPA) General Conformity Rule. Section 3.5 of AFI 32-7040, *NEPA and Environmental Impact Analysis Process Planning*, outlines requirements under NEPA for analysis of air quality impacts with respect to the Prevention of Significant Deterioration/New Source Review (40 CFR Part 51), Hazardous Air Pollutant (HAP) emissions, and emissions of any other pollutants regulated under the Clean Air Act (CAA), such as ozone-depleting substances. Direct and indirect emissions of criteria pollutants or their precursors associated with the Proposed Action must be calculated for all non-exempt emission sources, including mobile and stationary emissions.

With respect to the General Conformity Rule, effects on air quality would be considered significant if the Proposed Action would result in increased pollutant emissions within the Central Florida Intrastate Air Quality Control Region by 10 percent or more, or if such emissions exceed *de minimis* threshold levels established in 40 CFR 93.153(b) for criteria pollutants already in *nonattainment*.

On 1 August 2016, the CEQ released *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. This guidance describes how and when Federal agencies should account for the effects of greenhouse gas (GHG) emissions and climate change impacts under NEPA. The guidance uses projected GHG emissions as a proxy for assessing an action's potential climate change impacts. The guidance also directs agencies to consider the direct, indirect, and cumulative effects of the GHG emissions from an action, and take into account the effects of connected actions (CEQ 2016).

4.1.2 Impacts

4.1.2.1 Alternative A (Preferred Alternative)

Construction Emissions (Fugitive Dust & Combustion)

The Preferred Alternative would involve two primary construction elements associated with the two locations requiring shoreline stabilization and associated clean sand fill. As described in Section 2.3.1.1, *Rescue Road and Runway 11*, at the affected area adjacent to Rescue Road and Runway 11, the Preferred Alternative would include construction of a 788 linear foot revetment covering a total footprint of approximately 0.251 acres as well as the deposition of approximately 1,017 cubic yards of clean fill covering approximately 0.631 acres along the shore shoreline. At the glide slope west of Runway 03/21 site, the Preferred Alternative would require approximately 485 cubic yards of additional clean fill, to cover and backfill the exposed gabion baskets.

Under the Preferred Alternative, fugitive dust would be generated during construction activities, including site preparation, clearing, and grading. Dust emissions generated by such activities can vary substantially depending on levels of activity, specific operations, and prevailing meteorological conditions. Additionally, in water activities or activities within wetted sand or soils would have a reduced potential for fugitive dust. The standard dust emission factor for general non-residential construction activity is conservatively estimated at 0.19 tons of particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) generated per acre per month of activity (USEPA 2006). Per procedures documented in the National Emissions Inventory (USEPA 2006), particulate matter equal to or less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) emissions are estimated by applying a particle size multiplier of 0.10 to PM_{10} emissions. The USEPA National Emission Inventory documentation assumes that the emissions resulting from construction-related activities are uncontrolled. However, fugitive dust resulting from activities related to implementation of the Preferred Alternative could be reduced through standard dust minimization practices (e.g., regularly watering exposed soils, soil stockpiling, etc.). These dust minimization measures can reduce dust generation by up to 50 percent (USEPA 2006).

It has been conservatively estimated that the proposed construction projects included in the Preferred Alternative (refer to Table 2-1) would disturb a total area of approximately 1.55 acres (see Appendix C). This conservative estimate accounts for site preparation activities, materials staging, and heavy equipment storage, which may occur outside of the proposed fill footprints. The total amount of uncontrolled dust (including both PM_{10} and $PM_{2.5}$) generated by the proposed construction activities would be as much as 3.88 tons. However, this could be reduced to approximately 1.94 tons with the implementation of standard dust minimization practices (e.g., regularly watering exposed soils, soil stockpiling, etc.) (USEPA 2006). Calculations provided in Appendix C conservatively assume ground disturbance would occur continuously over 6 months during FY 2017.

Table 4-1. Anticipated Construction-Related Dust Emissions under the Preferred Alternative

Fiscal Year	Total Disturbed Area (acres)	Potential Dust Generated (tpy)	Potential Dust Generated per Year with BMPs (tpy)
2017	1.02	3.88	1.94

Note: Total disturbed area per year is calculated by multiplying the total surface area of proposed new construction demolition projects by 1.5, to account for site preparation, grading, and staging activities (see Appendix C).

Operation of construction equipment with internal combustion engines, and offsite vehicles (e.g., construction employee vehicles, delivery trucks) would result in emission of criteria air pollutants (i.e., carbon monoxide [CO], Volatile Organic Compounds [VOCs], nitrogen oxides [NO_x], sulfur dioxide [SO_2], and particulate matter [PM]). In addition to on-site construction emissions, minor regional emissions associated with haul truck trips for the delivery of supplies and removal of solid waste (e.g., any construction debris) would also occur under the Preferred Alternative. However, because the clean sand fill and repurposed concrete for the proposed shoreline stabilization would be locally sourced (e.g., the Patrick AFB Golf Course; refer to Section 2.3.1.1, *Rescue Road and Runway 11*), emissions associated with heavy haul trips would be relatively minor. Emissions associated with construction equipment used to install the revetment and clean sand fill (e.g., grader, backhoe, dozer, etc.) would be minimal because most equipment would be driven to and kept on-site for the duration of construction activities. Additionally, idling equipment would be shut off when not in use. Emissions

associated with construction worker commutes and the transportation of materials would also be minimal given the temporary nature of the activities.

Table 4-2 describes annual combustion emissions that would be anticipated as a result of the Preferred Alternative. For a full list of assumptions, emission factors, and emission category subtotals see Appendix C. Impacts due to combustion emissions from construction are generally not considered significant because they are temporary and of short duration. Anticipated combustion emissions during construction activities would remain below *de minimis* threshold values and result in *less than significant* short-term impacts to air quality.

Table 4-2. Potential Annual Emissions by Year from Construction Related Combustion under the Preferred Alternative

Year	CO	NO_x	SO_x	VOC	PM
2017	3.80	7.28	1.00	0.41	0.01

Note: See Appendix C for calculations and a detailed description of assumption.

Operational Emissions

Under the Preferred Alternative, there would be no long-term changes to operational emissions at Patrick AFB. Consequently, the implementation of the Preferred Alternative would not cause an exceedance of the National Ambient Air Quality Standards (NAAQS), nor exceed any *de minimis* threshold for any criteria pollutant. Therefore, operational emissions under the Preferred Alternative would involve *no impact* to long-term air quality and operational emissions would remain similar to those described in Section 3.1, *Air Quality*.

General Conformity

Brevard County is designated as *attainment* area for all NAAQS pollutants (USEPA 2016a). Since the Preferred Alternative would take place in an attainment area, conformity would not apply (USAF 2010). Further, since the Preferred Alternative would not impact operational emissions there would be no long-term impacts to the existing emissions at Patrick AFB described in Section 3.1, *Air Quality* and impacts would remain *less than significant*.

Greenhouse Gas Emissions

Under the Preferred Alternative, construction activities would result in short-term, temporary GHG (i.e., carbon dioxide [CO_2]) emissions from operation of heavy equipment and construction worker vehicles. However, the construction activities associated with the Preferred Alternative would not result in any measurable increase in regional GHG emissions. Further, implementation of the Preferred Alternative would not result in any increase in operational emissions at Patrick AFB. Consequently, the Preferred Alternative would result in a *less than significant* short-term, temporary increase in GHG emissions.

In addition, the final CEQ guidance requires that NEPA-compliant analyses also consider the impacts of climate change effects on the Preferred Alternative (e.g., increasing sea level, drought, high intensity precipitation events, increased fire risk, or ecological change). The proposed shoreline stability projects would be constructed in such a way to withstand future wave impacts and sea level rise over the foreseeable future. Further, the Preferred Alternative would not introduce any habitatable structures or other critical structures that could be threatened by sea level rise. Consequently, impacts of climate change on the Preferred Alternative would be *less than significant*.

4.1.2.2 No-Action Alternative

If the No-Action Alternative were selected, there would be no construction-related emissions associated with shoreline stabilization activities adjacent to Rescue Road and Runway 11 or the glide slope west of Runway 03/21. Consequently, no changes to existing air quality conditions, as described in Section 3.1, *Air Quality* would occur. Therefore, there would be *no impact* to air quality under the No-Action Alternative.

4.2 NOISE

4.2.1 Approach to Analysis

Noise impact analyses typically evaluate potential changes to existing noise environments that would result from implementation of a Proposed Action. Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased exposure to unacceptable noise levels). An increase in noise levels due to introduction of a new noise source can create an impact on the surrounding environment.

4.2.2 Impacts

4.2.2.1 Alternative A (Preferred Alternative)

Construction-Related Noise Impacts

Implementation of the Preferred Alternative would have minor, temporary effects on the noise environment in the immediate vicinity of the affected areas adjacent to Rescue Road and Runway 11 as well as the glide slope west of Runway 03/21. Use of heavy equipment for hauling, site preparation, construction of the revetment, and deposition of clean sand fill would generate noise and groundborne vibration exposure above typical ambient levels at Patrick AFB, as some equipment would generate local noise levels above 80 decibels (dB). However, noise generation would be short-term and typical of construction activities. Additionally, associated impacts could be reduced through the use of equipment sound mufflers and restriction of construction activity to normal working hours (i.e., between 7:00 A.M. and 5:00 P.M.). The affected areas are also located in close proximity to the airfield at Patrick AFB, which is dominated by noise from military aircraft. As depicted in Figure 3-1, construction activities adjacent Rescue Road and Runway 11 would occur immediately adjacent to the 65 day-night average sound level (DNL) contour and construction activities along the glide slope west of Runway 03/21 would occur within the 70 DNL and 80 DNL noise contours. Consequently, relative to the existing conditions at Patrick AFB, particularly within the immediate vicinity of the airfield, short-term construction-

related noise would result in *less than significant* impacts to the ambient noise environment.

The noise-sensitive residential land uses located nearest to the proposed construction activities include the residential neighborhoods at Tortoise Island and Merritt Island. The nearest residences at Tortoise Island are located nearly 1 mile to the south of the southern Runway 03/21 site, passed the Patrick AFB boundary and FL-404 W/Pineda Causeway. Merritt Island, is located nearly 5 miles to the north of the Rescue Road and Runway 11 site. Given these distances from sensitive receptors, noise generated by proposed shoreline stabilization construction activities under the Preferred Alternative would have no impact on these sensitive receptors. The Family Camping "Fam Camp" facility at Patrick AFB is located between the affected areas at Rescue Road and Runway 11 and Runway 03/21. This area can be reserved for recreational vehicle (RV) and tent camping along the Banana River, immediately adjacent to the airfield. While short-term construction activities would introduce additional day-time noise in this area, these impacts would be *less than significant* as the Fam Camp is located adjacent to an existing, active runway. The noise environment in this area would continue to be dominated by aircraft operations and other industrial-type noise characteristic of a military installation. Following the completion of the shoreline stabilization construction activities, there would be no long-term noise impacts to this recreational facility at Patrick AFB.

Operations-Related Impacts

Implementation of the Preferred Alternative would not impact operations at Patrick AFB, including aircraft operations. Consequently, the long-term noise environment at the base would remain as described under Section 3.2, *Noise* and there would be *no impact* to operational noise at Patrick AFB.

4.2.2.2 No-Action Alternative

Under the No-Action Alternative, no construction-related noise would occur as a result of shoreline stabilization activities at Patrick AFB, and long-term operations at the base would remain unchanged. Consequently, the noise environment at

Patrick AFB would remain as described in Section 3.2, *Noise* and there would be *no impact* to noise under the No-Action Alternative.

4.3 LAND USE

4.3.1 Approach to Analysis

Determination of land use impacts is based on the degree of land use sensitivity in the area. In general, the USAF considers a land use impact to be significant if it would: 1) be inconsistent or non-compliant with applicable land use plans or policies; 2) preclude an existing land use of concern from continuing to exist; 3) preclude continued use of an area; or 4) be incompatible with adjacent or vicinity land use to the extent that public health or safety is endangered (e.g., related to increased noise levels).

4.3.2 Impacts

4.3.2.1 Alternative A (Preferred Alternative)

Under implementation of the Preferred Alternative, short-term construction activities would occur within the Clear Zone (CZ) that overlays the shoreline adjacent to Rescue Road and Runway 11. Consequently, construction activities in this area would require a temporary airfield construction waiver throughout the duration of construction (see Section 4.10, *Safety*). The affected shoreline area along Runway 03/21 is not located within a CZ; however, the proposed construction activities in this area could potentially interfere with the Instrument Landing System (ILS) approach and therefore a temporary airfield construction waiver may be required in this location as well. However, there would be *no impact* to established or permitted land use activities at Patrick AFB, as defined by the base's master plan (USAF 2011).

The USAF has entered into pre-application coordination with the Florida Department of Environmental Protection (FDEP) and St. Johns River Water Management District (SJRWMD) regarding permitting authority and real property issues surrounding the proposed fill. As described in Section 2.4.2, *Alternative Shoreline Protection Methods and Configurations*, the original shoreline stabilization designs included waterward extension of the existing shoreline by 100 feet or more to the 2009 Mean High Tide Line (MHTL). However, based on communication and coordination with FDEP it was determined that an easement as well as a legal description would be required to describe the affected areas waterward of the 1.1

foot Ordinary High Water Mark (OHWM) in this area. Consequently, the 45th Space Wing (45 SW) elected to use 1.1 feet OHWM as the landward extent of the described lands, from the waterward face of the breakwater to the natural shore, which FDEP confirmed would be sufficient for proceeding through the permitting/state land authorization process with the SJRWMD as the lead. Further, shoreline stabilization activities associated with the Preferred Alternative are expected to remain consistent with the Coastal Zone Management Act (CZMA) and the Florida Coastal Management Program (FCMP) (see Section 4.6, *Water Resources*). Therefore, land use impacts at Patrick AFB would be *less than significant*.

4.3.2.2 No-Action Alternative

Under the No-Action Alternative, no construction activities associated with shoreline stabilization would occur adjacent Rescue Road and Runway 11 or along the glide slope west of Runway 03/21. Consequently, the land use at Patrick AFB would remain as described in Section 3.3, *Land Use*. However, continued shoreline erosion in these areas as a result of wave attack and other natural coastal processes could compromise the functional land use of the airfield in affected areas adjacent to Runway 11 and as well as the glide slope west of Runway 03/21. Therefore, implementation of this alternative could result in *potentially significant* impacts to the land uses and airfield operation located adjacent to and within the coastal areas of the installation.

4.4 GEOLOGY AND SOILS

4.4.1 Approach to Analysis

An impact to geological resources would be considered significant if implementation of the Proposed Action would: 1) increase potential occurrences of erosion, siltation, or geological hazards (e.g., landslides); 2) incorporate engineering or construction techniques that do not adequately address potential geologic hazards; or 3) expose people or structures to major geological hazards. Generally, impacts with regard to geological resources can be avoided or minimized if proper construction techniques, erosion/siltation control measures, and structural engineering designs are incorporated into project development. Since potential impacts to geological resources would be limited to the project vicinity within the boundaries of Patrick AFB, there would be no impacts to regional geology and further analysis of off-site resources has been eliminated.

4.4.2 Impacts

4.4.2.1 Alternative A (Preferred Alternative)

Potential impacts to geological resources associated with implementation of the Preferred Alternative at Patrick AFB would be limited to ground-disturbing construction activities related to the proposed construction of the revetment adjacent Rescue Road and Runway 11 as well as the deposition of clean sand fill in this area and along the glide slope west of Runway 03/21 (refer to Figure 2-1 and 2-3). The proposed shoreline stabilization projects would be constructed with locally sourced repurposed concrete and clean sand fill, which would not affect any areas potentially utilized for agriculture or mineral resources and would therefore not result in any long-term reduction of soil productivity. The proposed revetment would be constructed at a 1:4 slope adjacent to Rescue Road and Runway 11, while the clean sand fill would be deposited consistent with the existing slope along the affected areas of the shoreline. Neither of these components of the Preferred Alternative would result in substantial impacts to topography at the base. Further, the proposed improvements along the two sites would make Patrick AFB facilities more resilient to coastal processes as well as geologic hazards (e.g., slope failure), which would accomplish the purpose and

need of the Preferred Alternative and result in *beneficial* impacts to geology and soils.

4.4.2.2 No-Action Alternative

Under the No-Action Alternative, no construction activities associated with shoreline stabilization would occur adjacent to Rescue Road and Runway 11 or along the glide slope west of Runway 03/21. Consequently, geological resources at Patrick AFB would remain as described in Section 3.4, *Geology and Soils*. However, over the long-term, vulnerable areas of the shoreline along the Banana River would remain exposed to the coastal processes including wave attack and shoreline erosion. Consequently, these areas could experience increased coastal erosion over the long-term that could compromise the functionality of the airfield in affected areas adjacent to Runway 11 and along the glide slope of Runway 03/21. Therefore, implementation of this alternative is considered to result in *potentially significant* and adverse impacts to geological processes and soils.

4.5 BIOLOGICAL RESOURCES

4.5.1 Approach to Analysis

Significance criteria used in assessing impacts to biological resources are based on 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources would be significant if implementation of the Proposed Action would adversely affect a threatened or endangered species; greatly diminish habitat for a plant or animal species; substantially diminish a regionally or locally important plant or animal species; interfere with wildlife movement or reproductive behavior; and/or result in an infusion of exotic plant or wildlife species.

4.5.2 Impacts

4.5.2.1 Alternative A (Preferred Alternative)

Construction elements of the proposed shoreline stabilization measures included in the Preferred Alternative may affect vegetation, shorebirds and/or migratory birds, federally or state listed species, and federally designated critical habitat within the Banana River.

According to the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) as well as the Integrated Natural Resources Management Plan (INRMP) prepared for Patrick AFB (USAF 2014b), the proposed shoreline stabilization for the area adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21 would occur within estuarine and wetland habitat, which includes the Banana River and associated aquatic vegetation communities, as well as upland wetland/salt marsh vegetation. A biological survey of the area adjacent to Rescue Road and Runway 11 has been conducted by the 45 SW to identify and describe the existing conditions in this location. Conditions along the glide slope west of Runway 03/21 are expected to be similar; however, no site-specific/formal biological survey of this area has been conducted at this time.

Vegetation and Wetlands

Most of the shoreline within the affected areas adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21 has lost its characteristic wetland plant cover due to severe erosion (Patrick AFB 2016). However, a small salt marsh-mangrove community remains within the southern end of the area adjacent to Rescue Road and Runway 11. Vegetation communities in the upland marsh side of this area are composed of saltbush (*Baccharis halmifolia*), sea oxeye (*Borrichia* sp.), nickerbean (*Caesalpinia bonduc*), and seashore mallow (*Kosteletzkya virginica*) with greater densities of coin vine (*Dalbergia ecastaphyllum*). Vegetation to the waterward side of the marsh comprises a mix of herbaceous vegetation such as marsh fleabane (*Pluchea* sp.) and seashore mallow as well as groupings of white mangrove (*Laguncularia racemosa*), buttonwood (*Conocarpus erectus*), and coin vine. Two small groups of mangroves (approximately 20 specimens in total) and up to six buttonwoods would need to be removed during the shoreline revetment and fill work adjacent to Rescue Road and Runway 11 (Patrick AFB 2016). However, the 90 percent engineering drawings note that other large mangroves and wetland trees (i.e., buttonwood) would be avoided within the southern end of the project where the shoreline stabilization work would be anchored behind the vegetated beach with clean sand fill around the trees, and breakwaters would be installed in front of the mangroves and wetland trees. In addition, prior to initiating projects or activities (e.g., dredging, filling, work in and around a shoreline or wetland) occurring within or with the potential to affect a floodplain, wetland, or other water body, the authoritative agencies would be consulted to determine permitting requirements. An Environmental Resources Permit allowing mangrove trimming and alteration under the Preferred Alternative would be required and issued by the FDEP in conformance with the regulations of the Mangrove Trimming and Preservation Act.

The aquatic vegetation adjacent to Rescue Road and Runway 11 includes small amounts of patchy seagrass (*Halodule wrightii*) that were observed during seagrass surveys performed on 20 August 2015, 6 May 2016, and 9 June 2016 (Patrick AFB 2016). Along with the seagrass, there were also patches of green, brown, and red macroalgae attached to rocks and shells as well as unattached and floating. Initial survey activities identified two small areas of patchy seagrass (i.e., approximately

150 square feet and 156 square feet, respectively) within the erosion-created alcove along the northern end of the project area (Patrick AFB 2016). The second survey found only one of the small areas (previously 150 square feet) remaining, although the bed was separated into two smaller beds and the larger of the beds was extremely patchy (i.e., 25 square feet and 16 square feet, respectively). It appeared that wave and wind energy had pushed sand into the alcove between survey events, which covered some of the seagrass patches with full burial of the bed that had been located to the southeast (Patrick AFB 2016). The seagrass was also observed to be more heavily covered with epiphytic algae than during the first survey. Further, the density of the seagrass remained patchy, but was reduced overall (Patrick AFB 2016). However, the third small scale seagrass survey, conducted on 9 June 2016, again confirmed the presence of the second seagrass patch to the east (Patrick AFB 2016).

Construction activities associated with the installation of the proposed revetment adjacent to Rescue Road and Runway 11 would not require or result in the removal substantial amounts of terrestrial vegetation. Additionally, the backfilled area behind the proposed revetment adjacent to Rescue Road and Runway 11 would be planted with weed-free Bahia sod, consistent with existing airfield vegetation in this area. Heavy construction activity would likely result in some disturbance or trampling of existing vegetation in the vicinity of Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21; however, no sensitive or special status terrestrial flora would be adversely impacted by the implementation of the Preferred Alternative. The deposition of clean sand fill along the shoreline could result in the burial of seagrass as well as other aquatic vegetation; however, the proposed fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) that would compensate for potential impacts to aquatic vegetation and wetland habitats, which would be *less than significant*.

The 45 SW will coordinate with the U.S. Army Corps of Engineers (USACE) prior to the implementation of any construction-related activities associated with shoreline stabilization adjacent to Rescue Road and Runway 11 or along the glide slope west of Runway 03/21 and an Individual Permit(s) would be obtained pursuant to Section 404 of the Clean Water Act (CWA). In addition to standard best management practices (BMPs) (e.g., use of silt fences, straw bales, seeding or

sodding of exposed soil), additional standard mitigation measures would be specified in the permit requirements (USEPA 2005). The permit conditions would require that the Preferred Alternative:

- Avoid wetland and water impacts where practicable;
- Minimize potential impacts to wetlands and waters; and
- Compensate for any remaining, unavoidable impacts to wetlands or waters through activities to enhance or create wetlands and/or waters (e.g., with cordgrass plants within the clean sand fill).

Possible mitigation or compensation associated with the implementation of the Preferred Alternative could require the use of existing wetland mitigation credits banked through estuarine habitat enhancement at Cape Canaveral Air Force Station (CCAFS), which included the construction of culverts that opened up old mosquito impoundments, allowed fish migrations, and improved water quality for seagrass health. These conceptual mitigations have been discussed with the National Marine Fisheries Service (NMFS), USACE, FDEP, and SJRWMD. A formal mitigation plan consistent with the requirements of 32 CFR 989.15 and 32 CFR 989.22(d) will be developed during the permitting process prior to the implementation of any construction-related activities. It is anticipated that NMFS will also be working with the USACE to determine permit conditions and possible mitigation.

Wildlife

As described in Section 4.2, *Noise*, implementation of the Preferred Alternative would result in temporary, short-term airborne and underwater noise associated with construction of the 788 linear foot revetment adjacent to Rescue Road and Runway 11 as well as the deposition of clean sand fill in the area adjacent to Rescue Road and Runway 11 and along the glide slope west of Runway 03/21. These short-term temporary increases in ambient noise levels could cause aquatic and terrestrial wildlife to temporarily relocate to similar habitat types in the surrounding vicinity along the Banana River. However, both the terrestrial upland areas of Patrick AFB as well as the aquatic habitat within the Banana River are currently subject to noise associated with aircraft operations and boating traffic, including personal and commercial vessels. Consequently, the short-term,

temporary addition of construction-related noise would have a *less than significant* impact on terrestrial and aquatic wildlife relative to existing conditions.

In addition to indirect impacts related to temporarily increased noise levels, implementation of the Preferred Alternative would also result in the potential for direct impacts to aquatic and intertidal wildlife. In addition to fish populations, benthic estuarine communities within the Banana River include gastropod mollusks, crustaceans, amphipods, polychaetes, and various fungi and bacteria. Observations of small areas of polychaete worm tubes, and limited sightings of juvenile crabs and snails were made during the seagrass surveys conducted in 2015 and 2016 (Patrick AFB 2016). Construction of the proposed revetment adjacent to Rescue Road and Runway 11 as well as the deposition of clean sand fill adjacent to Rescue Road and Runway 11 would result in burial of approximately 0.882 acres sandy bottom aquatic habitat. Complete burial with more than 1 foot of sand for more than 1 year could result in 100-percent mortality to the infauna currently located within the proposed fill footprints. Results of studies assessing the recovery of organisms at nourished beaches are highly variable (Greene 2002). While some studies conclude that infauna populations may recover to previous levels in between 2 to 7 months, other studies suggest recovery times are much longer (Greene 2002). Additionally, indirect burial or temporary increases in turbidity from longshore movement of sediments could also indirectly affect aquatic organisms both up-shore and down-shore from the proposed fill footprints. However, these indirect impacts would be minor and would be unlikely to result in substantial mortality of aquatic organisms. Due to the limited size of the proposed fill footprints relative to the area of shoreline along the western boundary of Patrick AFB, potential impacts related to infauna mortality and turbidity associated with the proposed fill would be minor. Overall direct and indirect impacts to aquatic wildlife species would be *less than significant*.

Special Status Species

As described in Section 3.5.2.3, *Special Status Species*, several federally and state listed wildlife species as well as a number of Species of Special Concern (SC) may occur within and adjacent to the proposed fill footprints adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21. Protected and sensitive species that have been documented in these areas include Florida

manatee (*Trichechus manatus*), loggerhead turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), smalltooth sawfish (*Pristis pectinate*), American alligator (*Alligator mississippiensis*), piping plover (*Charadrius melodus*), little blue heron (*Egretta caerulea*), white ibis (*Eudocimus albus*), brown pelican (*Pelecanus occidentalis*), black skimmer (*Rynchops niger*), and least tern (*Sterna antillarum*) (Patrick AFB 2016). Each of these sensitive species is considered to be mobile and would be very likely to temporarily relocate to similar habitat along the Banana River throughout the duration of the proposed construction activities. Following completion of short-term temporary construction activities, it is likely that these species would continue to use the shoreline of the Banana River along the western boundary of Patrick AFB.

There is no formally designated critical habitat on Patrick AFB, as defined under Section 4 of the Endangered Species Act (ESA). However, federally designated critical habitat for the Florida manatee occurs within the Banana River in the proposed fill footprints adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21. Manatee have been observed in groups of up to six in the project area periodically during breeding and calving seasons even in the shallower waters. Additionally, loggerhead sea turtles and green sea turtles, can also be found in the Banana River, though federally designated critical habitat does not exist for these species within the proposed fill footprints. The 45 SW would perform a visual sweep of the area before the initiation of any construction-related activities to ensure that the area is clear of sensitive species. Additionally, the 45 SW would adhere to FDEP *Standard Manatee Conditions for In-water Work* (2011) and *Sea Turtle and Smalltooth Sawfish Construction Conditions* (2006) to protect manatees and sea turtles from direct project impacts. With the implementation of these conditions, impacts to sensitive species as a result of the Preferred Alternative would be *less than significant*. In a letter dated 23 August 2016, USFWS concurred with the determination that the Preferred Alternative may affect, but is not likely to adversely affect Florida manatees and no further action is required (see Appendix E). Further, in a letter dated 29 August 2016, NMFS concurred that all potential effects to listed species were discountable, insignificant, or beneficial, and concluded that the Preferred Alternative is not likely to adversely affect listed species under NMFS's purview (see Appendix E).

Essential Fish Habitat

The South Atlantic Fishery Management Council (SAFMC) is responsible for managing waters extending from 3 to 200 nautical miles (NM) off the coast of Florida, while the State of Florida is responsible for managing state waters, extending from 0 to 3 NM offshore. Therefore, the State of Florida is responsible for managing surface waters within the immediate vicinity of Patrick AFB. Within Essential Fish Habitat (EFH) designations, Habitat Areas of Particular Concern (HAPC) have also been identified. NMFS applies this designation by using three criteria of importance of ecological functions: sensitivity to human degradation, probability and extent of effects from development activities, and rarity of the habitat.

Submerged aquatic vegetation habitat and the unvegetated sediment in between grass beds is considered EFH-HAPC because of their complex and diverse use as feeding, breeding, and nursery habitat by a variety of estuarine juvenile and adult fishes. The species that utilize these beds include spotted seatrout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellatus*), mullet, snook (*Centropomus undecimalis*), snapper, grouper, spot (*Leiostomus xanthurus*), pinfish (*Lagodon rhomboids*), and penaeid shrimp. (Although these species are not listed as federally threatened or endangered by NMFS, their habitat is protected under the Magnuson–Stevens Fishery Conservation and Management Act.) Algae can also be commonly found within, near, and on seagrass and depending on the density can contribute to oxygen and nutrient production while providing shelter and food source for several genera of invertebrates, fishes, and sea turtle. As described above, seagrass surveys in 2015 and 2016 identified two patchy seagrass beds within the proposed fill footprint adjacent to Rescue Road and Runway 11 (Patrick AFB 2016). These beds decreased in size and overall density between the two surveys as a result of longshore sediment transport within the Banana River (Patrick AFB 2016). Proposed fill under the implementation of the Preferred Alternative would bury less than 50 square feet of marginal seagrass beds, resulting in negligible impacts to EFH-HAPC within the Banana River. The 45 SW has coordinated with NMFS regarding potential impacts to EFH. In a letter dated 17 August 2016, NMFS agreed with the 45 SW's approach to shoreline stabilization and offered no further EFH conservation recommendations (see Appendix E).

4.5.2.2 No-Action Alternative

Implementation of the No-Action Alternative would result in no changes to existing vegetation and wetlands, wildlife, sensitive species, or EFH occurring at or adjacent to Patrick AFB. Conditions would remain as described in Section 3.5, *Biological Resources* and *no impacts* to biological resources would result from implementation of this alternative.

4.6 WATER RESOURCES

4.6.1 Approach to Analysis

An impact to water resources would be significant if implementation of the Proposed Action or a project alternative would: 1) reduce water availability to or interfere with the supply of existing users; 2) create or contribute to the overdraft of groundwater basins or exceed decreed annual yields of water supply sources; 3) adversely affect surface or groundwater quality; 4) threaten or damage unique hydrologic characteristics; or 5) violate established laws or regulations that have been adopted to protect or manage water resources, including management plans adopted by the applicable land management agency.

4.6.2 Impacts

4.6.2.1 Alternative A (Preferred Alternative)

Surface Water and Water Quality

Implementation of the Preferred Alternative would result in ground disturbance and construction activities that could potentially affect water quality within the Banana River. For example, the proposed shoreline stabilization activities, including the deposition of clean sand fill within localized areas along the western boundaries of Patrick AFB would generate turbidity in the Banana River. Acute increases in turbidity within the nearshore environment could have the potential to bury vegetation and have impacts on aquatic wildlife (refer to Section 4.5, *Biological Resources*). In order to reduce the severity of these impacts, turbidity blankets and coir logs would be installed in the affected areas to control turbidity and minimize wave break in the work area. In addition to potential increases in turbidity, implementation of shoreline stabilization activities under the Preferred Alternative would result in a short-term increase in hazardous materials associated with heavy construction vehicles (e.g., fuel and other Petroleum, Oils, and Lubricants [POLs]). The presence of heavy equipment along the shoreline of the Banana River could result in the increased potential for accidental release and associated contamination of the Banana River. However, all standard BMPs would be implemented during construction, including regular inspection of construction equipment for leaks. Any potential minor spills or releases would be handled

according to procedures outlined in the base's Spill Prevention and Emergency Response Plans. Following completion of construction activities, there would be no lasting impacts to water quality within the Banana River.

In addition, shoreline stabilization activities implemented under the Preferred Alternative would reduce the potential for exposure and rupture of utility lines, including a sewer line, located along Rescue Road. Shoreline erosion, which currently threatens these utilities, would be addressed via implementation of the Preferred Alternative, effectively reducing the potential for contamination of the Banana River. Consequently, implementation of the Preferred Alternative would result in overall *less than significant* impacts to water quality.

Groundwater

Implementation of the Preferred Alternative would not result in the development of additional paved surfaces that could result in measurable long-term impacts to groundwater percolation. Further, activities included in the Preferred Alternative would not result in the potential for impacts to groundwater quality. Consequently, there would be *no impact* to groundwater at Patrick AFB under implementation of the Preferred Alternative.

Floodplains

According to the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map (FIRM) that includes Patrick AFB (FEMA 2015), construction activities adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21 would occur within the 100-year floodplain. Shoreline stabilization measures would introduce clean sand fill to these areas, extending the existing shoreline waterward in the area adjacent to Rescue Road and Runway 11. However, the extension of the shoreline would not exceed the 2007 MHTL and for most of its length, would not exceed the 2009 MHTL. Additionally, implementation of the Preferred Alternative would be intended to protect existing landward facilities (e.g., utilities, roadways, airfield, etc.) and would not introduce any new habitable structures or obstructions that would impede or divert overland floodwater flow or alter the existing hydrologic regime at Patrick AFB such that downstream flood hazards would be increased or newly created.

Therefore, the Preferred Alternative would result in *less than significant* impacts to floodplain management.

Coastal Zone Management Act Consistency

As described in Section 3.6, *Water Resources*, the geography of Florida and the CZMA dictate that the entire State of Florida, including Patrick AFB, be designated as a Coastal Zone and be subject to the FCMP. The USAF's Consistency Statement will be submitted to the Florida State Clearinghouse for a multi-agency review. FDEP will assemble and review the comments provided by the various state and county agencies and determine whether the proposed project is consistent with the Florida Coastal Management Program. The USAF's CZMA Consistency Statement is provided in Appendix D. Impacts associated with Coastal Zone Management Act Consistency would be considered *less than significant*.

4.6.2.2 No-Action Alternative

Under the No-Action Alternative, water resources at Patrick AFB would remain unchanged from baseline conditions as described in Section 3.6, *Water Resources*. However, based on historic patterns, it is likely that continued erosion would occur along Patrick AFB's western boundary with the Banana River, which could threaten utilities in the vicinity of Rescue Road and Runway 11. Under a worst case scenario where periodic storm surge and wave attack results in additional shoreline erosion north or south of the existing emergency revetment, pipeline corrosion could result in a potential release and associated contamination of the Banana River. Therefore, implementation of this alternative could result in substantially adverse and *potentially significant* impacts to water quality than those identified under the Preferred Alternative.

4.7 CULTURAL RESOURCES

4.7.1 Approach to Analysis

Cultural resources are subject to review under both Federal and state laws and regulations. Section 106 of the National Historic Preservation Act (NHPA) empowers the Advisory Council on Historic Preservation (ACHP) to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed or eligible for inclusion on the National Register of Historic Places (NRHP).

Once cultural resources have been identified, an eligibility determination is made according to the criteria set forth in NHPA. The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

a) That are associated with events that have made a significant contribution to the broad patterns of our history;
b) That are associated with the lives of persons significant in our past;
c) That embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d) That have yielded, or may be likely to yield, information important in prehistory or history.

Significance evaluation is the process by which resources are assessed relative to significance criteria for scientific or historic research, for the general public, and for traditional cultural groups. Only cultural resources determined to be significant (i.e., eligible for the NRHP) are protected under the NHPA.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may occur by 1) physically altering, damaging, or destroying all or part of a resource; 2) altering the characteristics of the surrounding environment that contribute to resource significance; 3) introducing visual, audible, or atmospheric elements that are out of character with the property

or alter its setting; or 4) neglecting the resource to the extent that it is deteriorated or destroyed.

Direct impacts can be assessed by identifying the types and locations of proposed actions and determining the exact locations of cultural resources that could be affected. Indirect impacts primarily result from the effects of project-induced population increases and the resultant need to develop new housing areas, utilities services, and other support functions necessary to accommodate population growth. These activities and facilities' subsequent use can disturb or destroy cultural resources.

4.7.2 Impacts

4.7.2.1 Alternative A (Preferred Alternative)

Implementation of the Preferred Alternative would not include any construction or demolition related activities that would affect facilities at Patrick AFB, including buildings or historic districts that are eligible for listing under the NRHP (refer to Section 3.7.2.3, *Historic Built Resources at Patrick AFB*). Consequently, construction-related impacts associated with the implementation of the Preferred Alternative at Patrick AFB would be limited to potential impacts to buried archaeological resources. However, as described in Section 3.7.2.2, *Archaeological Resources at Patrick AFB*, the base is thought to have a low potential for on-site archaeological resources due to previous dredging and fill activities in the 1940s associated with the construction of the Banana River Naval Air Station and subsequent development associated with Patrick AFB. Additionally, the affected areas along the Banana River are located in highly dynamic areas that are regularly affected by coastal processes, including shoreline erosion, which may have also exposed/damaged archaeological resources. While there is still potential for buried World War II resources to occur on Patrick AFB, it is highly unlikely that these resources would occur with the areas proposed for shoreline stabilization. Additionally, past construction activities (e.g., utility lines adjacent to Rescue Road and Runway 11 and installation of gabion baskets along the glide slope west of Runway 03/21) have not uncovered any archaeological resources. Consequently, implementation of the Preferred Alternative would anticipated *no impact* on cultural resources at Patrick AFB. The Florida State historic Preservation Office

(SHPO) reviewed the Preferred Alternative for possible effects on historic proprieties listed, or eligible for listing on the NRHP and concurred with the determination that the Preferred Alternative would have no effect (see Appendix E). However, while unlikely, the potential still exists for buried human remains or historic artifacts to be uncovered during ground-disturbing activities. If such resources were uncovered, activities would be suspended until a qualified archaeologist could recover and determine the significance of the resource(s), in compliance with Section 106 of the NHPA.

As described within the Integrated Cultural Resources Management Plan (ICRMP) the federally recognized tribes with documented aboriginal territories within the base's boundaries include the Miccosukee Tribe of Florida, Seminole Tribe of Florida, and the Seminole Nation of Oklahoma. The 45 SW continues to consult with these tribal governments about the overall management of cultural resources per EO 13084 *Government-to-Government Relations With Native American Tribal Governments*. However, the Miccosukee Tribe of Florida and Seminole Tribe of Florida have stated that they do not wish to participate in the meeting between their tribal councils and the 45 SW Commander and would rather contact the Commander directly if they have concerns. To date, the Seminole Nation of Oklahoma has not responded to repeated attempts to communicate with them (USAF 2015a).

4.7.2.2 No-Action Alternative

Under the No-Action Alternative, no construction activities associated with shoreline stabilization would occur adjacent to Rescue Road and Runway 11 or the glide slope west of Runway 03/21. Consequently, this alternative would not result in a potential for human disturbance of previously unknown cultural resources at Patrick AFB. Conditions would remain identical to those described in Section 3.7, *Cultural Resources*. *No impacts* to cultural resources would occur at Patrick AFB under the implementation of this alternative.

4.8 HAZARDOUS MATERIALS AND WASTES

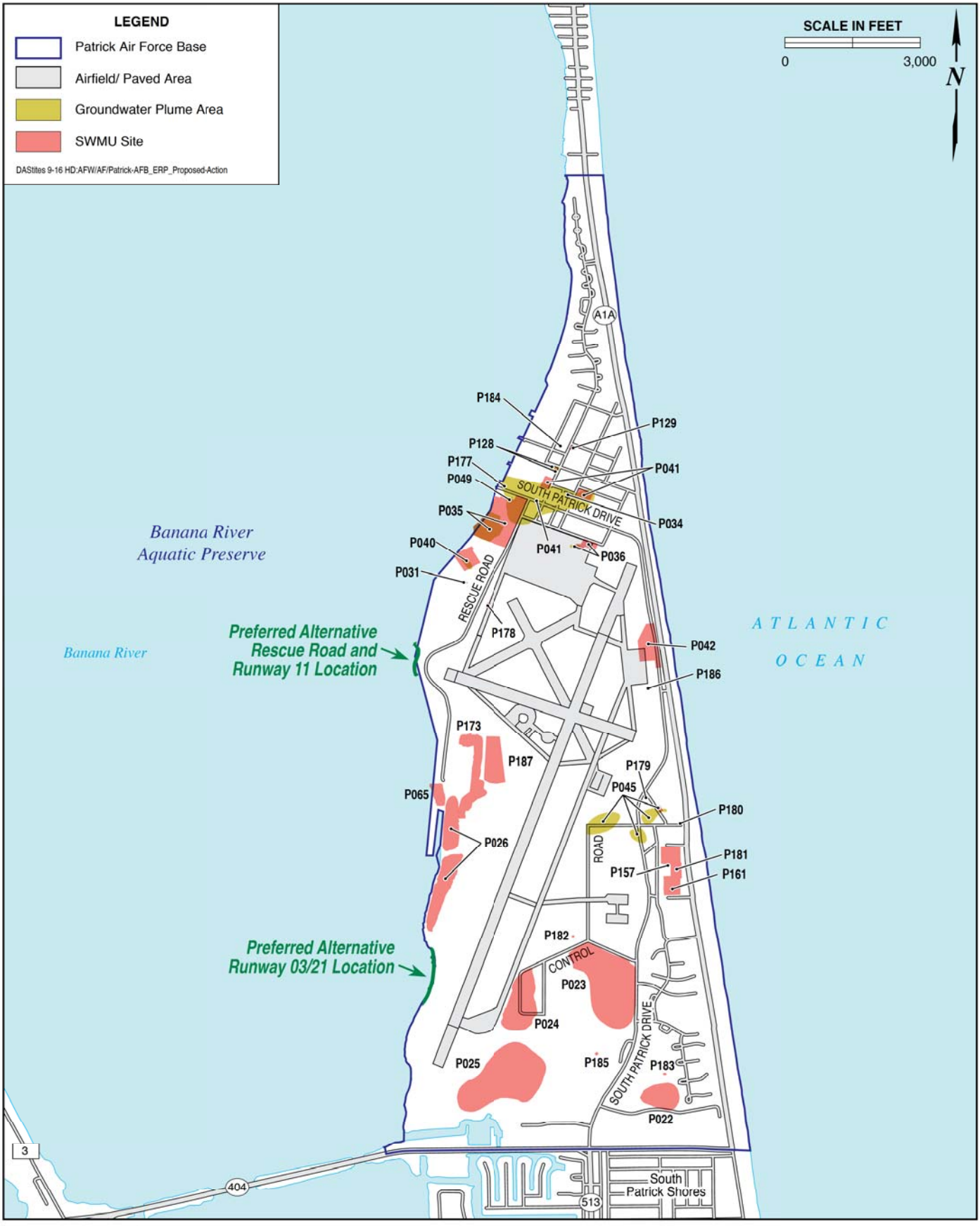
4.8.1 Approach to Analysis

Numerous Federal, state, and local laws regulate the storage, handling, disposal, and transportation of hazardous materials and wastes; the primary purpose of these laws is to protect public health and the environment. The severity of potential impacts associated with hazardous substances is based on their toxicity, ignitability, and corrosivity. Impacts associated with hazardous materials and wastes would be considered significant if the storage, use, transportation, or disposal of hazardous substances substantially increases the human health risk or environmental exposure.

4.8.2 Impacts

4.8.2.1 Alternative A (Preferred Alterative)

Implementation of shoreline stabilization activities under the Preferred Alternative would result in a short-term increase in hazardous materials associated with heavy construction vehicles (e.g., fuel and other POLs). However, the Preferred Alternative would have no long-term impacts to storage of hazardous materials at Patrick AFB. Additionally, implementation of the Preferred Alternative would not affect any facilities at the base (including facilities with known Asbestos-Containing Material [ACM] or Lead-based Paint) or result in any increase in the use or long-term generation of hazardous materials or hazardous wastes. Additionally, the affected areas under the Preferred Alternative would not occur within any Solid Waste Management Unit (SWMU), Environmental Restoration Program (ERP) site, or Area of Concern (AOC). Provided the distance to any contaminated sites at Patrick AFB, it is unlikely the Preferred Alternative would uncover or interact with any hazardous materials as a result of implementation of the Preferred Alternative. In the event hazardous material is discovered, or used, it would be identified, accumulated and removed in accordance with Federal, state, and local laws/regulations and in compliance with the procedures included in the existing Hazardous Waste Management Plan (HWMP) (USAF 2015c).



EA

ERP Sites and Proposed Project Locations at Patrick AFB

FIGURE 4-1

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.

Further, shoreline stabilization activities implemented under the Preferred Alternative would reduce the potential for exposure and rupture of utility lines, including a sewer line, located along Rescue Road. Shoreline erosion, which currently threatens these utilities, would be addressed under the Preferred Alternative, therefore effectively reducing the potential for contamination of the Banana River. Therefore, impacts relating to storage, handling, or exposure to hazardous materials and wastes would be *less than significant*.

4.8.2.2 No-Action Alternative

Under the No-Action Alternative, the proposed shoreline stabilization measures would not be implemented. Consequently, based on historic patterns, it is likely that continued erosion would occur, which could threaten utilities adjacent to Rescue Road and Runway 11. Under a worst case scenario where periodic storm surge and wave attack results in additional shoreline erosion north or south of the existing emergency revetment, pipeline corrosion could result in a potential release and associated contamination of the Banana River. Therefore, implementation of this alternative could result in substantially more adverse and *potentially significant* impacts to hazardous materials and wastes than those identified under the Preferred Alternative.

4.9 TRANSPORTATION AND CIRCULATION

4.9.1 Approach to Analysis

Potential impacts to transportation and circulation are assessed with respect to anticipated disruption or improvement of current transportation patterns and systems; deterioration or improvement of existing levels of service; and changes in existing levels of transportation safety. Beneficial or adverse impacts may arise from physical changes to circulation (e.g., closing, rerouting, or creating roads), or changes in daily or peak-hour traffic volumes created by installation workforce and population changes. Adverse impacts on roadway capacities would be considered significant if roads with no history of exceeding capacity were forced to operate at or above their full design capacity.

4.9.2 Impacts

4.9.2.1 Alternative A (Preferred Alterative)

During the period of construction activities associated with the proposed shoreline stabilization, heavy haul trucks, heavy construction equipment, and laborers would generate increased vehicle trips along the Patrick AFB circulation network. Additionally, construction activity adjacent to Rescue Road and Runway 11 may result in temporary closure of Rescue Road. However, as construction under the Preferred Alternative is considered short-term, traffic impacts would similarly be short-term and minor. Further, by providing shoreline stabilization at both sites, the Preferred Alternative may prevent potential long-term impacts of road damage as a result of continued shoreline erosion at Rescue Road and Runway 11. Consequently, implementation of the Preferred Alternative would result in l*ess than significant* short-term impacts as well as *beneficial* long-term impacts to transportation and circulation.

4.9.2.2 No-Action Alternative

Under the No-Action Alternative, existing conditions with respect to transportation would remain as described in Section 3.9, *Transportation and Circulation* over the short- to mid-term. However, over the long-term, continued shoreline erosion adjacent to Rescue Road and Runway 11 could result in severe

damage to Rescue Road, requiring re-alignment or closure. Therefore, implementation of this alternative could result in substantially greater impacts to transportation and circulation than those identified under the Preferred Alternative.

4.10 SAFETY

4.10.1 Approach to Analysis

If implementation of the Proposed Action would substantially increase risks associated with aircraft mishap potential or flight safety relevant to the public or the environment, it would represent a significant impact. For example, if an action involved an increase in aircraft operations such that mishap potential would increase significantly, air safety would be compromised.

4.10.2 Impacts

4.10.2.1 Alternative A (Preferred Alterative)

As described in Section 4.3, *Land Use*, under implementation of the Preferred Alternative, short-term construction activities associated with shoreline stabilization would occur within the Clear Zone (CZ) that overlays the affected area adjacent Rescue Road and Runway 11. Construction activities within this area along the 788 linear feet of proposed revetment would require a temporary airfield construction waiver throughout the duration of construction-related activities, including during construction of the proposed revetment and the deposition of clean sand fill along the shoreline. Additionally, depending on the type of equipment used, Runway 11 may need to be closed for certain periods during construction. However, Runway 11 is not frequently used due to its length (e.g., primary activities generally include training flights conducted by a reserve unit). The affected shoreline area along the glide slope west of Runway 03/21 is not located within a CZ; however, the proposed construction activities in this area could potentially interfere with the ILS approach and therefore a temporary airfield construction waiver may be required in this location as well. The 45 SW Commander would have to approve the temporary airfield waiver(s) prior to the implementation of any construction-related activities or staging. However, no permanent airfield waiver(s) would be required under this alternative as the design of the revetment, clean sand fill footprint, and the breakwaters, would not introduce new vertical features or potential Bird/Wildlife Aircraft Strike Hazard (BASH) issues to the airfield. Consequently, impacts to safety at Patrick AFB would be short-term and temporary and *less than significant*.

Implementation of the Preferred Alternative would not result in the construction or demolition of any facilities at Patrick AFB and therefore would have *no impact* on Anti-Terrorism/Force Protection (AT/FP) setbacks or Explosive Safety Quantity Distance (ESQD) arcs.

4.10.2.2 No-Action Alternative

Under the No-Action Alternative, the proposed shoreline stabilization activities would not occur. Consequently, there would be no need for the 45 SW to obtain a temporary airfield construction waiver. Over the short- to mid-term there would be some limited indirect impacts to safety (e.g., continued degradation of the ILS glideslope west of Runway 03/21). However, over the long-term, coastal processes including continued shoreline erosion in these areas could result in more substantial indirect impacts to safety. For example, continued erosion in the area adjacent to Rescue Road could affect the long-term integrity of the road and the airfield in that area. Therefore, impacts resulting from implementation of this alternative are considered *potentially significant.*

SECTION 5
CUMULATIVE IMPACTS

Cumulative impacts on environmental resources result from incremental impacts of Proposed Actions when combined with other past, present, and reasonably foreseeable future projects in an affected area. Cumulative impacts can result from minor, but collectively substantial, actions undertaken over a period of time by various agencies (e.g., Federal, state, or local) or persons. In accordance with the National Environmental Policy Act (NEPA), a discussion of cumulative impacts resulting from projects proposed, under construction, recently completed, or anticipated to be implemented in the near future is required.

5.1 APPROACH TO CUMULATIVE IMPACTS ANALYSIS

Per Council on Environmental Quality (CEQ) guidelines for considering cumulative effects under NEPA (CEQ 1997), this cumulative impact analysis includes three primary considerations to:

1. Determine the scope of the cumulative analysis, including relevant resources, geographic extent, and timeframe;
2. Conduct the cumulative effects analysis; and
3. Determine the cumulative impacts to relevant resources.

5.1.1 Scope of Cumulative Impact Analysis

Implementation of the Preferred Alternative would include the construction of shoreline stabilization measures in localized areas along the western boundary of Patrick Air Force Base (AFB) within and adjacent to the Banana River. The proposed shoreline stabilization measures would result in the construction of a 788-linear-foot revetment and establishment of Coquina rock breakwaters adjacent to Rescue Road and Runway 11 as well as the deposition of approximately 0.631 acres of clean sand fill adjacent to Rescue Road and Runway 11 and along the glide slope west of Runway 03/21. None of the alternatives evaluated in this EA would include the development or construction of any facilities or include any changes to operations or manpower levels at Patrick AFB. Consequently, there would be no potential for the Proposed Action to result in

potentially significant cumulative impacts or otherwise interact with the ongoing construction program at Patrick AFB under the base's General Plan (2011).

5.1.2 Cumulative Projects

CEQ guidelines require that potential cumulative impacts be considered over a specified time period (i.e., from past through future). The appropriate time for considering past, present, and reasonably foreseeable future projects can be the design life of a project, or future timeframes used in local master plans and other available predictive data. Determining the timeframe for cumulative impacts analysis requires estimating the length of time the impacts of a proposed action would last and considering the specific resource in terms of its history of degradation (CEQ 1997). Shoreline stabilization measures evaluated in this EA would occur over a duration of less than 1 year depending on the timing and duration of individual revetment construction and clean sand fill deposition activities. However, the revetment and clean sand fill would be expected to remain in place indefinitely, with coastal processes including shoreline erosion continuing to reduce the clean sand fill footprint over time. Therefore, the cumulative impacts analysis presented herein is not bound by a specific future timeframe.

Per CEQ guidelines, in order to assess the influence of a given action, a cumulative impact analyses should be conducted using existing, readily available data and the scope of the cumulative impact analysis should be defined, in part, by data availability. Consequently, only past projects or reasonably foreseeable future projects with the potential to contribute to cumulative impacts of the Proposed Action or its alternatives have been evaluated in this section. While the cumulative impacts analysis is not limited by a specific timeframe, it should be recognized that available information, uncertainties, and other practical constraints limit the ability to analyze cumulative impacts for the indefinite future. Consequently, future actions that are speculative are not considered in this EA.

The Preferred Alternative would involve proposed modifications to the existing western boundary of Patrick AFB adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21. The implementation of shoreline stabilization measures in these areas would be consistent with U.S. Air Force (USAF) regulations as well as with planning guidance provided by St. Johns River

Water Management District (SJRWMD) and Florida Department of Environmental Protection (FDEP). The 45th Space Wing (45 SW) would pursue and obtain all appropriate permits prior to imitating any construction activities associated with shoreline stabilization in either location. The Preferred Alternative would incorporate the 0.096-acre emergency revetment that was installed adjacent to Rescue Road and Runway 11 in 2014 under emergency permits provided by SJRWMD and U.S. Army Corps of Engineers (USACE) as well as the gabion baskets along the glide slope west of Runway 03/21. Consequently, the Preferred Alternative would not result in any additional construction or cumulative impacts associated with removal of this emergency revetment. Past and presently ongoing construction activities within the vicinity of the Proposed Action area have occurred over the past 5 years, and are expected to continue into the foreseeable future and through implementation of the Preferred Alternative. Previous shoreline stabilization projects have been implemented along the Banana River, including the installation of gabion baskets in 2001 and 2009 to protect the Family Camping "Fam Camp" facility at Patrick AFB as well as the glide slope west of Runway 03/21. However, none of these past Federal actions would be anticipated to affect or otherwise interact with the Proposed Action. Further, no proposed construction projects which would involve shoreline construction or would otherwise interfere with or directly affect the Proposed Action area are anticipated within the foreseeable planning horizon. Environmental effects identified in the analysis do not support a conclusion that there would be significant cumulative impacts as a result of shoreline stabilization features that would be established under the Proposed Action. Cumulative impacts would therefore be l*ess than significant*.

SECTION 6
SPECIAL PROCEDURES

Impact evaluations conducted during preparation of this Environmental Assessment (EA) have determined that no significant environmental impacts would result from implementation of the Proposed Action at Patrick Air Force Base (AFB). This determination is based on a thorough review and analysis of existing resource information and coordination with knowledgeable, responsible personnel from the U.S. Air Force (USAF) and relevant local, state, and Federal agencies.

Construction Activities

During construction activities associated with the proposed shoreline stabilization measures adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21, the 45th Space Wing (45 SW) would implement standard best management practices (BMPs) to further reduce the potential for construction-related impacts in these areas.

- Standard dust minimization practices (e.g., regularly watering exposed soils, soil stockpiling, etc.) would be implemented throughout the duration of construction activities.
- During construction, idling equipment would be shut off when not in use.
- Equipment sound mufflers would be used as appropriate construction activity would be restricted to normal working hours (i.e., between 7:00 A.M. and 5:00 P.M.).
- Large mangroves and wetland trees (i.e., buttonwood) to the south of the shoreline stabilization area adjacent to Rescue Road and Runway 11 would be avoided.
- All proposed clean sand fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) that would compensate for potential impacts to aquatic vegetation and wetland habitats.

- Silt fences, straw bales, coir logs, seeding and/or sodding of exposed soil would be implemented during construction activities to reduce potential water quality issues within the Banana River

- Construction equipment would be regularly inspected for leaks daily throughout the duration of construction. Any potential minor spills or releases would be handled according to procedures outlines in the base's Spill Prevention and Emergency Response Plan. In addition, all equipment, including sound mufflers, would be kept in good, working condition to ensure their safe and efficient operation.

- If buried human remains or historic artifacts were uncovered during construction, all activities would be suspended until a qualified archaeologist could recover and determine the significance of the resource(s), in compliance with Section 106 of the National Historic Preservation Act (NHPA).

- In the event hazardous material is discovered, or used, it would be identified, accumulated and removed in accordance with Federal, state, and local laws/regulations and in compliance with the procedures included in the existing Hazardous Waste Management Plan (HWMP).

- The 45 SW Commander would have to approve the temporary airfield waiver(s) prior to the implementation of any construction-related activities or staging adjacent to Rescue Road and Runway 11 or along the glide slope west of Runway 03/21.

Permit Conditions

In addition to standard construction BMPs, additional standard mitigation measures for impacts to jurisdictional wetlands would be specified in associated permit requirements. The permit conditions would require that the Proposed Action:

- Avoid wetland and water impacts where practicable;
- Minimize potential impacts to wetlands and waters; and
- Compensate for any remaining, unavoidable impacts to wetlands or waters through activities to enhance or create wetlands and/or waters (e.g., with cordgrass plants within the clean sand fill).

Possible mitigation or compensation associated with the implementation of the Preferred Alternative could require the use of existing wetland mitigation credits banked through estuarine habitat enhancement at Cape Canaveral Air Force Station (CCAFS) with construction of culverts that opened up old mosquito impoundments and allowed fish migrations and improved water quality for seagrass health. These conceptual mitigations have been discussed with National Marine Fisheries Service (NMFS), U.S. Army Corps of Engineers (USACE), Florida Department of Environmental Protection (FDEP), and St. Johns River Water Management District (SJRWMD). A formal mitigation plan consistent with the requirements of 32 CFR 989.15 and 32 CFR 989.22(d) will be developed during the permitting process prior to the implementation of any construction-related activities. It is anticipated that NMFS will also be working with the USACE to determine permit conditions and possible mitigation.

SECTION 7
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SECTION 8
LIST OF PREPARERS

This report by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) for and under direction by the U.S. Air Force (USAF). Members of Amec Foster Wheeler's professional staff are listed below:

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Production

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Production

Deirdre Stites
Graphic Artist

APPENDIX A

INTERGOVERNMENTAL REVIEW AND CONSULTATION

PUBLIC NOTICE
PREPARATION OF ENVIRONMENTAL ASSESSMENT
SHORELINE STABILIZATION AND AIRFIELD PROTECTION
PATRICK AIR FORCE BASE, FLORIDA

The U.S. Air Force (USAF) is preparing a Draft Environmental Assessment (EA) for shoreline stabilization and airfield protection at Patrick Air Force Base (AFB), Florida. During the past 20 years the shoreline of the Banana River fronting Patrick AFB has eroded substantially. The general purpose of the Proposed Action is: 1) to stabilize the shoreline and protect the exposed sewer and water lines fronting Rescue Road and Runway 11; and 2) to re-establish the shoreline which fronts the existing gabion baskets, approximately 1.25 miles south of Rescue Road site. The Proposed Action would stabilize the shoreline west of Runway 11 by extending it waterward of the emergency rip-rap to its historic extent mapped in 2009. This action would entail placement of approximately 100 feet of clean fill to a depth of 2 to 3 feet covering approximately 0.702 acres (requiring approximately 3,500 cubic yards of clean fill). The Proposed Action would also add clean fill west of Runway 20/02 in order to cover the exposed gabion baskets and to restore the shoreline to its historic extent mapped in 2009, when the gabion baskets were originally installed. There are three method alternatives for the Proposed Action including: (1) repurposed concrete rip-rap; (2) gabion baskets with Coquina rocks; and (3) the inclusion of a breakwater/living shoreline (only native salt-tolerant grasses would be included in any living shoreline design in order to reduce bird attractants). There is one geographical subset alternative; this alternative would include the stabilization of the shoreline west of Runway 11 but would not include the stabilization elements along the west of Runway 20/02.

The Proposed Action, which would occur in a Federal Emergency Management Agency (FEMA) designated floodplain (Panel 12009C0526G, Effective 17 March 2014), would be subject to Executive Order (EO) 11988 (Floodplain Management) requirements and objectives. The USAF requests advance public comment to determine if there are any public concerns regarding the project's potential impacts. The USAF would also like to solicit public input or comments on potential project alternatives. The proposed shoreline stabilization project will be analyzed in a forthcoming EA and the public will have the opportunity to comment on the Draft EA when it is released.

The public comment period is [DATE – DATE]. Please submit comments or requests for more information to Ms. Eva Long, NEPA Project Manager via email (eva.long@us.af.mil) or by standard mail to: 1224 Jupiter Street, Patrick AFB, FL 32925-3343.

Notice of Availability
Draft Final Environmental Assessment (EA) for Shoreline Stabilization and Airfield Protection at Patrick Air Force Base, Florida

The U.S. Air Force and the 45th Space Wing announces the availability of a Draft Final EA for proposed shoreline stabilization and airfield protection at Patrick AFB, including the deposition of clean sand fill and the establishment of offshore coquina rock wave breaks fronting Rescue Road and Runway 11 as well as the deposition of clean sand fill along the glide slope west of Runway 03/21. The need for the proposed fill action is driven by the substantial erosion that has occurred during the past 20 years that has threatened Rescue Road and Runway 11 as well as the functionality of the Instrument Landing System (ILS) at the glide slope west of Runway 03/21. The implementation of the proposed fill action would stabilize the shoreline and protect the exposed sewer and water lines fronting Rescue Road and Runway 11 and re-establish the shoreline in front of the existing gabion baskets along the glide slope west of Runway 03/21, which would prevent the reflection of ILS signal off of the surface of the Banana River.

Pursuant to the Council on Environmental Quality (CEQ) regulations and in accordance with the National Environmental Policy Act (NEPA), this Draft Final EA serves as a concise public document that provides evidence and analysis for determining whether a Finding of No Significant Impact / Finding of No Practicable Alternative is appropriate or an Environmental Impact Statement should be prepared. The Draft Final EA presents the purpose and need for the action, the proposed action and alternatives, a description of the affected environment, and an analysis of environmental consequences. The Draft Final EA also documents cumulative impacts from projects which are proposed, under construction, recently completed, or anticipated to be implemented in the near future. No significant environmental impacts have been identified in the Draft Final EA.

The public is invited to review and make comments on the Draft Final EA, which is available at the Cocoa Beach Public Library at 550 North Brevard Avenue, Cocoa Beach, Florida. Comments must be received no later 11 April 2017. The public may submit written comments to the address below:

Attn: Mr. Hamid Kamalpour
AFCEC/CZN Bldg 171
2261 Hughes Ave, Ste 155
Lackland AFB, TX 78236-9853
Email: hamid.kamalpour@us.af.mil

3 March 2017

MEMORANDUM FOR FLORIDA STATE CLEARINGHOUSE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
3900 COMMONWEALTH BLVD, MAIL STATION 47
TALLAHASSEE, FL 32399-3000

FROM: 45 CES/CEIE-C

SUBJECT: Request for Comment on the Draft Environmental Assessment for Shoreline Stabilization and Airfield Protection at Patrick Air Force Base

1. The U.S. Air Force (USAF) has prepared a Draft Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to analyze the potential environmental and socioeconomic impacts associated with the proposed shoreline stabilization and airfield protection at Patrick Air Force Base (AFB). The Proposed Action would include the deposition of clean sand fill and the establishment of offshore coquina rock wave breaks fronting Rescue Road and Runway 11 as well as the deposition of clean sand fill along the glide slope west of Runway 03/21.

2. The Proposed Action would stabilize the shoreline and protect the exposed sewer and water lines fronting Rescue Road and Runway 11 as well as re-establish the shoreline at the existing gabion baskets along the glide slope west of Runway 03/21. The proposed fill action adjacent to Rescue Road and Runway 11 is driven by the substantial erosion that has occurred during the past 20 years, and the recently accelerated rate of erosion, with more than 100 feet of shoreline width lost in the last 5 years. The subject erosion west of Rescue Road and Runway 11 has exposed a sewer main and water reuse line, requiring emergency repairs that were temporarily permitted by St. Johns River Water Management District and the U.S. Army Corps of Engineers. These emergency repairs covered the exposed utilities and temporarily stabilized Rescue Road and the airfield. Implementation of the Proposed Action would result in establishment of a long-term solution to the erosion in this area west of Rescue Road and Runway 11. The need for the proposed fill action at the glide slope west of Runway 03/21 is driven by the need for the continued functionality of the Instrument Landing System (ILS) at this location. Gabion baskets were installed at the glide slope – approximately 1.25 miles south of the Rescue Road site – in 2009 to maintain the shoreline in this area and to prevent reflection of the ILS signal off of the surface of the Banana River. Since that time, the gabion baskets have become exposed in this area. The Proposed Action would restore the shoreline in order to ensure continued long-term viability of the ILS serving the Patrick AFB airfield.

3. The USAF requests that the Florida State Clearinghouse coordinate a review of the attached Draft EA and solicit any comments or concerns on the Draft EA and proposed FONSI/FONPA in accordance with the following authorities: Executive Order 12372, Intergovernmental Review

of Federal Programs; §403.061(42), Florida Statutes; the Coastal Zone Management Act, 16 U.S. Code (USC) §§1451- 1464, as amended; and NEPA, 42 USC §§4321-4347, as amended. Comments may be submitted no later than 30 days from receipt of this letter and should be provided to Mr. Hamid Kamalpour, AFCEC/CZN, Bldg 171, 2261 Hughes Ave, St 155, Lackland AFB, Texas, 78236-9853, or by email to hamid.kamalpour@us.af.mil. Thank you for your assistance in this matter and we look forward to your involvement with this project.

BLAYLOCK.MICHAEL.A.1061700630

Digitally signed by BLAYLOCK.MICHAEL.A.1061700630
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=BLAYLOCK.MICHAEL.A.1061700630
Date: 2017.03.03 15:03:29 -05'00'

MICHAEL A. BLAYLOCK, GS-13, USAF
Chief, Environmental Conservation

Attachment:
Draft EA for Shoreline Stabilization and Airfield Protection (10 CDs)

APPENDIX B

RESCUE ROAD AND RUNWAY 11 ENGINEERING DRAWINGS

PATRICK AIR FORCE BASE
FLORIDA

STATE OF FLORIDA
SCALE: NONE

LOCATION PLAN
SCALE: NONE
TRUE NORTH

ENLARGED
RUNWAY 11 SHORELINE AREA
SCALE: NONE

SXHT 15-1005

REPAIR RIVER SHORELINE, RUNWAY 11

APPROVED

USER: _____
CHIEF, ENGINEERING FLIGHT: _____
PROJECT MANAGER: _____
ENVIRONMENTAL: _____
FIRE: _____
CE OPERATIONS: _____
COMMUNICATIONS: _____
SAFETY: _____
SECURITY FORCES: _____
ATO: _____
OTHER: _____

DRAWING INDEX	
SHEET ID	DESCRIPTION
	GENERAL
G-001	VICINITY MAP, LOCATION PLAN AND DRAWING INDEX
	CIVIL
C-001	GENERAL NOTES, ABBREVIATIONS, AND LEGEND
C-100	OVERALL SHORELINE PROTECTION PLAN
C-101	NORTH SECTION SHORELINE PROTECTION PLAN
C-102	SOUTH SECTION SHORELINE PROTECTION PLAN
C-301	CROSS SECTIONS
C-501	TYPICAL CROSS SECTION AND BREAKWATER DETAILS
C-502	MISCELLANEOUS DETAILS

PERMIT(S)/ENVIRONMENTAL ACTIONS REQUIRED PRIOR TO CONSTRUCTION			
ERP/STORMWATER		NOI/SWPPP	
ERP/WETLANDS/DREDGE & FILL	√	IRP	
FDEP/DRINKING WATER		SURVEY/WILDLIFE	√
FDEP/DOM. WASTE WATER		ARCHEO./HISTORICAL	
FDEP/IND. WASTE WATER		OTHER	
FDEP/FUEL TANK		NONE	

NOTE: IF IT IS SUSPECTED THAT ANY HAZARDOUS MATERIAL NOT IDENTIFIED ON THESE DRAWINGS IS REQUIRED TO BE DISTURBED IN ORDER TO PERFORM THE CONTRACT WORK, LEAVE MATERIAL UNDISTURBED AND IMMEDIATELY INFORM THE CONTRACTING OFFICER.

HAZARDOUS MATERIALS	YES	NO	NOT VERIFIED
ASBESTOS			√
HEAVY METALS			√
LEAD			√
PCB			√

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

DESIGNED BY: D. LAKENDER
DRAWN BY: D. ARTZNER
REVIEWED BY: J. KELLET
SUBMITTED BY: G. BEARD
DATE: 4/13/16
SXHT 15-1005
AS BUILT DATE: ####
REQUIREMENT NO: 0095

USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095

RAEIS OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
VICINITY MAP, LOCATION MAP AND DRAWING INDEX

SHEET IDENTIFICATION
G-001

L:\Engineering\jobs\2015\15005 Repair River Shoreline RWY 11\15-1005 G-001.dwg, 4/14/2016 12:17:24 PM, DWG To PDF.pc3

GENERAL CONSTRUCTION NOTES:

1. NO UNDERGROUND UTILITY LINES HAVE BEEN LOCATED; ALL SITE FEATURES AND UNDERGROUND UTILITIES SHOWN ARE BASED ON PAFB GIS MAPPING AND SCALED AERIAL MAPS; 45TH SW TAKES NO RESPONSIBILITY FOR THE ACCURACY OF THESE LOCATIONS. EXTREME CAUTION SHALL BE USED TO MAINTAIN EXISTING UTILITIES.
2. CONTRACTOR IS RESPONSIBLE FOR REQUESTING UTILITY LOCATES AND VERIFYING ALL EXISTING UTILITIES PRIOR TO STARTING CONSTRUCTION.
3. PRIOR TO CONSTRUCTION AND EXCAVATION, THE CONTRACTOR SHALL PROCESS AN AF FORM 103, WHICH INCLUDES NOTIFICATION OF SUNSHINE ONE CALL (811) UTILITY LOCATE TICKET.
4. ANY DAMAGE CAUSED TO EXISTING SITE FEATURES, ROADS, CURBS, WALKS, DRAINAGE STRUCTURES, ETC., SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR OR REPLACE TO EXISTING CONDITIONS OR BETTER. THE CONTRACTOR WILL BE REQUIRED TO MOVE CONSTRUCTION EQUIPMENT OUTSIDE THE RUNWAY CLEAR ZONE (1,000 FEET FROM RWY. CENTERLINE) AT THE END OF EACH WORK DAY FOR STORAGE. COORDINATE WITH CONTRACTING OFFICER FOR ACCEPTABLE LOCATION.
5. DISTURBED AREAS SHALL BE KEPT TO A MINIMUM AND ONLY AS NECESSARY TO ACCOMPLISH THE WORK.
6. ALL SURFACE WATERS WILL BE PROTECTED AS REQUIRED USING TURBIDITY BARRIERS, SILT FENCING OR EQUIVALENT MATERIAL TO PREVENT EROSION AND SLOUGHING OF EXCAVATED MATERIALS INTO ADJACENT WATERS OR STORM INLETS. THE CONTRACTING OFFICER MUST BE NOTIFIED OF ANY IMPACTS TO EXISTING VEGETATION. TREES THAT MUST BE REMOVED DUE TO IMPEDANCES MUST BE IDENTIFIED TO THE CONTRACTING OFFICER AND 45 CES ENVIRONMENTAL (45 CES/CEIE) PRIOR TO REMOVAL.
7. CONSTRUCTION OF BREAKWATERS AND REVETMENT RIP-RAP SHALL COMPLY WITH ALL PROJECT SPECIFICATIONS.
8. CONSTRUCTION MATERIALS REJECTED BY THE GOVERNMENT SHALL BE REMOVED FROM THE SITE IMMEDIATELY.
9. CONTRACTOR SHALL COMPLETE ALL NECESSARY WORK TO CONSTRUCT/REPAIR A STABLE SHORELINE PROTECTION SYSTEM.
10. IF ANY CONSTRUCTION DEWATERING IS NECESSARY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING APPROVAL OF A DEWATERING PLAN, THROUGH THE CONTRACTING OFFICER, PRIOR TO ANY DEWATERING. NO CONSTRUCTION DEWATERING SHALL BE ALLOWED INTO EXISTING STORMWATER RETENTION AREAS. REFERENCE SPECIFICATIONS SECTION 01 57 19, DEWATERING.
11. IF A STORAGE TANK IS UTILIZED FOR FUELING CONSTRUCTION VEHICLES, THE TANK MUST HAVE ADEQUATE SECONDARY CONTAINMENT AND IF THE TANK IS 55 GALS OR GREATER, MONTHLY INSPECTIONS ARE TO BE PERFORMED AND DOCUMENTED BY THE CONTRACTOR. THE CONTRACTOR'S REFUELING PLAN SHALL BE SUBMITTED TO THE 45 CES/CEIE OFFICE FOR REVIEW.
16. THE EXISTING CONDITIONS SURVEY WAS PERFORMED BY ALLEN ENGINEERING, INC. DATED 4/2/15.
17. CONTRACTOR SHALL REPAIR OR RESTORE DISTURBED AREAS TO ORIGINAL CONDITION OR BETTER. SODDING SHALL BE USED FOR A MINIMUM OF 2 FEET ADJACENT TO EDGE OF ALL PAVEMENTS, CURBS, SIDEWALKS, BEHIND REVETMENTS, AND ON SLOPES OF DITCHES OR SURFACE WATERS; SEEDING MAY BE USED ELSEWHERE.
19. IF NIGHT WORK IS REQUIRED FROM 1 MAY TO 31 OCTOBER, BETWEEN 2100 TO 0600 HOURS, A LIGHT MANAGEMENT PLAN MUST BE REVIEWED AND APPROVED THROUGH THE CONTRACTING OFFICER AND 45 CES ENVIRONMENTAL (45 CES/CEIE) PRIOR TO NIGHT WORK COMMENCEMENT.
20. THE CONTRACTOR SHALL COMPLY WITH, BUT NOT BE LIMITED TO: AFI 32-7086, HAZARDOUS MATERIALS MANAGEMENT, FEBRUARY 2015 AND THE 45TH SW HAZMAT TRACKING PROCEDURES FOR CONSTRUCTION AND SERVICE CONTRACTORS. THE CONTRACTOR SHALL CONTACT THE 45 CES/CEIE HAZARDOUS MATERIALS PROGRAM MANAGER AT 321-494-9268 TO REVIEW HAZARDOUS MATERIALS AUTHORIZATION PROCEDURES PRIOR TO HAZARDOUS MATERIALS BEING BROUGHT ON TO 45 SW FACILITIES. NO HAZARDOUS MATERIALS ARE ALLOWED TO BE BROUGHT ON TO ANY 45 SW INSTALLATION WITHOUT PRIOR APPROVAL.
21. IF ANY HAZARDOUS/CONTROLLED WASTE IS GENERATED OR BROUGHT ONSITE BY THE CONTRACTOR, IT MUST BE MANAGED IN ACCORDANCE WITH 45 SW MANAGEMENT PLAN 19-14.
22. STORMWATER DISCHARGE SHALL BE MONITORED FOR QUALITY DURING THE CONSTRUCTION, AND FLOATING TURBIDITY BARRIERS SHALL BE INSTALLED AROUND WORK AREAS TO PREVENT DISCHARGE OF TURBID WATER TO THE BANANA RIVER PRIOR TO START OF WORK.

SHORELINE PROTECTION NOTES:

1. EXISTING ADJACENT AND OFF-SITE DRAINAGE PATTERNS SHALL BE MAINTAINED DURING CONSTRUCTION.
2. ALL UNDERGROUND UTILITIES MUST BE LOCATED AND PROTECTED DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL PROVIDE THE CONTRACTING OFFICER AND ENGINEER WITH FINAL IMPROVEMENT AS-BUILT INFORMATION FROM A REGISTERED SURVEYOR MEETING REGULATORY PERMIT CONDITIONS AS WELL AS THE FOLLOWING:
   LOCATION, MATERIAL, BOTTOM AND CREST ELEVATIONS, LENGTHS AND WIDTHS OF BREAKWATER STRUCTURES.
   LOCATION, ELEVATIONS OF FILL SLOPES, REVETMENT TOE AND TOP.
   COMPLETE TOPOGRAPHIC AND BATHYMETRIC SURVEY OF ALTERED PROJECT AREA .
4. TYPE II FLOATING TURBIDITY BARRIERS SHALL BE INSTALLED IN THE WATER AROUND WORK AREAS TO PREVENT SEDIMENT TRANSPORT OUTSIDE OF WORK AREA.
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH THE CONDITIONS OF THE ENVIRONMENTAL RESOURCE PERMIT FOR WORK IN THE WATERS OF THE STATE.
6. GEOTEXTILE FOR USE IN THE WATER UNDER THE BREAKWATER ROCKS SHALL BE MIRAFI HP370 WOVEN POLYPROPYLENE FABRIC OR APPROVED EQUAL.
7. GEOTEXTILE FOR USE IN THE SHORELINE REVETMENT RIP-RAP SHALL BE MIRAFI S1600 NON-WOVEN POLYPROPYLENE FABRIC OR APPROVED EQUAL.
8. COQUINA ROCK BOULDERS SHALL BE USED FOR THE BREAKWATER AND SHALL BE 1-2 FEET IN SIZE WITH AN AVERAGE SIZE OF 18 INCHES, AND WEIGH BETWEEN 100 - 250 POUNDS.
9. CONCRETE RUBBLE RIP-RAP SHALL BE USED FOR THE SHORELINE REVETMENT AND SHALL VARY BETWEEN 6 INCH TO 3 FEET IN SIZE, A MINIMUM WEIGHT OF 25 POUNDS, AND AVERAGE WEIGHT OF 100 POUNDS. CONCRETE RUBBLE SHALL BE FREE OF REBAR, OTHER METALS, OR DEBRIS.

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING PROTECTED SPECIES CONSTRUCTION CONDITIONS:

A. THE CONTRACTOR SHALL INSTRUCT ALL PERSONNEL ASSOCIATED WITH THE PROJECT OF THE POTENTIAL PRESENCE OF THESE SPECIES AND THE NEED TO AVOID COLLISIONS WITH SEA TURTLES AND SMALLTOOTH SAWFISH. ALL CONSTRUCTION PERSONNEL ARE RESPONSIBLE FOR OBSERVING WATER-RELATED ACTIVITIES FOR THE PRESENCE OF THESE SPECIES.

B. THE CONTRACTOR SHALL ADVISE ALL CONSTRUCTION PERSONNEL THAT THERE ARE CIVIL AND CRIMINAL PENALTIES FOR HARMING, HARASSING, OR KILLING SEA TURTLES OR SMALLTOOTH SAWFISH, WHICH ARE PROTECTED UNDER THE ENDANGERED SPECIES ACT OF 1973.

C. SILTATION BARRIERS SHALL BE MADE OF MATERIAL IN WHICH A SEA TURTLE OR SMALLTOOTH SAWFISH CANNOT BECOME ENTANGLED. BE PROPERLY SECURED, AND BE REGULARLY MONITORED TO AVOID PROTECTED SPECIES ENTRAPMENT. BARRIERS MAY NOT BLOCK SEA TURTLE OR SMALLTOOTH SAWFISH ENTRY TO OR EXIT FROM DESIGNATED CRITICAL HABITAT WITHOUT PRIOR AGREEMENT FROM THE NATIONAL MARINE FISHERIES SERVICE'S PROTECTED RESOURCES DIVISION, ST. PETERSBURG, FLORIDA.

D. ALL VESSELS ASSOCIATED WITH THE CONSTRUCTION PROJECT SHALL OPERATE AT "NO WAKE/IDLE" SPEEDS AT ALL TIMES WHILE IN THE CONSTRUCTION AREA AND WHILE IN WATER DEPTHS WHERE THE DRAFT OF THE VESSEL PROVIDES LESS THAN A FOUR-FOOT CLEARANCE FROM THE BOTTOM. ALL VESSELS WILL PREFERENTIALLY FOLLOW DEEP-WATER ROUTES (E.G., MARKED CHANNELS) WHENEVER POSSIBLE.

E. IF A SEA TURTLE OR SMALLTOOTH SAWFISH IS SEEN WITHIN 100 YARDS OF THE ACTIVE DAILY CONSTRUCTION/DREDGING OPERATION OR VESSEL MOVEMENT, ALL APPROPRIATE PRECAUTIONS SHALL BE IMPLEMENTED TO ENSURE ITS PROTECTION. THESE PRECAUTIONS SHALL INCLUDE CESSATION OF OPERATION OF ANY MOVING EQUIPMENT CLOSER THAN 50 FEET OF A SEA TURTLE OR SMALLTOOTH SAWFISH. OPERATION OF ANY MECHANICAL CONSTRUCTION EQUIPMENT SHALL CEASE IMMEDIATELY IF A SEA TURTLE OR SMALLTOOTH SAWFISH IS SEEN WITHIN A 50-FT RADIUS OF THE EQUIPMENT. ACTIVITIES MAY NOT RESUME UNTIL THE PROTECTED SPECIES HAS DEPARTED THE PROJECT AREA OF ITS OWN VOLITION.

F. ANY COLLISION WITH AND/OR INJURY TO A SEA TURTLE OR SMALLTOOTH SAWFISH SHALL BE REPORTED IMMEDIATELY TO THE NATIONAL MARINE FISHERIES SERVICE'S PROTECTED RESOURCES DIVISION (727-824-5312) AND THE LOCAL AUTHORIZED SEA TURTLE STRANDING/RESCUE ORGANIZATION.

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING CONDITIONS INTENDED TO PROTECT MANATEES FROM DIRECT PROJECT EFFECTS:

A. ALL PERSONNEL ASSOCIATED WITH THE PROJECT SHALL BE INSTRUCTED ABOUT THE PRESENCE OF MANATEES AND MANATEE SPEED ZONES, AND THE NEED TO AVOID COLLISIONS WITH AND INJURY TO MANATEES. THE CONTRACTOR SHALL ADVISE ALL CONSTRUCTION PERSONNEL THAT THERE ARE CIVIL AND CRIMINAL PENALTIES FOR HARMING, HARASSING, OR KILLING MANATEES WHICH ARE PROTECTED UNDER THE MARINE MAMMAL PROTECTION ACT, THE ENDANGERED SPECIES ACT, AND THE FLORIDA MANATEE SANCTUARY ACT.

B. ALL VESSELS ASSOCIATED WITH THE CONSTRUCTION PROJECT SHALL OPERATE AT "IDLE SPEED/NO WAKE" AT ALL TIMES WHILE IN THE IMMEDIATE AREA AND WHILE IN WATER WHERE THE DRAFT OF THE VESSEL PROVIDES LESS THAN A FOUR-FOOT CLEARANCE FROM THE BOTTOM. ALL VESSELS WILL FOLLOW ROUTES OF DEEP WATER WHENEVER POSSIBLE.

C. SILTATION OR TURBIDITY BARRIERS SHALL BE MADE OF MATERIAL IN WHICH MANATEES CANNOT BECOME ENTANGLED, SHALL BE PROPERLY SECURED, AND SHALL BE REGULARLY MONITORED TO AVOID MANATEE ENTANGLEMENT OR ENTRAPMENT. BARRIERS MUST NOT IMPEDE MANATEE MOVEMENT.

D. ALL ON-SITE PROJECT PERSONNEL ARE RESPONSIBLE FOR OBSERVING WATER-RELATED ACTIVITIES FOR THE PRESENCE OF MANATEE(S). ALL IN-WATER OPERATIONS, INCLUDING VESSELS, MUST BE SHUTDOWN IF A MANATEE(S) COMES WITHIN 50 FEET OF THE OPERATION. ACTIVITIES WILL NOT RESUME UNTIL THE MANATEE(S) HAS MOVED BEYOND THE 50-FOOT RADIUS OF THE PROJECT OPERATION, OR UNTIL 30 MINUTES ELAPSES IF THE MANATEE(S) HAS NOT REAPPEARED WITHIN 50 FEET OF THE OPERATION. ANIMALS MUST NOT BE HERDED AWAY OR HARASSED INTO LEAVING.

E. ANY COLLISION WITH OR INJURY TO A MANATEE SHALL BE REPORTED IMMEDIATELY TO THE FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION (FWC) HOTLINE AT 1-888-404-3922. COLLISION AND/OR INJURY SHOULD ALSO BE REPORTED TO THE U.S. FISH AND WILDLIFE SERVICE IN JACKSONVILLE (1-904-731-3336) FOR NORTH FLORIDA OR IN VERO BEACH (1-772-562-3909) FOR SOUTH FLORIDA, AND EMAILED TO FWC AT IMPERILEDSPECIES@MYFWC.COM.

F. TEMPORARY SIGNS CONCERNING MANATEES SHALL BE POSTED PRIOR TO AND DURING ALL IN-WATER PROJECT ACTIVITIES. ALL SIGNS ARE TO BE REMOVED BY THE CONTRACTOR UPON COMPLETION OF THE PROJECT. TEMPORARY SIGNS THAT HAVE ALREADY BEEN APPROVED FOR THIS USE BY THE FWC MUST BE USED. ONE SIGN WHICH READS CAUTION: BOATERS MUST BE POSTED. A SECOND SIGN MEASURING AT LEAST 8½" BY 11" EXPLAINING THE REQUIREMENTS FOR "IDLE SPEED/NO WAKE" AND THE SHUT DOWN OF IN-WATER OPERATIONS MUST BE POSTED IN A LOCATION PROMINENTLY VISIBLE TO ALL PERSONNEL ENGAGED IN WATER-RELATED ACTIVITIES. THESE SIGNS CAN BE VIEWED AT HTTP://WWW.MYFWC.COM/WILDLIFEHABITATS/MANATEE_SIGN_VENDORS.HTM. QUESTIONS CONCERNING THESE SIGNS CAN BE FORWARDED TO THE EMAIL ADDRESS LISTED ABOVE.

LEGEND:

- BANANA RIVER MHWL OF 2001
- BANANA RIVER MHWL OF 2007
- BANANA RIVER MHWL OF 2009
- EXISTING RIVER WATER EDGE LINE (4/2/15)
- SAFE UPLAND LINE (OHWL)
- EXISTING TOP OF BANK
- FM — EXISTING SANITARY FORCE MAIN
- RW — EXISTING RECLAIMED WATER MAIN
- FB — PROPOSED FLOATING TURBIDITY BARRIER
- SF — PROPOSED SILT FENCE
- EXISTING CONTOUR LINE
- x 2.50 — EXISTING GRADE SPOT ELEVATION
- x 2.50 — PROPOSED FINISHED GRADE SPOT ELEVATION

ABBREVIATIONS:

BOT.	BOTTOM
CONC.	CONCRETE
E	EASTING
EL.	ELEVATION
LB	LAND SURVEYING BUSINESS
MHWL	MEAN HIGH WATER LEVEL
N	NORTHING
NAVD	NORTH AMERICAN VERTICAL DATUM
NGVD	NATIONAL GEODETIC VERTICAL DATUM
TYP.	TYPICAL

SURVEYOR'S NOTES:

1. THIS IS NOT A BOUNDARY SURVEY.
2. THE COORDINATE VALUES AND BEARINGS SHOWN HEREON ARE BASED ON NORTH AMERICAN DATUM (NAD) OF 1983, FLORIDA EAST AND WERE ESTABLISHED FROM GPS OBSERVATIONS USING PUBLISHED VALUES FOR UNITED STATES COASTAL & GEODETIC SURVEY (USC&GS) MONUMENT "TECH."
3. THE ELEVATIONS SHOWN HEREON ARE BASED ON USC&GS MONUMENT "TECH," ELEVATION= 6.80 FEET. ALL ELEVATIONS SHOWN ARE BASED ON NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.
4. ONLY ABOVE GROUND INDICATIONS OF UTILITIES WERE LOCATED BY THIS SURVEY.

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

DESIGNED BY: D. LANDECKER
DRAWN BY: D. ARTZNER
REVIEWED BY: J. KELLET
SUBMITTED BY: G. BEARD
DATE: 4/13/16
SKMT 15-1005
RECERT NO. 0095
AS BUILT DATE ####

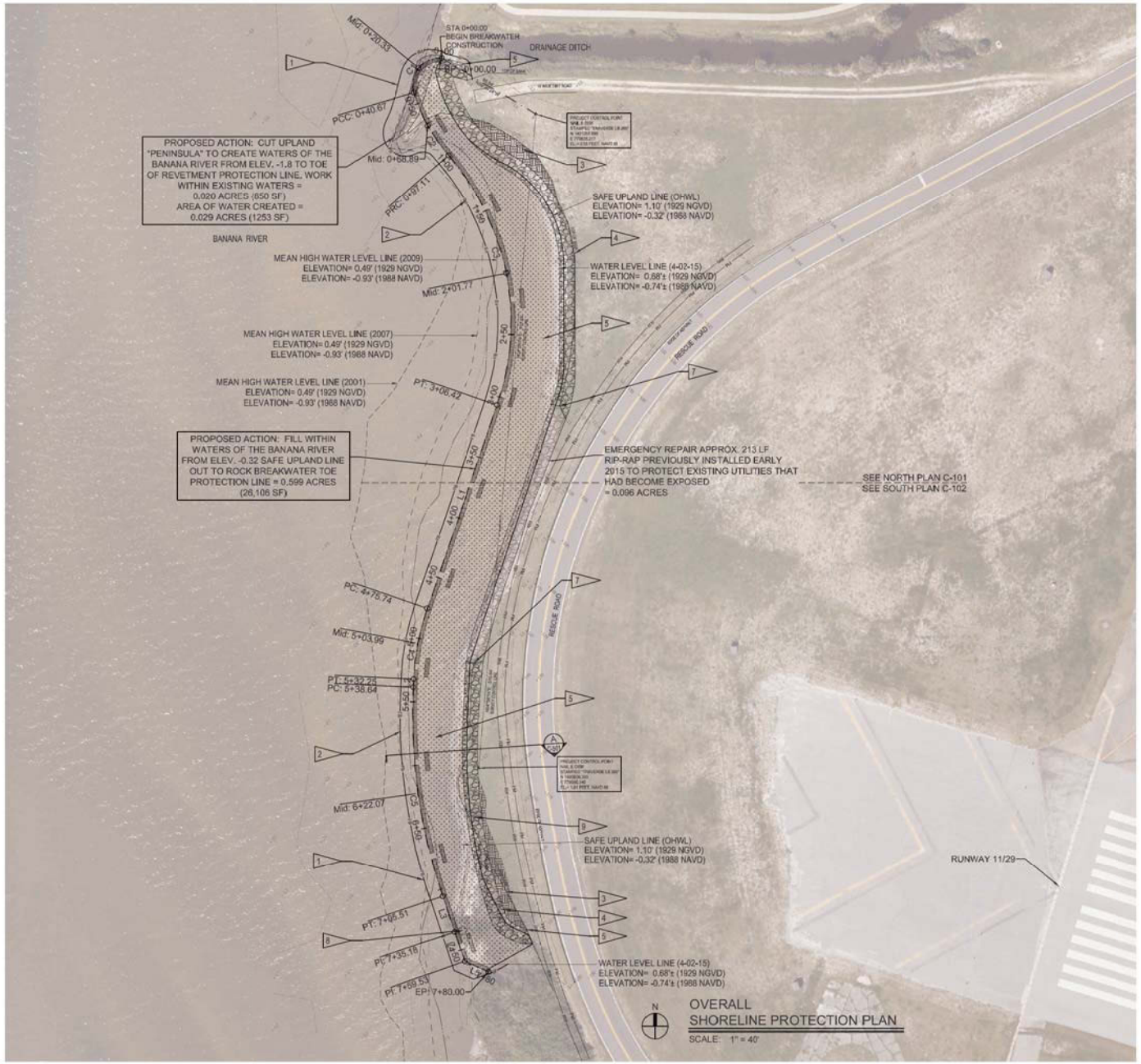
USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095

RAE|S OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
GENERAL NOTES ABBREVIATIONS, AND LEGEND

SHEET IDENTIFICATION
C-001

L:\Engineering\DWG\2015\15005 Repair River Shoreline RWY 11\15-1005 C-001.dwg, 4/14/2016 12:17:37 PM, DWG To PDF.pc3



CONSTRUCTION FLAG NOTES:

1. INSTALL AND MAINTAIN THROUGHOUT CONSTRUCTION TYPE II FLOATING TURBIDITY BARRIER. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH PERMIT CONDITIONS OF WORK IN WATERS OF THE STATE. REMOVE UPON PROJECT STABILIZATION COMPLETION.
2. COQUINA ROCK BREAK WATER PLACED ON TOP OF WOVEN GEOTEXTILE FABRIC AS DETAILED ON SHEET C-501.
3. CLEAN FILL FROM ELEVATION 2.5' OF TOP OF ROCK DOWN TO EXISTING TOP OF BANK ELEVATION VARIES FROM 1.9' TO 2.5'.
4. CONCRETE RUBBLE RIP-RAP REVETMENT OVER FILTER FABRIC, SEE DETAIL ON SHEET C-501.
5. CLEAN SAND FILL FROM COQUINA BREAKWATER EASTERN TOE AT 1:14 FILL SLOPE TO MEET RIP-RAP REVETMENT. PLANT SALT MARSH VEGETATION AS DETAILED ON SHEET C-501.
6. TURN RIP-RAP REVETMENT BACK IN TOWARD SHORE TO ANCHOR.
7. EXISTING RIP-RAP REVETMENT TO REMAIN, REMOVE 5' OF ROCK FROM EITHER END TO EXPOSE EXISTING FILTER FABRIC AND LAP SPLICE EXTENSION OF FILTER FABRIC TO CONTINUE RIP-RAP IN BOTH DIRECTIONS, REPLACE ROCK.
8. EXISTING MANGROVE TO REMAIN, ADJUST COQUINA BREAKWATER AS NEEDED.
9. SMALL MANGROVE CLUSTERS WITHIN LIMITS OF PROPOSED REVETMENT ARE TO BE REMOVED.

CURVE TABLE

ID	RADIUS	DELTA ANGLE	LENGTH	CHORD	CHORD BEARING
C1	21'	110° 57' 02"	40.67'	34.60'	S 38° 55' 17" W
C2	132'	24° 30' 03"	56.45'	56.02'	S 28° 48' 15" E
C3	200'	59° 57' 50"	209.31'	199.89'	S 11° 04' 22" E
C4	200'	16° 11' 22"	56.51'	56.32'	S 10° 48' 52" W
C5	450'	21° 14' 47"	166.87'	165.91'	S 07° 54' 13" E

LINE TABLE

ID	BEARING	LENGTH
L1	S18°54'33"W	169.31'
L2	S02°43'11"W	6.39'
L3	S18°31'36"E	29.67'
L4	S19°23'11"E	24.35'
L5	S66°27'56"E	20.47'

LEGEND:

- AREA OF SOFT ARMOR FILL WITH SALT MARSH VEGETATION PLANTINGS 0.631 AC (27,470 SF)
- AREA OF HARD ARMOR ROCK REVETMENT 0.155 AC (6,764 SF); 575 LINEAR FEET
- COQUINA ROCK BREAKWATERS 780 LINEAR FEET
- FB — TYPE II FLOATING TURBIDITY BARRIER
- SF — TYPE III SILT FENCE

SURFACE WATER IMPACTS:

LENGTH OF WORK IN EXISTING SURFACE WATERS = 805 LF

SQUARE FEET OF WORK IN EXISTING SURFACE WATERS = 26,956 SF (0.619 AC)

40' 0' 40' 80' 120'

GRAPHIC SCALE 1" = 40'

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

DESIGNED BY: D. LAVENDER
DRAWN BY: D. LAVENDER
REVIEWED BY: J. KELLET
SUBMITTED BY: G. BEARD
DATE: 4/13/16
SKMT 15-1005
REQUEST NO. 0095
AS BUILT DATE ####

USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095

RAE|S OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
OVERALL SHORELINE PROTECTION PLAN

SHEET IDENTIFICATION
C-100

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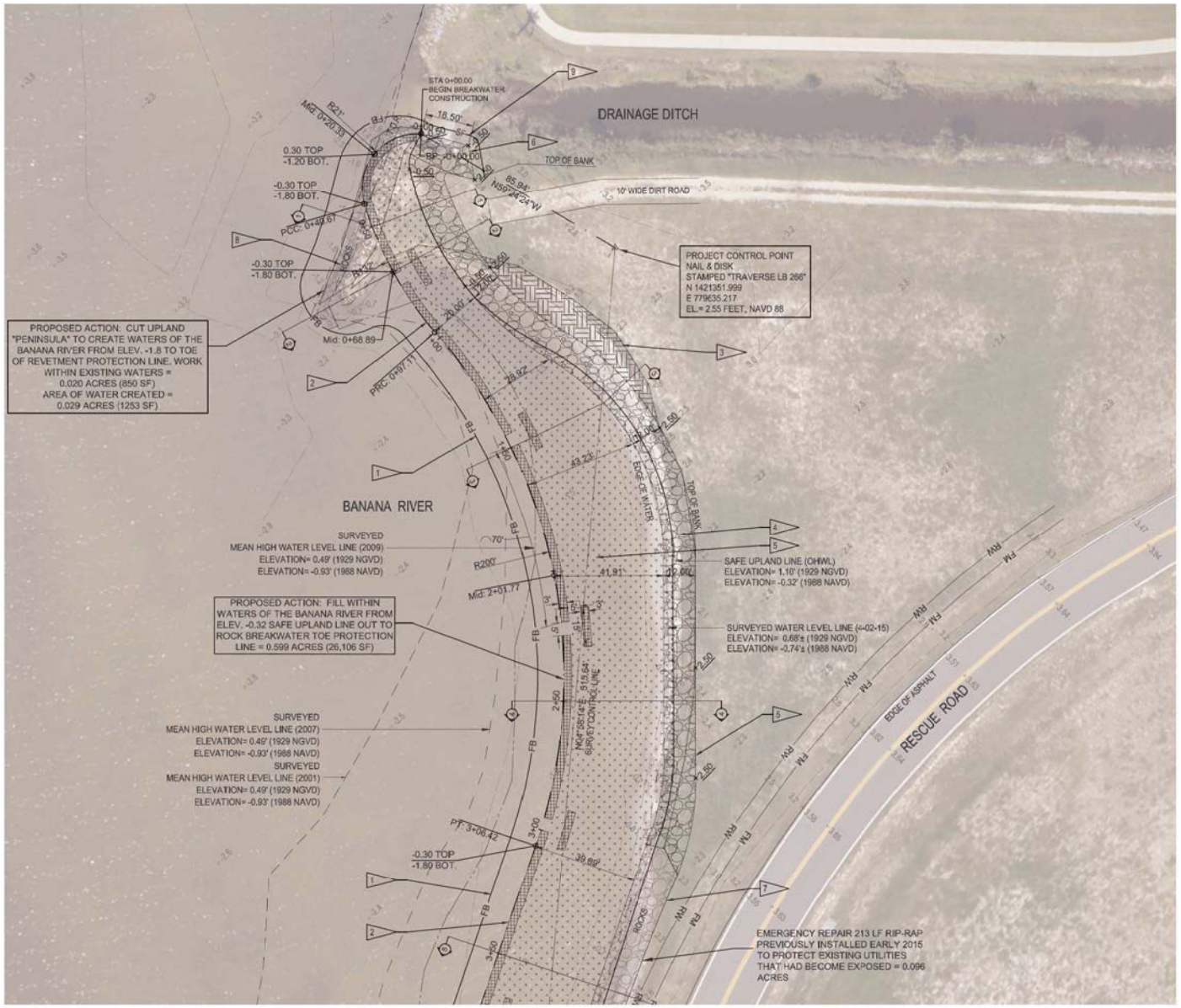


N

NORTH SECTION
SHORELINE PROTECTION PLAN
SCALE: 1" = 20'

CONSTRUCTION FLAG NOTES:

1. INSTALL AND MAINTAIN THROUGHOUT CONSTRUCTION TYPE II FLOATING TURBIDITY BARRIER. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH PERMIT CONDITIONS OF WORK IN WATERS OF THE STATE. REMOVE UPON PROJECT STABILIZATION COMPLETION.
2. 3' WIDE COQUINA ROCK BREAK WATER PLACED ON TOP OF WOVEN GEOTEXTILE FABRIC AS DETAILED ON SHEET C-501.
3. CLEAN FILL FROM ELEVATION 2.5' OF TOP OF ROCK DOWN TO EXISTING TOP OF BANK ELEVATION VARIES FROM 1.9' TO 2.5'.
4. CONCRETE RUBBLE RIP-RAP REVETMENT OVER FILTER FABRIC, SEE DETAIL ON SHEET C-501.
5. CLEAN SAND FILL FROM COQUINA BREAKWATER EASTERN TOE AT 1:14 FILL SLOPE TO MEET RIP-RAP REVETMENT. PLANT SALT MARSH VEGETATION AS DETAILED ON SHEET C-501.
6. TURN RIP-RAP REVETMENT BACK IN TOWARD SHORE TO ANCHOR.
7. EXISTING RIP-RAP REVETMENT TO REMAIN, REMOVE 5' OF ROCK FROM EITHER END TO EXPOSE EXISTING FILTER FABRIC AND LAP SPLICE EXTENSION OF FILTER FABRIC TO CONTINUE RIP-RAP IN BOTH DIRECTIONS, REPLACE ROCK.
8. REMOVE EXISTING RUBBLE REVETMENT PENINSULA SOUTH OF DRAINAGE DITCH. EXCAVATE GRADE TO ELEVATION -1.2 UP TO PROPOSED LOCATION OF BREAKWATER.
9. INSTALL SILT FENCE PRIOR TO START OF WORK.

LEGEND:

- AREA OF SOFT ARMOR FILL WITH SALT MARSH VEGETATION PLANTINGS 0.631 AC (27,470 SF)
- AREA OF HARD ARMOR ROCK REVETMENT 0.155 AC (6,764 SF); 575 LINEAR FEET
- COQUINA ROCK BREAKWATERS 780 LINEAR FEET
- FB — TYPE II FLOATING TURBIDITY BARRIER
- SF — TYPE III SILT FENCE

20' 0' 20' 40' 60'

GRAPHIC SCALE 1" = 20'

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL

CONTRACT NO.: FA2521-13-D-0005 - 0095

RAEIS OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

DESIGNED BY: D. LAVENDER | DRAWN BY: D. LAVENDER | REVIEWED BY: J. KELLET | SUBMITTED BY: G. BEARD | DATE: 4/13/16 | SKMT 15-1005 | REQUIREMENT NO. 0095 | AS BUILT DATE ####

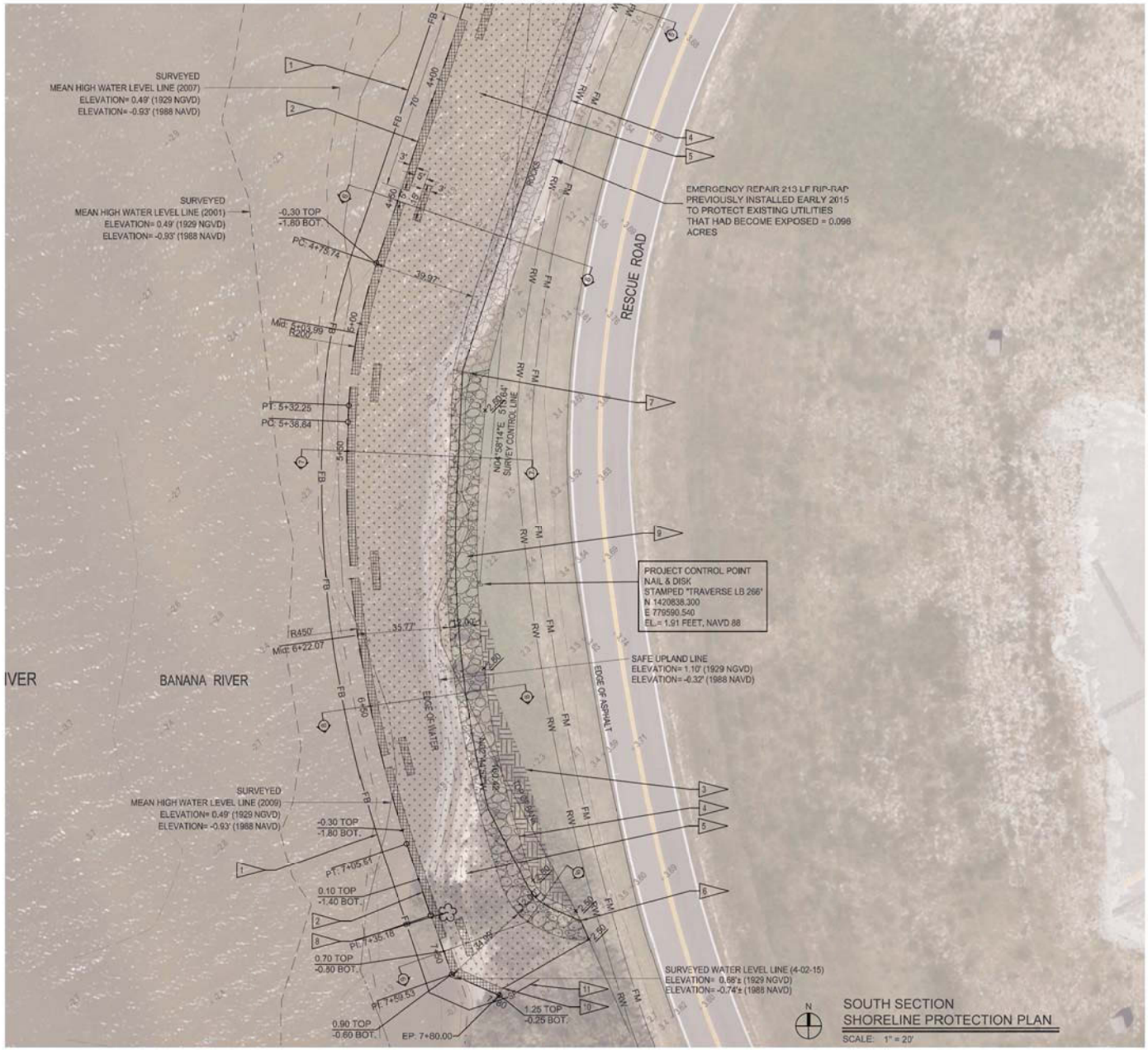
DBEH 15-1005

REPAIR RIVER SHORELINE, RUNWAY 11

NORTH SECTION SHORELINE PROTECTION PLAN

SHEET IDENTIFICATION

C-101



CONSTRUCTION FLAG NOTES:

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5. CLEAN SAND FILL FROM COQUINA BREAKWATER EASTERN TOE AT 1:14 FILL SLOPE TO MEET RIP-RAP REVETMENT. PLANT SALT MARSH VEGETATION AS DETAILED ON SHEET C-501.
6. TURN RIP-RAP REVETMENT BACK IN TOWARD SHORE SLOPING UP TO ANCHOR.
7. EXISTING RIP-RAP REVETMENT TO REMAIN, REMOVE 5' OF ROCK FROM EITHER END TO EXPOSE EXISTING FILTER FABRIC AND LAP SPLICE EXTENSION OF FILTER FABRIC TO CONTINUE RIP-RAP IN BOTH DIRECTIONS, REPLACE ROCK.
8. EXISTING MANGROVE TO REMAIN, ADJUST COQUINA BREAKWATER AS NEEDED.
9. SMALL MANGROVE CLUSTERS WITHIN LIMITS OF PROPOSED REVETMENT ARE TO BE REMOVED.
10. SLOPE COQUINA ROCK BREAKWATER UP STARTING AT STA. 7+00 AND ANGLE THE END SECTION TOWARD THE SHORELINE WITH THE ROCKS PARTIALLY BURIED TO MEET EXISTING CONTOURS.
11. INSTALL SILT FENCE PRIOR TO STARTING WORK.

LEGEND:

- AREA OF SOFT ARMOR FILL WITH SALT MARSH VEGETATION PLANTINGS 0.631 AC (27,470 SF)
- AREA OF HARD ARMOR ROCK REVETMENT 0.155 AC (6,764 SF); 575 LINEAR FEET
- COQUINA ROCK BREAKWATERS 780 LINEAR FEET
- FB — TYPE II FLOATING TURBIDITY BARRIER
- SF — TYPE III SILT FENCE

20' 0' 20' 40' 60'

GRAPHIC SCALE 1" = 20'

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

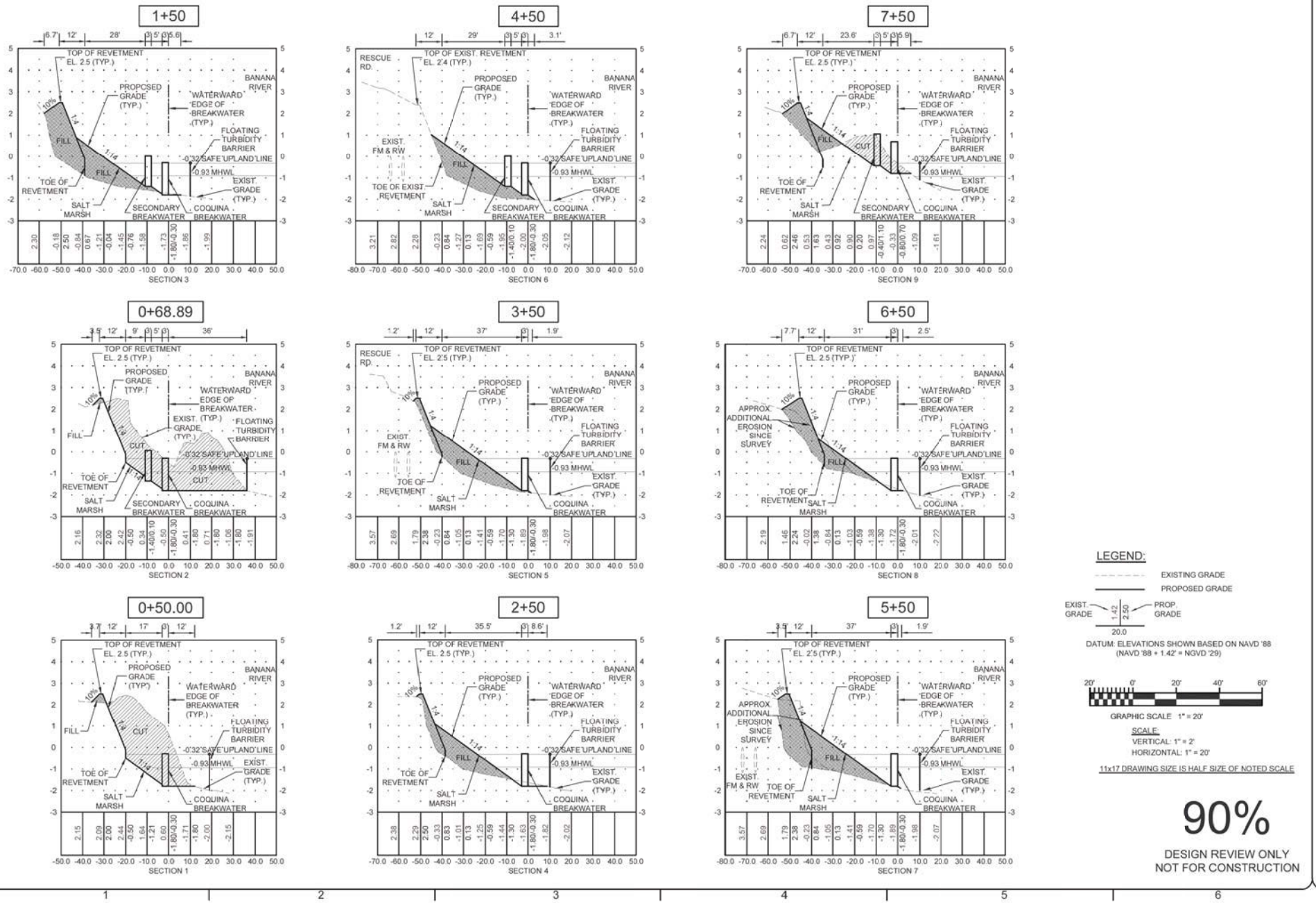
DESIGNED BY: D. LAVENDER
DRAWN BY: D. LAVENDER
REVIEWED BY: J. KELLET
SUBMITTED BY: G. BEARD
DATE: 4/13/16
SKMT 15-1005
RECURRING PROJECT NUMBER 0095
AS BUILT DATE ####

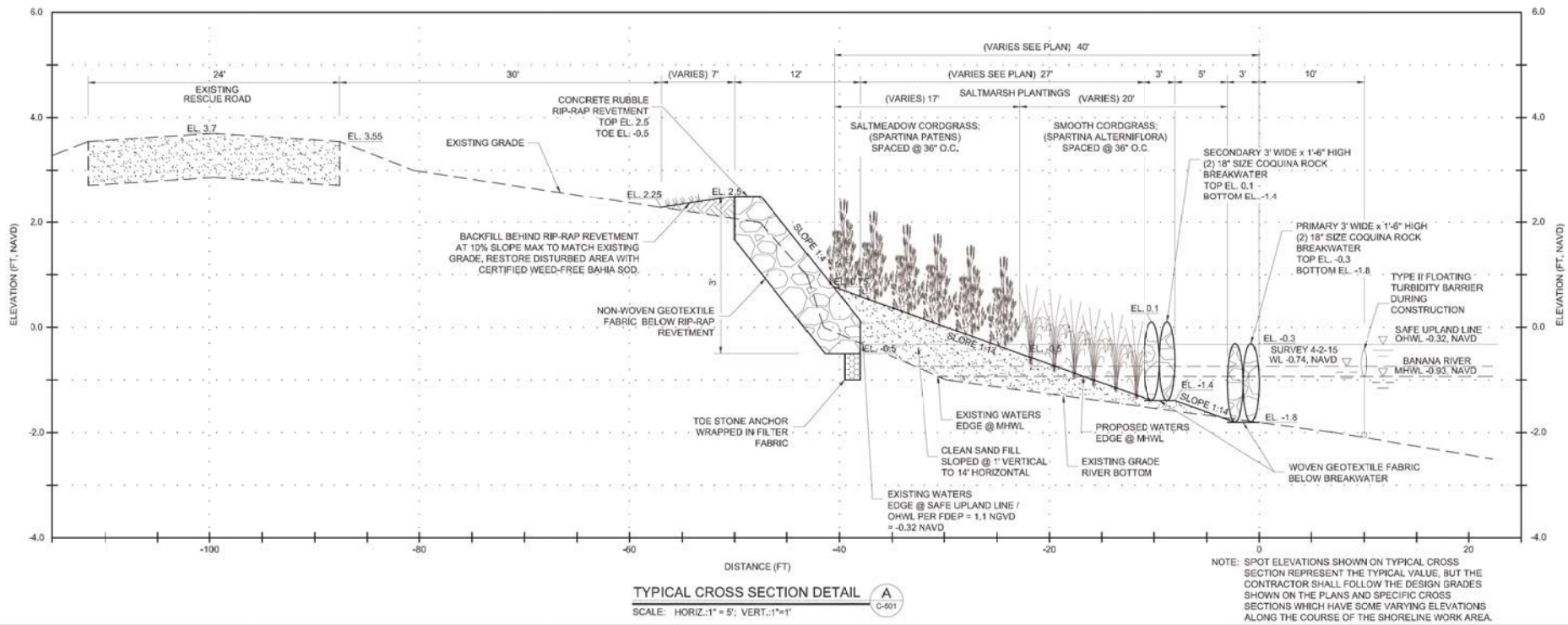
USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095

RAEIS OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
SOUTH SECTION
SHORELINE PROTECTION PLAN

SHEET IDENTIFICATION
C-102

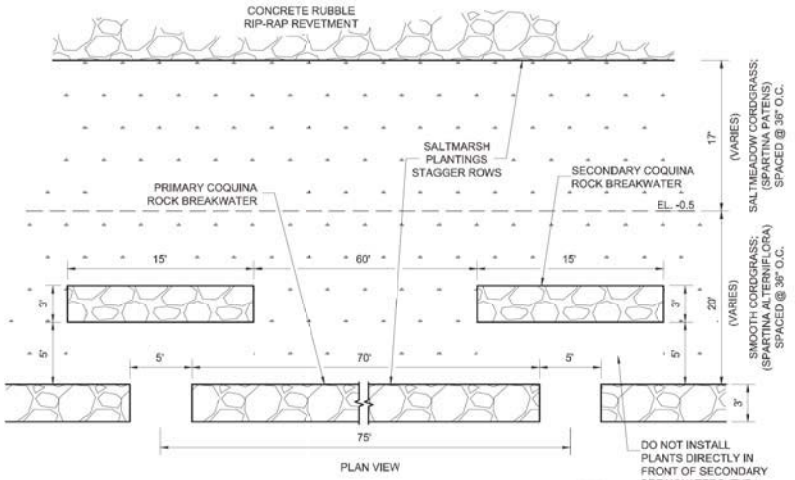

1+50
SECTION 3
4+50
SECTION 6
7+50
SECTION 9
0+68.89
SECTION 2
3+50
SECTION 5
6+50
SECTION 8
0+50.00
SECTION 1
2+50
SECTION 4
5+50
SECTION 7
TOP OF REVETMENT EL. 2.5 (TYP.)
TOP OF EXIST. REVETMENT EL. 2.4 (TYP.)
TOP OF REVETMENT EL. 2.5 (TYP.)
TOP OF REVETMENT EL. 2.5 (TYP.)
PROPOSED GRADE (TYP.)
WATERWARD EDGE OF BREAKWATER (TYP.)
BANANA RIVER
FLOATING TURBIDITY BARRIER
-0.32 SAFE UPLAND LINE
-0.93 MHWL
EXIST. GRADE (TYP.)
FILL
CUT
TOE OF REVETMENT
SALT MARSH
SECONDARY BREAKWATER
COQUINA BREAKWATER
RESCUE RD.
EXIST. FM & RW
APPROX. ADDITIONAL EROSION SINCE SURVEY
EXIST. GRADE (TYP.)
PROP. GRADE
LEGEND:
EXISTING GRADE
PROPOSED GRADE
1.42
2.50
20.0
DATUM: ELEVATIONS SHOWN BASED ON NAVD '88
(NAVD '88 + 1.42' = NGVD '29)
GRAPHIC SCALE 1" = 20'
SCALE:
VERTICAL: 1" = 2'
HORIZONTAL: 1" = 20'
11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE
90%
DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION
USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095
RAEIS
OTIE
GP STRATEGIES
AMRC
ALLEN Engineering Inc.
DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
CROSS SECTIONS
SHEET IDENTIFICATION
C-301



TYPICAL CROSS SECTION DETAIL A C-501

SCALE: HORIZ.:1" = 5'; VERT.:1"=1'

NOTE: SPOT ELEVATIONS SHOWN ON TYPICAL CROSS SECTION REPRESENT THE TYPICAL VALUE, BUT THE CONTRACTOR SHALL FOLLOW THE DESIGN GRADES SHOWN ON THE PLANS AND SPECIFIC CROSS SECTIONS WHICH HAVE SOME VARYING ELEVATIONS ALONG THE COURSE OF THE SHORELINE WORK AREA.



TYPICAL BREAKWATER & PLANTING LAYOUT DETAIL B C-501

SCALE: N.T.S.

LEGEND:

- AREA OF SOFT ARMOR FILL WITH SALT MARSH VEGETATION PLANTINGS
- HARD ARMOR RIP-RAP REVETMENT OR COQUINA ROCK BREAKWATERS
- CLEAN SAND FILL, 1:14 SLOPE
- TOE ANCHOR STONE WITH GEOTEXTILE FABRIC
- AREA OF SUITABLE BACKFILL WITH BAHIA SOD

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
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USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL

CONTRACT NO.: FA2521-13-D-0005 - 0095

RAEIS OTIE GP STRATEGIES AMRC ALLEN Engineering Inc.

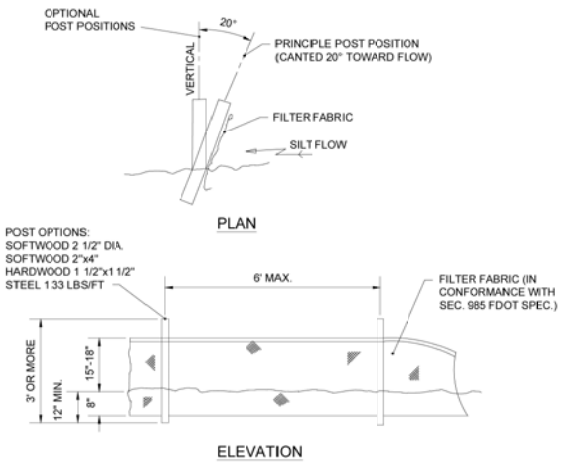
DBEH 15-1005

REPAIR RIVER SHORELINE, RUNWAY 11

TYPICAL CROSS SECTION DETAIL

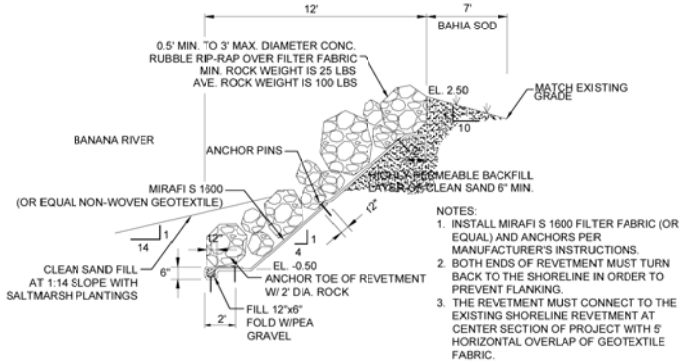
SHEET IDENTIFICATION

C-501



SILT FENCE DETAIL 1 C-502

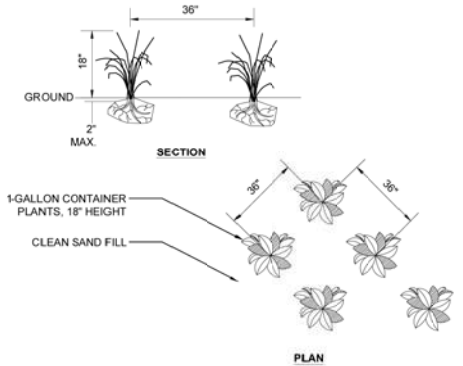
SCALE: NONE



NOTES:
1. INSTALL MIRAFI S 1600 FILTER FABRIC (OR EQUAL) AND ANCHORS PER MANUFACTURER'S INSTRUCTIONS.
2. BOTH ENDS OF REVETMENT MUST TURN BACK TO THE SHORELINE IN ORDER TO PREVENT FLANKING.
3. THE REVETMENT MUST CONNECT TO THE EXISTING SHORELINE REVETMENT AT CENTER SECTION OF PROJECT WITH 5' HORIZONTAL OVERLAP OF GEOTEXTILE FABRIC.

SHORELINE RIP-RAP REVETMENT DETAIL 2 C-502

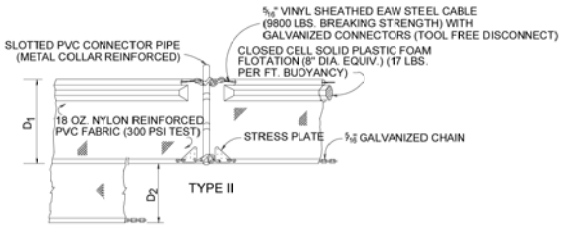
SCALE: NONE



NOTES:
1. SEE TYPICAL SECTION FOR PLANT SPECIES AND ZONES FOR SPECIFIC SPECIES.
2. THE PLANTING HOLE SHALL BE THE SAME SIZE OR ONLY SLIGHTLY LARGER THAN THE ROOTBALL AND DEEP ENOUGH THAT THE TOP OF ROOTBALL IS FLUSH OR SLIGHTLY BELOW GROUND, BUT NOT MORE THAN 2" BELOW GROUND.
3. SETTLE SOIL TIGHTLY AROUND ROOT BALL OF EACH PLANT TO PREVENT WOBBLING. PLANTS SHALL REMAIN UPRIGHT AFTER PLANTING.

SALTMARSH PLANTING DETAIL 3 C-502

SCALE: NONE

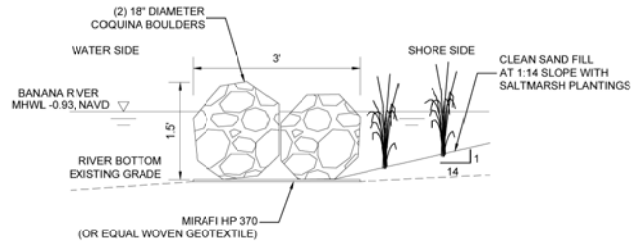


D_1 = 5' STD. (SINGLE PANEL FOR DEPTHS 5' OR LESS).
D_2 = 5' STD. (ADDITIONAL PANEL FOR DEPTHS > 5').
CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET.
TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN
10 FEET UNLESS SPECIAL DEPTH CURTAINS SPECIFICALLY CALLED
FOR IN THE PLANS OR AS DETERMINED BY THE ENGINEER.

NOTE: COMPONENTS OF TYPE II MAY BE SIMILAR OR IDENTICAL TO PROPRIETARY DESIGNS. ANY INFRINGEMENT ON THE PROPRIETARY RIGHTS OF THE DESIGNER SHALL BE THE SOLE RESPONSIBILITY OF THE USER. SUBSTITUTIONS FOR TYPE II SHALL BE AS APPROVED BY THE ENGINEER.

FLOATING TURBIDITY BARRIER 4 C-502

SCALE: NONE



COQUINA ROCK BREAKWATER DETAIL 5 C-502

SCALE: NONE

11x17 DRAWING SIZE IS HALF SIZE OF NOTED SCALE

90%

DESIGN REVIEW ONLY
NOT FOR CONSTRUCTION

DEPARTMENT OF THE AIR FORCE

DESIGNED BY: D. LAVENDER
DRAWN BY: D. ARTZNER
REVIEWED BY: J. KELLEY
SUBMITTED BY: G. BEARD
DATE: 4/13/16
EXHIT 15-1005
PROJECT NO. FA2521-13-D-0005-0095
AS BUILT DATE: ####

USAF 45TH CIVIL ENGINEER SQUADRON PAFB, FL
CONTRACT NO.: FA2521-13-D-0005 - 0095

RAEIS OTIE GP STRATEGIES AMRC ALLEN Engineering, Inc.

DBEH 15-1005
REPAIR RIVER SHORELINE, RUNWAY 11
MISCELLANEOUS DETAILS

SHEET IDENTIFICATION
C-502

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APPENDIX C

AIR QUALITY CALUCALTIONS

Appendix C

Appendix C contains data supporting the air quality analysis provided in Section 4.1, *Air Quality* of the Environmental Assessment. Calculations have been prepared to estimate construction-related emissions, including fugitive dust and combustion emissions, associated with the proposed fill at Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21.

Fugitive Dust Emissions

Construction at the Recue Road and Runway 11 site would disturb approximately 1.32 acres and construction at the glide slope west of Runway 03/21 would disturb approximately 1.50 acres. To estimate fugitive dust emissions a standard USEPA (2005) general construction activities emission factor was multiplied by the disturbed acreage to calculate PM2.5 and PM10 emissions.

Disturbed Acreage x PM_{10} Emission Factor

Combustion Emissions

Combustion emissions were calculated by multiplying the total hours of construction activities per year by a standard conservative emission factor (South Coast Air Quality Management District 2007) for each criteria pollutant. Given that construction has not been planned at this time 6 months of construction has been assumed (10 hours per day, 5 days per week, 4 weeks per month). Criteria pollutants were also calculated for construction worker commutes by multiplying an emission factor for each criteria pollutant by the total mileage, assuming 6 months of construction.

Hours of Construction x Criteria Pollutant Emission Factor

Fugitive Dust Emissions For Demolition and New Construction (2006 USEPA Standards)

FY	Action	Square Footage	Acreage	Total Disturbed Acreage	PM_{10} Emissions Factor*	PM_{10} Emissions per Month	PM_{10} Emissions per Year	$PM_{2.5}$ Emissions per Year	Total Fugitive Dust Emissions (PM_{10} & $PM_{2.5}$)	Emissions after Implementation of BMPs
2017	Rescue Road and Runway 11	38,419	0.882	1.32	0.19	0.3	3.0	0.30	3.32	1.66
2017	Glide Slope West of Runway 03/01	6,534	0.150	0.23	0.19	0.0	0.5	0.05	0.56	0.28
Total		**44,953**	**1.032**	**1.5**			**3.5**	**0.4**	**3.9**	**1.9**

Source: MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1)*. Midwest Research Institue (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996; USEPA 2001. Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999. EPA 454/R-01-006. Office of Air Quality Planning and Standards, March 2001; USEPA 2006. Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants. Prepared for: Emissions Inventory and Analysis Group (C339-02), July 2006.

Notes: General Construction Activites Emission Factor = 0.19 ton PM10 per acre-month; New Road Construction Emission Factor = 0.42 ton PM10 per acre-month; PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions (USEPA 2006); The USEPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas (USEPA 2006); Total disturbed area per year is calculated by multiplying the total surface area of proposed new construction demolition projects by 1.5, to account for site preparation, grading, and staging activites; The total disturbed area for providing secondary installation accesswas calculated by multiplying the 6,864 linear feet, by the appoximate width of the proposed road, 65 feet, to calculate a square footage.

Annual Fugitive Dust Emissions (2006 USEPA Standards)

FY	Total Disturbed Acreage (per year)	Potential Dust Generated (tpy)	Potential Dust Generated per Year with BMPs (tpy)
2017	1.55	3.88	1.94

Note: Actual annual emissions may exceed or be lower than the annual average presented.

Construction Equipment Emissions			Emission Factors (lb/hr)					Emissions (tons/year)				
Year	**Equipment**	**Hours**	**CO**	**NO_x**	**PM**	**SO_x**	**VOC**	**CO**	**NO_x**	**PM**	**SO_x**	**VOC**
2017	Off-Highway Truck	1200	0.6361	1.8543	0.0644	0.0027	0.2141	0.382	1.113	0.039	0.002	0.128
	Grader	1200	0.6053	1.1663	0.0593	0.0015	0.1446	0.363	0.700	0.036	0.001	0.087
	Trencher	1200	0.4675	0.6684	0.0549	0.0007	0.1427	0.281	0.401	0.033	0.000	0.086
	Loader	1200	0.4763	0.9346	0.0508	0.0012	0.1195	0.286	0.561	0.030	0.001	0.072
	Roller	1200	0.4060	0.6546	0.0453	0.0008	0.0973	0.244	0.393	0.027	0.000	0.058
	Paving Equipment	1200	0.4316	0.7709	0.0536	0.0008	0.1142	0.259	0.463	0.032	0.000	0.069
							Total	**1.814**	**3.629**	**0.005**	**0.500**	**0.197**

Source: SCAQMD 2007. *2013 SCAB Fleet Average Emission Factors*. Available at: http://www.aqmd.gov/ceqa/handbook/offroad/offroad.html.
Notes: Assuming 6 months of operation per year, or 10 hours per day, 5 days per week, 4 weeks per month.

Construction Worker Commute Emissions			Emission Factors (lb/mi)					Emissions (tons/year)				
Year	**Activity**	**Mileage**	**CO**	**NO_x**	**PM**	**SO_x**	**VOC**	**CO**	**NO_x**	**PM**	**SO_x**	**VOC**
2017	Construction Worker Commute (per employee)	48,000	0.0071	0.0007	0.0001	0.0000	0.0007	0.170	0.017	0.018	0.002	0.000
							Total	**1.984**	**3.647**	**0.007**	**0.500**	**0.215**

Source: SCAQMD 2007. *2013 Emission Factors for On-Road Passenger Vehicles & Delivery Trucks*. Available at: http://www.aqmd.gov/ceqa/handbook/onroad/onroad.html.
Notes: Assuming a 20-mile round trip per employee during the 6-month construction period, or 5 days per week, 4 weeks per month.

APPENDIX D

COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY DETERMINATION

FEDERAL AGENCY COASTAL ZONE MANAGEMENT ACT (CZMA) CONSISTENCY DETERMINATION

Introduction

This document provides the State of Florida with the U.S. Air Force's (USAF's) Consistency Determination under Coastal Zone Management Act (CZMA) Section 307, 15 Code of Federal Regulations (CFR) Part 930 Sub-part C, Chapter 380 Florida Statutes, Part II, Coastal Planning and Management. The Florida Department of Environmental Protection (FDEP) is designated as the lead agency for the Florida Coastal Management Plan (FCMP) pursuant to the CZMA.

Federal consistency is the requirement that Federal actions that affect any land or water use or natural resource of a state's coastal zone must be consistent with the enforceable policies of the state. The FCMP Federal consistency process consists of a network of 24 Florida Statutes (i.e., enforceable policies) administered by FDEP and a group of partner agencies responsible for implementing the statutes. Consistency is based on effects rather than geographic boundaries; consequently, there are no categorical exclusions from the consistency requirement. Any Federal activity or federally-funded activity that would have an effect on a state's coastal zone is subject to a consistency review, unless specifically exempted by Federal law. Effects are determined by assessing reasonably foreseeable direct and indirect effects on any coastal use or resource.

This Federal consistency determination addresses the proposed shoreline stabilization measures along Patrick Air Force Base's (AFB's) western boundary with the Banana River, which would include the construction of a proposed revetment and Coquina rock breakwaters adjacent to Rescue Road and Runway 11 as well as the deposition of clean sand fill adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21.

Proposed Federal Agency Action:

The Banana River is part of the Indian River Lagoon System and extends from Eau Gallie Causeway at the southern end where it intercepts the Indian River and terminates approximately 17 nautical miles (NM) to the north within the Merritt Island National Wildlife Refuge (NWR) and Kennedy Space Center (KSC) properties. Over the past 20 years, certain areas of the Banana River shoreline along Patrick AFB have eroded dramatically, including more than 100 feet of shoreline loss in the vicinity of Rescue Road and Runway 11 in the last 5 years. The subject erosion west of Rescue Road and Runway 11 has exposed a sewer main and water reuse line, requiring emergency repairs that were temporarily permitted by St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE). Additionally, erosion along the glide slope west of Runway 03/21 has exposed the existing gabion baskets in this location and threatens the continued functionality of the Instrument Landing System (ILS) at Patrick AFB. The purpose of the Proposed Action is 1) to stabilize the shoreline and protect the exposed sewer and water lines fronting Rescue Road and Runway 11; and 2) to re-establish the shoreline along the glide slope west of Runway 03/21, approximately 1.25 miles south of Rescue Road site. Implementation of the Proposed Action would result in establishment of a long-term solution to the erosion issues in these areas.

Rescue Road and Runway 11

The Preferred Alternative at this location would be to stabilize the shoreline west of Rescue Road by armoring and extending the existing shoreline waterward by approximately 40 feet (i.e., still inland of the extent that it reached during 2009). The conceptual design includes the construction of a concrete rubble rip-rap revetment, extending approximately 788 linear feet from the drainage ditch to the existing mangrove vegetation to the south. The proposed revetment would incorporate the existing 213 linear foot emergency revetment, which would remain in place, and would be constructed from an elevation of approximately 2.5 feet above the Ordinary High Water Mark (OHWM) to -0.5 feet OHMW at a slope of 1:4, covering a total footprint of approximately 0.251 acres. The material used for the construction of the revetment would be free of rebar and all other foreign constituents. The size of the boulders or rubble would be similar to those used for the emergency repair action, with most averaging approximately 100 pounds and none larger than 500 pounds. The rip-rap would be curved back and trenched into the upland bank of the restored shoreline at each end and along the entire toe. Woven geotextile filter cloth would be placed on the bank with the bottom and sides of the cloth trenched in along the entire length of the fill area. The landward area behind the proposed revetment would be backfilled as necessary to match the existing grade and planted with weed-free Bahia sod. Clean sand fill from local sources (e.g., the Patrick AFB golf course) would be placed in front of the revetment from an elevation of approximately 0.75 feet OHWM to approximately -1.8 feet OHWM at a 1:14 slope. The fill would cover a total footprint of approximately 0.631 acres (requiring approximately 1,017 cubic yards of clean fill). In order to provide long-term stabilization of the shoreline and restoration of wetland habitat, the fill would be planted with saltmeadow cordgrass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*) and armored by Coquina rock breakwaters fronting the entire length of the revetment. The breakwaters would include two rows of 18-inch dimeter boulders forming an alternating 3-foot wide breakwater above woven geotextile fabric. The primary (i.e., waterward) breakwater would extend a length of 70 linear feet with 5-foot gaps, while the secondary breakwater would be set back approximately 5 feet inland, immediately behind these gaps and extending approximately 15 linear feet.

Glide Slope West of Runway 03/21

The Preferred Alternative at this location would add clean sand fill to the glide slope west of Runway 03/21 in order to cover and backfill the exposed gabion baskets in this area, which would remain in place. Similar to the Rescue Road and Runway 11 site, this fill area may be planted with salt-tolerant native grasses; however, this area would not be armored by breakwater or any other proposed feature along the toe of the fill.

Federal Consistency Review

Statutes addressed as part of the FCMP consistency review and considered in the analysis of the Proposed Action are discussed in the following table.

Pursuant to 15 CFR § 930.41, the Florida State Clearinghouse has 60 days from receipt of this document in which 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 USAF does not receive its response on the 60th day from receipt of this determination.

Florida Coastal Management Program Consistency Review

Statute	Scope	Consistency
Chapter 161 *Beach and Shore Preservation*	This statute provides policies 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.	The Preferred Alternative would extend the base's western boundary with the Banana River to the 1.1 foot OHWM adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21. The implementation of the Preferred Alternative would provide a long-term solution to substantial shoreline loss in these areas, which threatens to expose utilities (including a water reuse line and sewer line waterward of Rescue Road) as well as affect the functionality of the airfield at Patrick AFB. Implementation of the Preferred Alternative would avoid potentially substantial long-term impacts to water quality that could occur under the No-Action Alternative (e.g., release of contaminates from exposed sewer pipeline). The 45th Space Wing (45 SW) has coordinated with FDEP and SJRWMD regarding the proposed design and area of fill in order to minimize physical impacts to the Banana River. The 45 SW would obtain all appropriate permits prior to the initiation of construction associated with the Preferred Alternative, and would adhere to all permit conditions, as necessary. Consequently, the Preferred Alternative would be consistent with all polices provided in Chapter 161.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	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.	The Preferred Alternative would be consistent would local, regional, and state comprehensive plans. Additionally, the Preferred Alternative would not conflict with any USAF planning guidelines or the Patrick AFB General Plan.
Chapter 186 *State and Regional Planning*	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.	The Preferred Alternative, including all standard Best Management Practices (BMPs), would have no significant impacts on air quality, energy, urban and downtown revitalization, and transportation and would be consistent with the State Comprehensive Plan as adopted under Florida Statute Title 8 Planning and Development Section 187.101.

Statute	Scope	Consistency
Chapter 252 *Emergency Management*	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.	The Preferred Alternative would not affect the state's vulnerability to natural disasters. Further, the Preferred Alternative would not affect emergency response and evacuation procedures.
Chapter 253 *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.	Implementation of the Preferred Alternative would neither impact the state's administration of public lands nor the property of the state. The original shoreline stabilization designs included waterward extension of the existing shoreline by 100 feet or more to the 2009 mean high tide line (MHTL). However, based on communication and coordination with FDEP it was determined that an easement as well as a legal description would be required to describe the affected areas waterward of the 1.1 foot OHWM in this area. Consequently, the 45th Space Wing (45 SW) elected to use 1.1 feet OHWM as the landward extent of the described lands, from the waterward face of the breakwater to the natural shore, which FDEP confirmed would be sufficient for proceeding through the permitting/state land authorization process with the SJRWMD as the lead.
Chapter 258 *State Parks and Preserves*	Addresses administration and management of state parks and preserves.	Implementation of the Preferred Alternative would not require any activities within Florida state parks, however, the construction of a proposed revetment and Coquina rock breakwaters as well as the deposition of clean sand fill would occur within the Banana River Aquatic Preserve. However, the 45 SW has coordinated with the FDEP and SJRWMD regarding the proposed design and area of fill in order to minimize physical impacts to the Banana River. The implementation of the Preferred Alternative would avoid impacts to mangroves, as well as other wetland trees and vegetation to the maximum extent feasible. Further, all proposed clean sand fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass and smooth cordgrass that would off-set potential impacts to aquatic vegetation and wetland habitats. The 45 SW would obtain all appropriate permits prior to the initiation of construction associated with the Preferred Alternative, and would adhere to all permit conditions, as necessary. Further, implementation of the Preferred Alternative would avoid potentially substantial long-term impacts to water quality that could occur under the No-Action Alternative (e.g., release of contaminates from exposed sewer pipeline). Consequently, the Preferred Alternative would be consistent with all polices provided in Chapter 258.
Chapter 259 *Land Acquisition for Conservation or*	Authorizes acquisition of environmentally endangered lands and outdoor recreation	The implementation of the Preferred Alternative would not affect tourism and/or outdoor recreation along the Banana River. Following short-term temporary

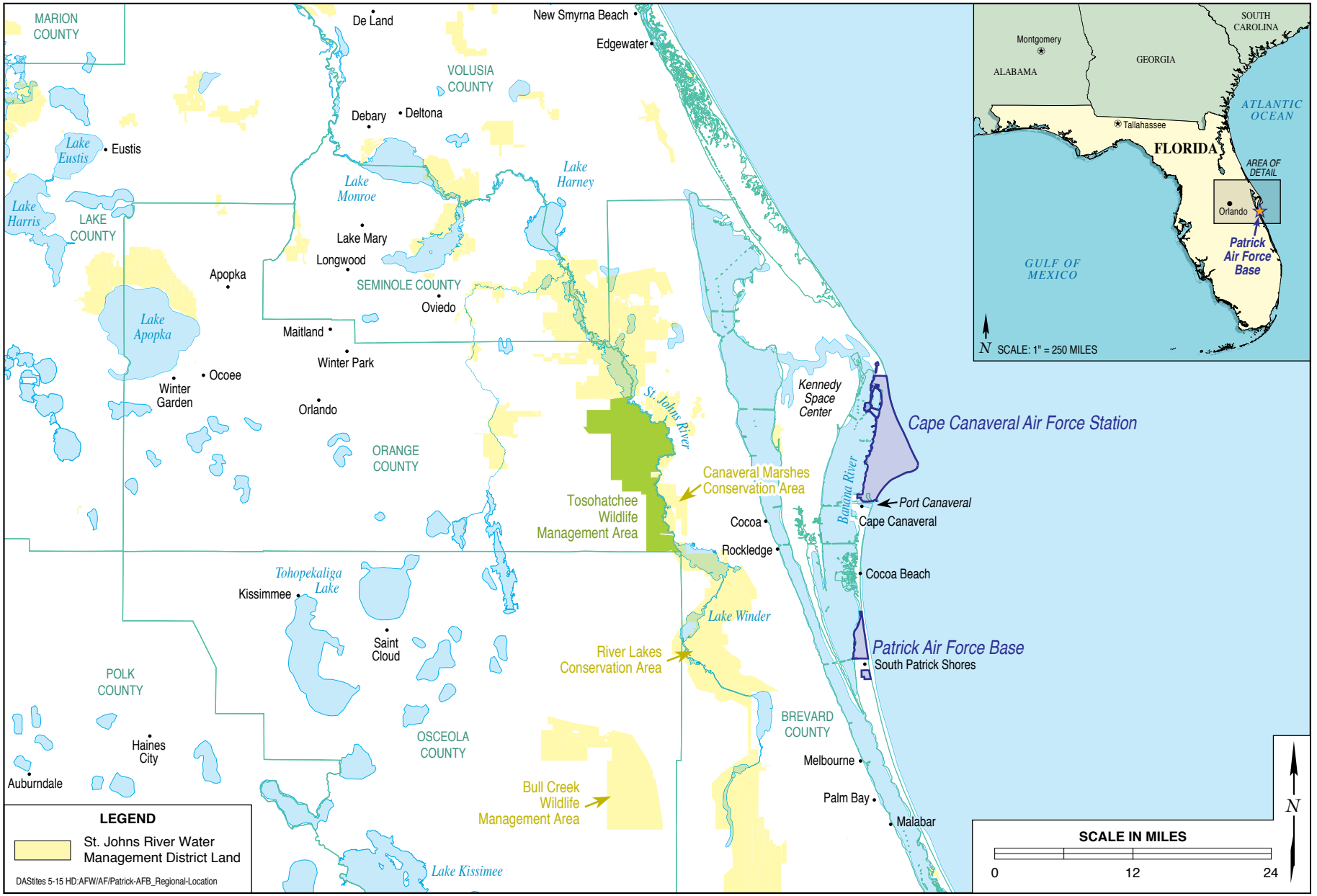
Statute	Scope	Consistency
Recreation	lands.	construction activities, there would be no long-term impacts to the Banana River.
Chapter 260 *Florida Greenways and Trails Act*	Established in order to conserve, develop, and use the natural resources of Florida for healthful and recreational purposes.	The Preferred Alternative would not affect Florida's Greenways or Trails Programs.
Chapter 267 *Historical Resources*	Addresses management and preservation of the state's archaeological and historical resources.	There are no known historic structures or archaeological resources located in the vicinity of Rescue Road and Runway 11 or the glide slope west of Runway 03/21. The Florida State historic Preservation Office (SHPO) reviewed the Proposed Action for possible effects on historic proprieties listed, or eligible for listing on the NRHP and concurred with the determination that the Proposed Action would have no effect. However, in the event that buried human remains or historic artifacts are uncovered during construction, all activities would be suspended until a qualified archaeologist could recover and determine the significance of the resource(s), in compliance with Section 106 of the National Historic Preservation Act (NHPA). Therefore, the Preferred Alternative would be consistent with Florida's statutes and regulations regarding the state's archaeological and historical resources.
Chapter 288 *Commercial Development and Capital Improvements*	Promotes and develops general business, trade, and tourism components of the state economy	The Preferred Alternative would occur on Federal property and would not directly or indirectly affect future business opportunities on state lands, or the promotion of tourism in the region.
Chapter 334 *Transportation Administration*	Addresses the state's policy concerning transportation administration.	Implementation of the Preferred Alternative would not affect transportation.
Chapter 339 *Transportation Finance and Planning*	Addresses the finance and planning needs of the state's transportation system.	The implementation of the Preferred Alternative would not affect the finance and planning needs of the state's transportation system.
Chapter 373 *Water Resources*	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.	Implementation of the Preferred Alternative would result in ground disturbance and construction activities that could potentially have temporary effects on water quality within the Banana River. For example, the proposed shoreline stabilization activities, including the deposition of clean sand fill within localized areas along the western boundaries of Patrick AFB would generate turbidity in the Banana River. In order to reduce the severity of these impacts, turbidity blankets and coir logs would be installed in the affected areas to control turbidity and minimize wave break in the work area. In addition to potential increases in turbidity, implementation of

Statute	Scope	Consistency
		shoreline stabilization activities under the Preferred Alternative would result in a short-term increase in hazardous materials associated with heavy construction vehicles (e.g., fuel and other Petroleum, Oils, and Lubricants [POLs]). The presence of heavy equipment along the shoreline of the Banana River could result in the increased potential for accidental release and associated contamination of the Banana River. However, all standard BMPs would be implemented during construction, including regular inspection of construction equipment for leaks. Any potential minor spills or releases would be handled according to procedures outlines in the base's Spill Prevention and Emergency Response Plan. Implementation of the Preferred Alternative would not result in the development of additional paved surfaces that could result in measurable long-term impacts to groundwater percolation. Further, activities included in the Preferred Alternative would not result in the potential for impacts to groundwater quality. According to the Federal Emergency Management Agency (FEMA) Federal Insurance Rate Map (FIRM) for Patrick AFB, construction activities adjacent to Rescue Road and Runway 11 as well as along the glide slope west of Runway 03/21 would occur within the 100-year floodplain. Shoreline stabilization measures would introduce clean sand fill to these areas, extending the existing shoreline waterward. However, the extension of the shoreline would not exceed the 2007 MHTL and for most of its length, would not exceed the 2009 MHTL. Additionally, implementation of the Preferred Alternative would be intended to protect existing landward facilities (e.g., utilities, roadways, airfield, etc.) and would not introduce any new habitable structures or obstructions that would impede or divert overland floodwater flow or alter the existing hydrologic regime at Patrick AFB such that downstream flood hazards would be increased or newly created. Therefore, the Preferred Alternative would result in less than significant impacts to floodplain management. The 45 SW would obtain all appropriate permits prior to the initiation of construction activities and would comply with all permit conditions as necessary. Consequently, the Preferred Alternative would be consistent with Florida's statutes and regulations regarding the water resources of the state.
Chapter 375 *Outdoor Recreation and Conservation Lands*	Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describe current	The implementation of the Preferred Alternative would not affect opportunities for recreation on state lands.

Statute	Scope	Consistency
	recreational opportunities, estimate need for additional recreational opportunities, and propose means to meet the identified needs.	
Chapter 376 *Pollutant Discharge Prevention and Removal*	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.	Construction activities associated with the Preferred Alternative may require the use of hazardous materials, and hazardous waste may be generated. However, the Preferred Alternative would not substantially increase operational hazardous material or hazardous waste. Implementation of the Preferred Alternative would include proper handling, use and disposal of hazardous materials and waste and would be compliant within all appropriate tracking and reporting requirements. Consequently, the implementation of the Preferred Alternative would not affect the transfer, storage, or transportation of pollutants.
Chapter 377 *Energy Resources*	Addresses regulation, planning, and development of oil and gas resources of the state.	The Preferred Alternative would not affect energy resource production, including oil and gas, and/or the transportation of oil and gas.
Chapter 379 *Fish and Wildlife Conservation*	Addresses the management and protection of the state of Florida's wide diversity of fish and wildlife resources.	Pursuant to the National Environmental Policy Act (NEPA) Sec. 2, 102(H), avoidance and minimization of potential impacts to federally and state-protected species have been considered for the Preferred Alternative. A biological survey of the area adjacent to Rescue Road and Runway 11 has been conducted by the 45 SW to describe the existing conditions in this location. Two small groups of mangroves (approximately 20 in total) and up to six buttonwoods would need to be removed during the shoreline revetment and fill work at Rescue Road and Runway 11. However, other large mangroves and wetland trees (i.e., buttonwood) would be avoided within the southern end of the project where the shoreline stabilization work would be anchored behind the vegetated beach with clean sand fill around the trees, and breakwaters in front of the mangroves and wetland trees. The deposition of clean sand fill along the shoreline could result in the potential burial of seagrass (*Halodule wrightii*) as well as other aquatic vegetation; however, the proposed fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass and smooth cordgrass that would be off-set potential impacts to aquatic vegetation and wetland habitats. The 45 SW would coordinate with USACE prior to the implementation of any construction-related activities associated with shoreline stabilization adjacent to Rescue Road and Runway 11 or along the glide slope west of Runway 03/21 and a Section 404 Individual Permit(s) would be obtained pursuant to the Clean Water Act

Statute	Scope	Consistency
		(CWA). These short-term temporary increases in ambient noise levels could cause aquatic and terrestrial wildlife to temporarily relocate to similar habitat types in the surrounding vicinity along the Banana River. However, both the terrestrial upland areas of Patrick AFB as well as the aquatic habitat within the Banana River are subject to existing noise associated with aircraft and boating traffic. Due to the limited size of the proposed fill footprints relative to the area of shoreline along the western boundary of Patrick AFB, the potential impacts related to infauna mortality and turbidity associated with the proposed fill would be minor. The 45 SW would perform a visual sweep of the area before the beginning of construction activities to ensure that the area is clear of sensitive species. Additionally, the 45 SW would adhere to FDEP Standard Manatee Conditions for In-water Work (2011) and Sea Turtle and Smalltooth Sawfish Construction Conditions (2006) to protect manatees and sea turtles from direction project impacts. Proposed fill under the implementation of the Preferred Alternative would bury less than 50 square feet of marginal seagrass beds, resulting in negligible impacts to Essential Fish Habitat (EFH) – Habitat Areas of Particular Concern (HAPC) within the Banana River. The 45 SW is coordinating with USFWS and NMFS regarding potential impacts to federally listed threatened and endangered species, federally designated critical habitat, and EFH. The outcome of informal consultation will be provided in Appendix A of the Environmental Assessment (EA).
Chapter 380 *Land and Water Management*	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.	Under the Preferred Alternative, development of state lands with regional (i.e., more than one county) impacts would not occur. No changes to coastal infrastructure such as capacity increases of existing coastal infrastructure, or use of state funds for infrastructure planning, designing or construction would occur.
Chapter 381 *Public Health, General Provisions*	Establishes public policy concerning the state's public health system.	The Preferred Alternative would not affect the state's policies concerning the public health system.
Chapter 388 *Mosquito Control*	Addresses mosquito control effort in the state.	The Preferred Alternative would not affect mosquito control efforts.
Chapter 403 *Environmental Control*	Establishes public policy concerning environmental control in the state.	The 45 SW would coordinate all applicable permits in accordance with the Florida Administrative Code (FAC). The implementation of the Preferred Alternative could result in potential short-term temporary impacts on affect surface water bodies, including the Banana River. However, standard BMPs would be implemented during

Statute	Scope	Consistency
		construction activities. For example, turbidity blankets and coir logs would be installed in the affected areas to control turbidity and minimize wave break in the work area. Additionally all proposed clean sand fill adjacent to Rescue Road and Runway 11 would be planted with saltmeadow cordgrass and smooth cordgrass that would off-set potential impacts to aquatic vegetation and wetland habitats. Air quality impacts during construction activities associated with the Preferred Alternative would be less than significant and the 45 SW would take all reasonable precautions to minimize fugitive particulate (i.e., dust) emissions during any construction activities in accordance with FAC 62-296. Total emissions would remain below *de minimis* levels and any adverse impacts to air quality under the Preferred Alternative would be less than significant. During construction activities there may be a minor increase in hazardous materials or hazardous waste generated; however, following the completion of construction activities there would be no long-term impacts or increases associated with hazardous materials or hazardous wastes. Consequently, the Preferred Alternative would not have significant impacts on water quality, air quality, pollution control, solid waste management, or other environmental control efforts.
Chapter 582 *Soil and Water Conservation*	Provides for the control and prevention of soil erosion.	All applicable BMPs, such as erosion and sediment controls and stormwater management measures would be implemented to minimize erosion and storm water run-off, and to regulate sediment control during construction. Therefore, the Preferred Alternative would be consistent with the Florida's statutes and regulations regarding soil and water conservation efforts.

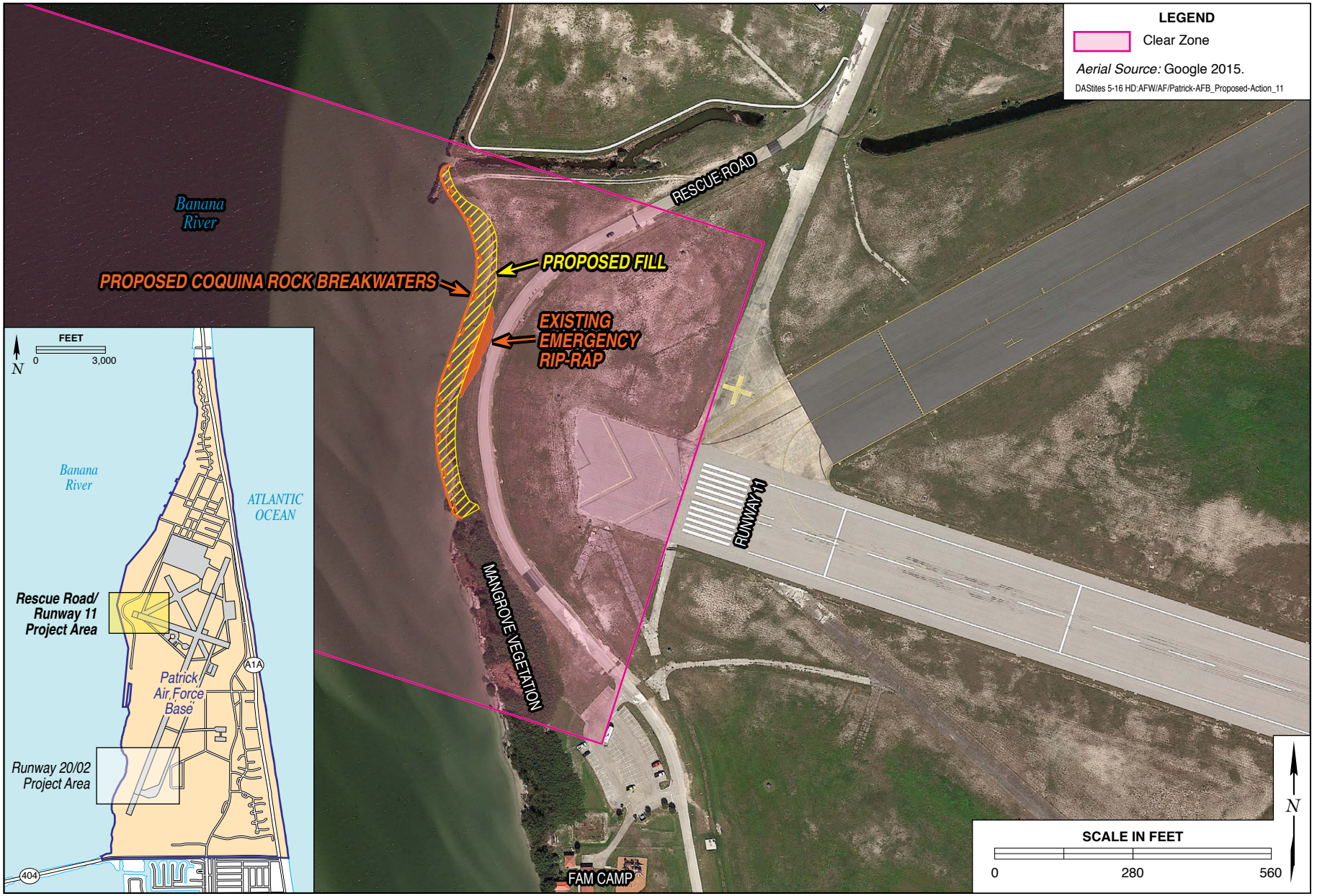


EA

Regional Location Map

FIGURE 1

No warranty is made by the USAF as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. This map is a "living document," in that it is intended to change as new data become available and are incorporated into the GIS database.



EA

Preferred Alternative
Rescue Road and Runway 11 Location

FIGURE 2

EA

Preferred Alternative
Runway 03/21 Location

FIGURE 3

APPENDIX E

AGENCY CONSULTATION

FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Mr. Michael A. Blaylock
Chief, Environmental Conservation
45th Space Wing
45 CES/CEIE
1224 Jupiter Street, MS-9125
Patrick Air Force Base, Florida 32925-3343

March 3, 2016

RE: DHR Project File No.: 2016-0482, Received by DHR: February 5, 2016
Project: *Proposed Erosion Control, East Bank of the Banana River, Patrick Air Force Base*
County: Brevard

Mr. Blaylock:

The Florida State Historic Preservation Officer reviewed the referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties.*

It is the opinion of this office that the proposed project will have no effect on historic properties listed, or eligible for listing, on the *National Register of Historic Places.*

If you have any questions, please contact Christopher Hunt, RPA, Historic Sites Specialist, by email at *Christopher.Hunt@dos.myflorida.com*, or by telephone at 850.245.6333 or 800.847.7278.

Sincerely,

Timothy A Parsons, Ph.D.,
Interim Director, Division of Historical Resources
& State Historic Preservation Officer

FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Mr. Michael A. Blaylock
Chief, Environmental Conservation
45th Space Wing
45 CES/CEIE
1224 Jupiter Street, MS-9125
Patrick Air Force Base, Florida 32925-3343

March 4, 2016

RE: DHR Project File No.: 2016-0918, Received by DHR: February 5, 2016
Project: *Proposed Erosion Control, East Bank of the Banana River at the South End of Patrick Air Force Base*
County: Brevard

Mr. Blaylock:

The Florida State Historic Preservation Officer reviewed the referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties.*

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If you have any questions, please contact Christopher Hunt, RPA, Historic Sites Specialist, by email at *Christopher.Hunt@dos.myflorida.com*, or by telephone at 850.245.6333 or 800.847.7278.

Sincerely,

Timothy A Parsons, Ph.D.,
Interim Director, Division of Historical Resources
& State Historic Preservation Officer

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DEPARTMENT OF THE AIR FORCE
45TH SPACE WING (AFSPC)

MEMORANDUM FOR NATIONAL MARINE FISHERIES SERVICE
NOAA SOUTHEAST REGIONAL OFFICE
PROTECTED SPECIES DIVISION
263 13TH AVE SOUTH
ST PETERSBURG, FL 33701-5505

JUN 2 1 2016

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: Informal Section 7 Consultation for Shoreline Stabilization for Rescue Road and Runway 11, Patrick Air Force Base (PAFB), Florida

1. The 45th Space Wing (45 SW) is proposing to stabilize approximately 1,000 linear feet of shoreline with upland rock revetment, breakwaters, and filling of 0.63 acres (1,017 cubic yards of clean sand fill) of the Banana River to repair evolusive erosion that has eroded the PAFB shoreline at this location for over 20 years with recent erosion of more than 100 feet of loss since 2009. Heavy wind and wave action is continuing to erode PAFB land and the shoreline is now only 30 feet from the edge of Rescue Road at its closest and 230 feet from the edge of Runway 11. Additionally, this project will provide better protection for an underground sewer pipe that is close to the shoreline. The pipe had been exposed in 2014 after high wave energy through storm events; revetment was installed along the shoreline just along the exposed pipe location under an emergency project to protect the pipe in the interim until this long-term stabilization project was designed and permitted. The fill for the long-term stabilization project will be clean sand which will be planted with marsh grasses and sloped (1:14) to allow for hydrologic connection with the lowest waterward section of the restored shoreline. The primary, waterward rock breakwaters will be installed in 70 foot sections with 5 foot gaps in between to allow for reduction of wave energy while not impeding wildlife and fish movements at the waterward edge. The secondary rock breakwaters would be in 15 feet sections set back five feet behind the primary staggered to overlap behind portions of the primary. Turbidity curtains will be used during installation to protect the Banana River, prevent turbidity in forage habitat outside of the construction zone, and provide a barrier to prevent wildlife access to the work zone. The associated 90% drawings are enclosed.

2. In accordance with the Endangered Species Act and the Marine Mammal Protection Act, this consultation is initiated to ensure minimum impacts to the listed sea turtles,smalltooth sawfish and Atlantic sturgeon and marine mammals. The work is not within any critical habitat. It is the Air Force's opinion that this loss of less than one acre of aquatic habitat, which was all land in 2009, and loss of roughly 200 square feet of seagrass (*Halodule wrightii*) is not likely to adversely affect sea turtles, smalltooth sawfish, Atlantic sturgeon or marine mammals. None of the listed species have been observed in this area, but have the potential for occurrence as they can be found in the Banana River, although smalltooth sawfish and Atlantic sturgeon have been considered as rare occurences. Marine mammals have been observed near the area foraging/fishing. All construction workers will be advised to follow the "Sea Turtle and Smalltooth Sawfish Conditions." Workers will be advised to maintain awareness of the listed species and marine mammals, stop work if these animals are near the work zone, and only re-initiate work when the animal(s) move a safe distance away. With the associated BMPs, it is the Air Force's opinion that this project may affect, but is not likely to adversely affect sea turtles, smalltooth sawfish, Atlantic sturgeon or marine mammals.

Please review the proposed project in accordance with Section 7 of the Endangered Species Act. If you have any questions or comments, please contact Ms. Keitha Dattilo-Bain at (321) 853-6438, or E-mail: keitha.dattilobain@us.af.mil.

MICHAEL A. BLAYLOCK, GS-13
Chief, Environmental Conservation

Attachments:
1. Design drawings and maps

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31: NMB

Michael A. Blaylock
Chief, Environmental Conservation
45th Space Wing
Department of the Air Force
45 CES/CEIE
1224 Jupiter Street
Patrick Air Force Base, Florida 32925-3343

AUG 29 2016

Irene Sadowski
Chief, Cocoa Permits Section
U.S. Army Corps of Engineers
400 High Point Drive, Suite 600
Cocoa, Florida 32926

Dear Sir or Madam:

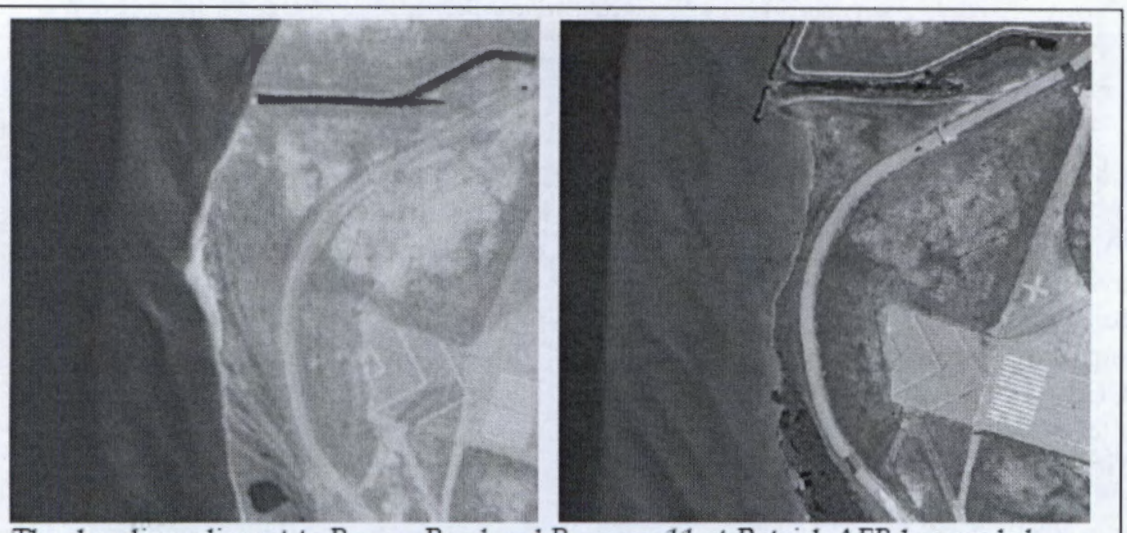
This letter responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

Action Agency	SER Number	Project Type
Department of the Air Force, Patrick Air Force Base and U.S. Army Corps of Engineers	SER-2016-18039	Shoreline stabilization/ living shoreline

Consultation History
We received your letter requesting consultation on June 5, 2016. We requested additional information on July 29, 2016. We received a final response on August 24, 2016, and initiated consultation that day.

Project Location

Address	Latitude/Longitude	Water body
Rescue Road and Runway11, Patrick Air Force Base, Brevard County, Florida	28.242447°N, 80.616741°W (North American Datum 1983)	Banana River



The shoreline adjacent to Rescue Road and Runway 11 at Patrick AFB has eroded substantially over the last 20 years (1994 left and 2014 right).

Image of the project location's eroding shoreline and surrounding area provided by Patrick Air Force Base

Existing Site Conditions

This site is an eroded shoreline along Patrick Air Force Base. A portion of the shoreline is armored with riprap to protect an underground sewer pipe exposed by high waves in 2014, with the rest unarmored. Benthic conditions are described as sand with shell and rock scattered along the river bottom. A fluctuating area of approximately 200-400 square feet (ft^2) of non ESA-listed seagrasses were identified within the project footprint. The shoreline supports a total of approximately 30 linear feet (lin ft) of mangrove shoreline including 5-6 red mangrove seedlings and 20 white mangroves.

Project Description

The applicant proposes to restore an eroded shoreline by armoring the existing shoreline with riprap, install a 1,000 linear foot (lin ft) additional breakwater barrier (living shoreline) waterward of the existing shoreline, and plant native marsh grasses between the existing shoreline and breakwater.

1. Riprap for the shoreline stabilization will be installed using a backhoe or long-arm excavator from the shoreline.
2. The riprap breakwater will be installed by a barge-mounted backhoe or land-based crane and will be staggered with gaps to allow water flow and species movement. The breakwaters will consist of 70-foot (ft) sections with 5-ft gaps and will have 15-ft sections placed behind each gap opening.
3. The area between the shoreline riprap and breakwaters will be graded with a bulldozer or backhoe and then planted with marsh grasses by hand.

The proposed project will result in filling approximately 0.63 acres of the Banana River including the loss of the 200-400 square feet (ft^2) of non-ESA listed seagrasses and a total of 30 lin ft of scattered red and white mangroves. Construction is anticipated to take 2-5 weeks to complete.

Construction Conditions
The applicant intends to use turbidity curtains and follow NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006, which requires work to stop if sea turtles or sawfish are observed within 50 ft of operating or moving construction equipment. All work will be completed during daylight hours.

Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North and South Atlantic distinct population segment [DPS])	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Leatherback	E	NLAA	NE
Loggerhead (Northwest Atlantic Ocean DPSs)	T	NLAA	NLAA
Hawksbill	E	NLAA	NE
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NE
Shortnose sturgeon	E	NLAA	NE
Atlantic sturgeon (South Atlantic DPS)	E	NLAA	NE
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect; NP = not present			

We believe the project will have no effect on hawksbill and leatherback sea turtles, due to the species' very specific life history strategies, which are not supported at the project site. Leatherback sea turtles have pelagic, deepwater life history, where they forage primarily on jellyfish. Hawksbill sea turtles typically inhabit inshore reef and hard bottom areas where they forage primarily on encrusting sponges.

We believe that there will be no effect to shortnose or Atlantic sturgeon at this location since it is south of the current known range for these species.

Critical Habitat
The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

Analysis of Potential Routes of Effects to Species
Sea turtles and smalltooth sawfish may be injured if struck with barge-mounted and land based construction equipment and the placement of materials. However, we believe this effect is discountable because these species are likely to move away and expected to exhibit avoidance behavior. The applicant's implementation of NMFS's *Sea Turtle and Smalltooth Sawfish*

Construction Conditions will further reduce the risk by requiring all construction workers watch for smalltooth sawfish or sea turtles. Operation of any mechanical construction equipment will cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.

Restoration of this shoreline will fill in approximately 0.63 acres of the Banana River. This will result in the loss of up to 30 total lin ft of scattered mangrove shoreline which could result in a reduction of foraging or refuge habitat for juvenile smalltooth sawfish. We believe the small loss of mangrove shoreline will have insignificant effects to the availability of mangrove habitat for smalltooth sawfish within the Banana River. In addition, the loss of 200-300 ft^2 of seagrasses will have an insignificant effect on the availability of seagrasses for green sea turtle foraging. Green sea turtles will be able to continue to forage throughout the Banana River.

Conclusion

Because all potential project effects to listed species were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We have enclosed additional relevant information for your review. We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Nicole Bonine, Consultation Biologist, at (727) 824-5336, or by email at Nicole.Bonine@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: 1. *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Revised March 23, 2006)
2. *PCTS Access and Additional Considerations for ESA Section 7 Consultations* (Revised March 10, 2015)

File: 1514-22.F.2

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

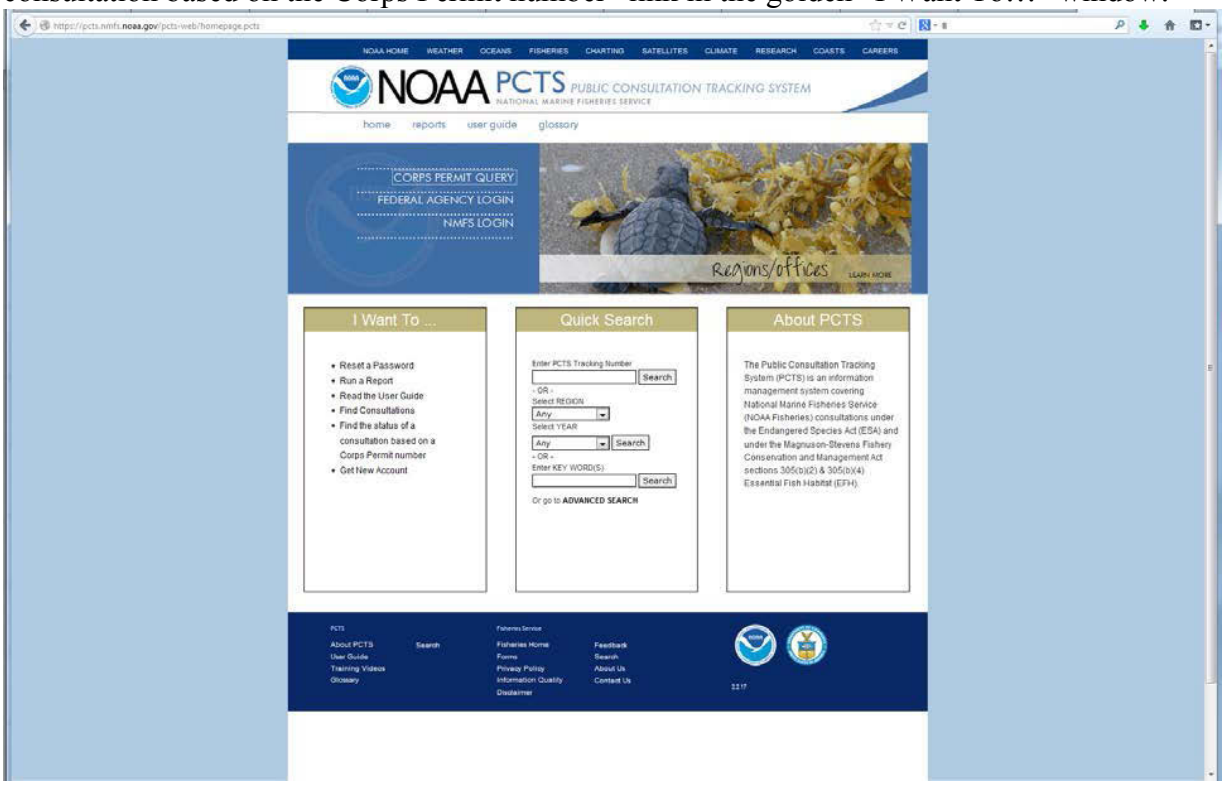
g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

PCTS Access and Additional Considerations for ESA Section 7 Consultations
(Revised 03-10-2015)

Public Consultation Tracking System (PCTS) Guidance: PCTS is a Web-based query system at **https://pcts.nmfs.noaa.gov/** that allows all federal agencies (e.g., U.S. Army Corps of Engineers - USACE), project managers, permit applicants, consultants, and the general public to find the current status of NMFS's Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations which are being conducted (or have been completed) pursuant to ESA Section 7 and the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) Sections 305(b)2 and 305(b)(4). Basic information including access to documents is available to all.

The PCTS Home Page is shown below. For USACE-permitted projects, the easiest and quickest way to look up a project's status, or review completed ESA/EFH consultations, is to click on either the "Corps Permit Query" link (top left); or, below it, click the "Find the status of a consultation based on the Corps Permit number" link in the golden "I Want To…" window.



Then, from the "Corps District Office" list pick the appropriate USACE district. In the "Corps Permit #" box, type in the 9-digit USACE permit number identifier, with no hyphens or letters. Simply enter the year and the permit number, joined together, using preceding zeros if necessary after the year to obtain the necessary 9-digit (no more, no less) number. For example, the USACE Jacksonville District's issued permit number SAJ-2013-0235 (LP-CMW) must be typed in as 201300235 for PCTS to run a proper search and provide complete and accurate results. For querying permit applications submitted for ESA/EFH consultation by other USACE districts, the procedure is the same. For example, an inquiry on Mobile District's permit MVN201301412 is entered as 201301412 after selecting the Mobile District from the "Corps District Office" list. PCTS questions should be directed to Kelly Shotts at Kelly.Shotts@noaa.gov or (727) 551-5603.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to Section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA Section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA Section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

MEMORANDUM FOR NATIONAL MARINE FISHERIES SERVICE
SOUTHEAST REGIONAL OFFICE
PROTECTED RESOURCES DIVISION
263 13TH AVENUE SOUTH
ST PETERSBURG, FL 33701-5505

JUN 24 2016

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: Magnuson-Stevens Act Consultation for Shoreline Stabilization for Rescue Road and Runway 11, Patrick Air Force Base (PAFB), Florida

1. The 45th Space Wing (45 SW) is proposing to stabilize approximately 1,000 linear feet of shoreline with upland rock revetment, breakwaters, and filling of 0.63 acres (1,017 cubic yards of clean sand fill) of the Banana River to repair evolusive erosion that has eroded the PAFB shoreline at this location for over 20 years with recent erosion of more than 100 feet of loss since 2009 (Figure 1). Heavy wind and wave action is continuing to erode PAFB land and the shoreline is now only 30 feet from the edge of Rescue Road at its closest and 230 feet from the edge of Runway 11. Additionally, this project will provide better protection for an underground sewer pipe that is close to the shoreline. The pipe had been exposed in 2014 after high wave energy through storm events; revetment was installed along the shoreline just along the exposed pipe location under an emergency project to protect the pipe in the interim until this long-term stabilization project was designed and permitted. The fill for the long-term project will be clean sand which will be planted with native marsh grasses and sloped (1:14) to allow for hydrologic connection with the lowest waterward section of the restored shoreline. The primary, waterward rock breakwaters will be installed in 70 foot sections with 5 foot gaps in between to allow for reduction of wave energy while not impeding wildlife and fish movements at the waterward edge. The secondary rock breakwaters would be in 15 feet sections set back five feet behind the primary staggered to overlap behind portions of the primary. Turbidity curtains will be used during installation to protect the Banana River, prevent turbidity in forage habitat outside of the construction zone, and provide a barrier to prevent wildlife access to the work zone. The associated 90% drawings are enclosed.

2. In accordance with the Magnuson-Stevens Fishery Conservation and Management Act, this consultation is initiated to discuss impacts to Essential Fish Habitat (EFH). Relevant to the proposed actions in the Banana River, the EFH designations within NMFS fishery management plans (FMP) are penaeid shrimp, and the snapper/grouper complex. The FMPs also include the specific EFH habitats of seagrass, mangroves, and oysters which are also designated as Habitat Areas of Particular Concern (HAPCs). Specifically, biological surveys for this project area included observations of small patches of seagrass (*Halodule wrightii*), tree and seedling mangroves (*Laguncularia racemosa* and *Rhizophora mangle*), buttonwood (*Conocarpus erectus*), amphipods on seagrass, small schools of young mullet, needle fish, snails, polychaete worm tubes, barnacles attached to rocks and shells, several species of green, red and brown macroalgae (both floating and attached to shells, rocks and seagrass), and a high percentages of sandy bottom scattered only with broken shells and rocks. No oysters are present in the project area or within 20 meters of the area. Water depth in the project area ranged from 0 to 91 cm from the shoreline out to approximately 20 meters beyond the proposed fill/breakwater construction.

3. For more specific detail concerned observed EFH and potential impacts, only roughly 200-400 sq ft of patchy shoal grass with 1-30% density (using a 1-m^2 grid) and 11 cm canopy height has been observed in the northern section of the project area that will be covered by the fill and breakwater action (Figure 2). Grass bed size has fluctuated dependent on sand movements based on three separate surveys during the growing seasons. Mangroves are also present in the proposed project area, and will be impacted. Two small groups of 5-6 red mangrove seedlings were found along the eroded shoreline along a sloughed bank along the northern end of the project area. At the southern end of the project site, there are two groups of small white mangroves. One group consists of about 10 with 1- to 2-inch diameter trunks, and the other group of about 10 with less than 0.5- to 2-inch diameter trunks (Figure 3). Some white mangroves have been destroyed by the wave action and are dead standing in this area as well. These mangroves and up to six buttonwood of various sizes will need to be removed during the shoreline revetment and waterward sand filling work (Figure 4). The project design notes that other large mangroves and wetland trees (buttonwood) will be avoided within the southern end of the project where the shoreline stabilization work will be anchored/tied in behind (upland of) the vegetated beach with sand fill around the trees, and breakwaters in front of the mangroves/trees. The vegetated beach along the southern end of the project site has also become susceptible to erosion. Buttonwoods are uprooted and laying on their sides in the water (Figure 5).

4. It is the Air Force's opinion that this loss of less than one acre of aquatic habitat, very small amounts of seagrass, and small numbers of mangrove (that will eventally be destroyed by further erosion should this stabilization project not occur) will be mitigated through creation of new salt marsh (0.63 acres) at the project site, and through possible use of existing wetland mitigation credits banked through estuarine habitat enhancement at Cape Canaveral Air Force Station with construction of culverts that opened up old mosquito impoundments and allowed fish migration and improved water quality for seagrass health. The Air Force also believes that the breakwater construction will protect existing remaining mangroves found along the southern vegetated beach. The formal mitigation plan will be developed during the permitting process, and it is anticipated that NMFS will also be working with the United States Army Corps of Engineers to determine permit conditions and possible mitigation.

5. Please review the proposed project in accordance with the Magnuson-Stevens Act and provide any recommendations so we can address them during the National Environmental Policy Act process prior to permitting as well as have an understanding of what recommendations will be provided during permit review. If you have any questions or comments, please contact Ms. Keitha Dattilo-Bain at (321) 853-6438, or E-mail: keitha.dattilobain@us.af.mil.

Michael Blaylock

MICHAEL A. BLAYLOCK, GS-13
Chief, Environmental Conservation

Attachments:
1. Figures 1-5
2. Design Drawings

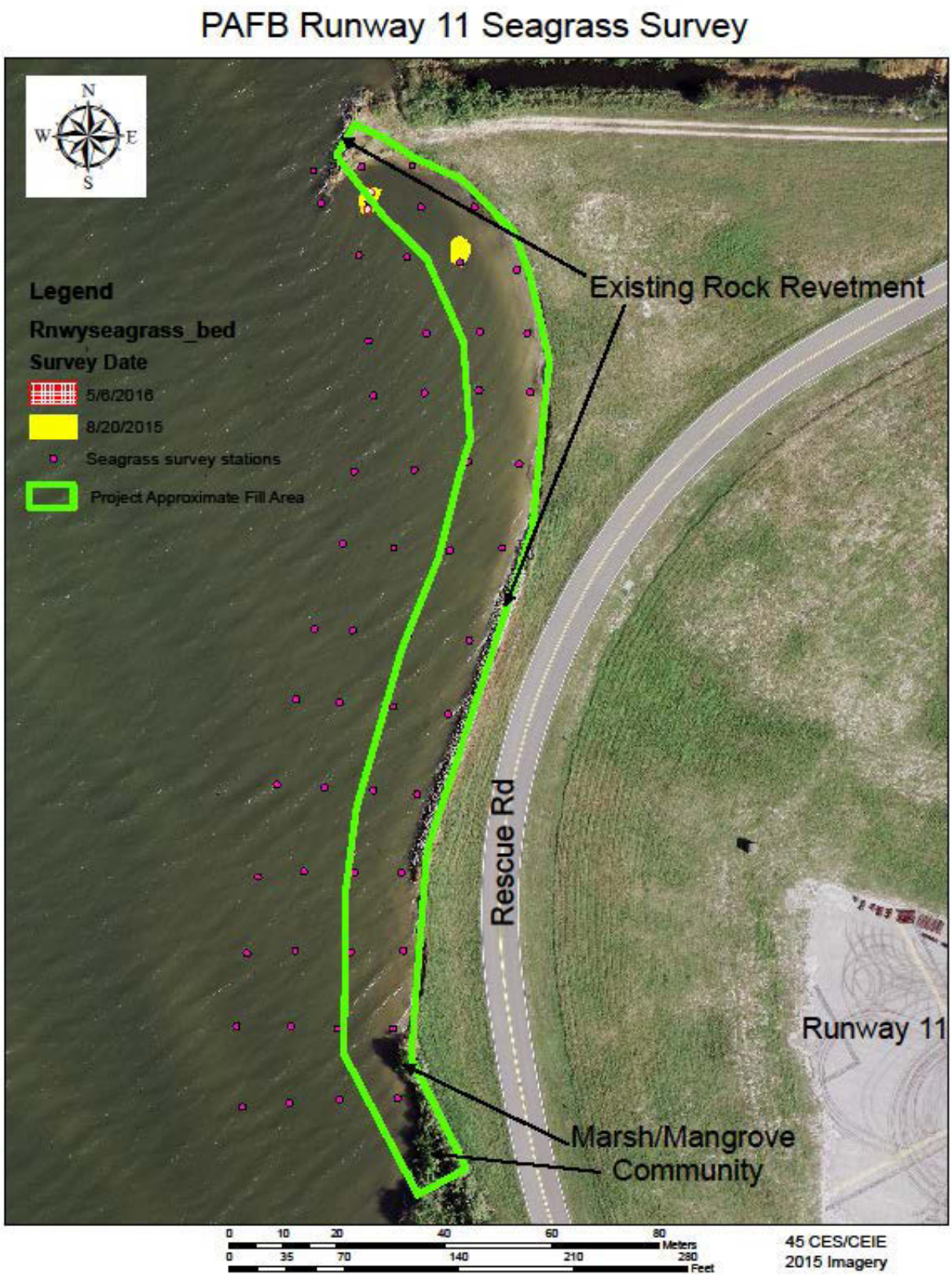
FIGURE 1

The shoreline adjacent to Rescue Road and Runway 11 at Patrick AFB has eroded substantially over the last 20 years (1994 left and 2014 right).

FIGURE 2

Next Page

FIGURE 2


PAFB Runway 11 Seagrass Survey
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Survey Date
5/6/2016
8/20/2015
Seagrass survey stations
Project Approximate Fill Area
Existing Rock Revetment
Rescue Rd
Runway 11
Marsh/Mangrove Community
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0 35 70 140 210 280 Feet
45 CES/CEIE
2015 Imagery

LOCATOR MAP FOR FIGURES 3, 4 AND 5

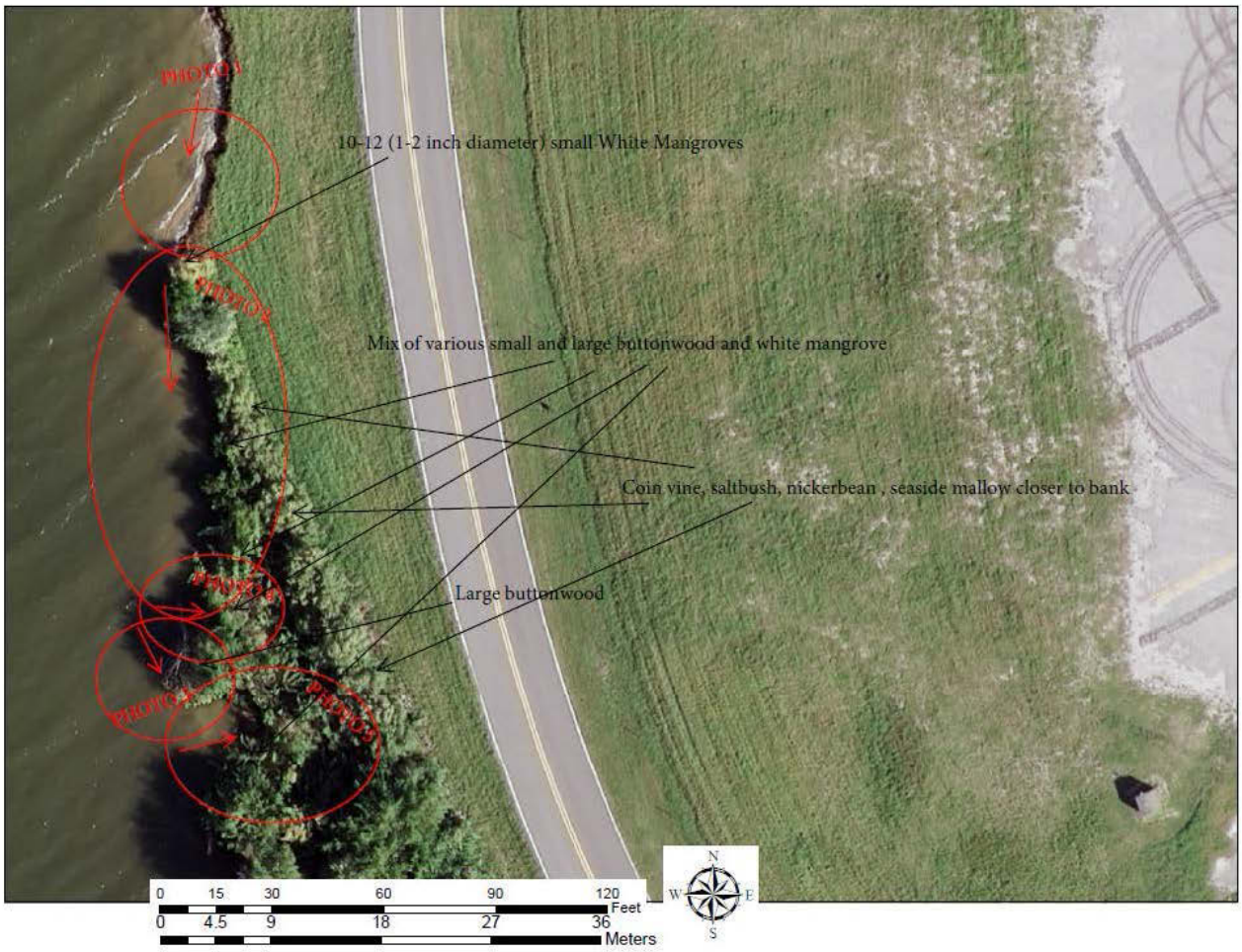


FIGURE 3- PHOTO 1

FIGURE 4- PHOTO 2

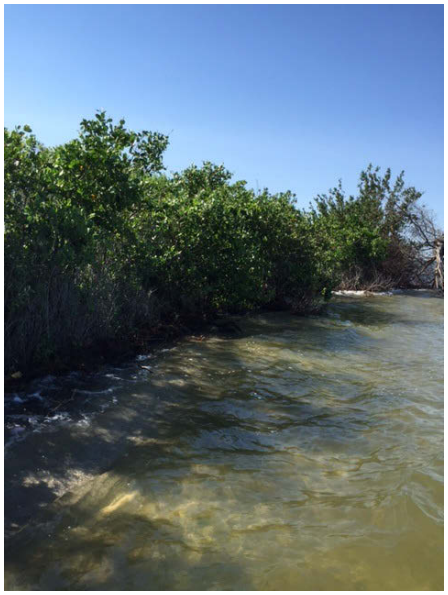
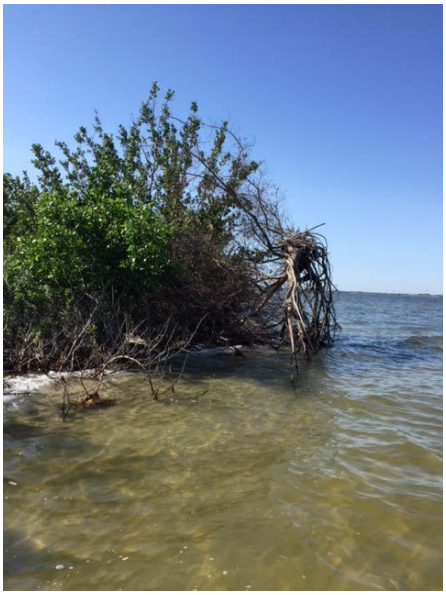


FIGURE 5-PHOTO 3



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

August 17, 2016 F/SER47:PW/pw

(Sent via Electronic Mail)

Michael Blaylock
Chief, Environmental Conservation
45 CES/CEVP
1224 Jupiter St. MS 9125
Patrick AFB, Florida 32925-3343

Attention: Keitha Dattilo-Bain

Dear Mr. Blaylock:

NOAA's National Marine Fisheries Service (NMFS) reviewed the letter dated June 24, 2016, from the Department of the Air Force, 45th Space Wing (45 SW), describing a shoreline stabilization project along the Banana River, Brevard County, to protect Rescue Road and Runway 11 at the USAF Patrick Air Force Base (PAFB). Specifically, the 45 SW proposes to stabilize approximately 1,000 linear feet of shoreline with an upland rock revetment, breakwaters, and 1,017 cubic yards of clean sandy fill planted with marsh grasses. The 45 SW would install the primary waterward rock breakwaters in 70-foot sections with five-foot gaps in between to allow for reduction of wave energy while not impeding wildlife and fish movements. The secondary rock breakwaters would be in 15-foot sections set back five feet behind the primary sections and staggered to overlap the gaps between the primary sections. The 45 SW would use turbidity curtains and other standard best management practices to protect habitat outside of the construction zone and to prevent wildlife access to the work zone. The 45 SW has determined the prosed shoreline stabilization would not have significant adverse impacts on essential fish habitat (EFH) or federally managed fishery species. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the NMFS provides the following comments and recommendations pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

The subject shoreline at PAFB has eroded significantly during the past 20 years and more than 100 feet of loss occurred since 2009. Heavy wind and wave action continues to erode PAFB land, and the shoreline is now 30 feet from the edge of Rescue Road at its closest and 230 feet from the edge of Runway 11. In addition to protecting these features, the proposed project would enhance protection for an underground sewer pipe at the location; an emergency action occurred to protect the pipe when it exposed in 2014.

The current shoreline has small red mangroves (*Rhizophora mangle*), white mangroves (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*) as well as dead standing white mangroves and uprooted buttonwoods likely killed by wave action and/or loss of soil. Offshore

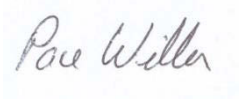
but within the project footprint are small patches of shoal grass (*Halodule wrightii*), totaling 200 to 400 square feet. The 45 SW reports grass bed size and location have varied across three surveys performed during the growing season, and the fluctuation appears correlated with sand movements. As noted in the letter from the 45 SW, the South Atlantic Fishery Management Council (SAFMC) identifies mangroves and seagrass as Habitat Areas of Particular Concern (HAPCs) in the fishery management plan for the snapper/grouper complex. Additionally, this portion of the Banana River is part of the Banana River Aquatic Preserve, which is an HAPC under the fishery management plans for penaeid shrimp and for the snapper/grouper complex. The SAFMC provides additional information on EFH and HAPCs and their support of federally managed fishery species in *Fishery Ecosystem Plan of the South Atlantic Region*, which is available at *www.safmc.net*.

To accomplish the shoreline stabilization, the 45 SW proposes to impact small amounts of seagrass and mangrove habitat. The 45 SW notes continued erosion would destroy or further degrade the remaining mangrove habitat at the site if no action occurs. The 45 SW also notes its living shoreline approach to stabilizing the shoreline includes creating 0.63 acres of salt marsh habitat. If mitigation is necessary, the 45 SW indicates it may request credit from an estuarine habitat enhancement project at Cape Canaveral Air Force Station where construction of culverts opened up former mosquito impoundments allowing fish access and improving water quality for seagrass. The 45 SW would develop a formal mitigation plan during the permitting process administered by the U.S. Army Corps of Engineers (USACE).

The NMFS agrees with the approach the 45 SW has chosen for stabilizing the subject shoreline and offers no EFH conservation recommendations at this time. Before submitting a permit application to the USACE, the NMFS recommends the 45 SW locally verify the target elevations for the marsh grass planting to ensure the planted grasses have optimal tidal inundation.

The NMFS appreciates the opportunity to provide these comments. Please direct related correspondence to the attention of Pace Wilber at our Charleston Area Office. He may be reached at (843) 762-8601 or by e-mail at Pace.Wilber@noaa.gov.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: USAF, Keitha.Dattilobain@us.af.mil
USAF, Angy.Chambers@us.af.mil
SAFMC, Roger.Pugliese@safmc.net
F/SER4, David.Dale@noaa.gov

MEMORANDUM FOR UNITED STATES DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE
ATTENTION: TONY DALY-CREWS
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FL 32256-7517

JUN [illegible] 2015

FROM: 45 CES/CEIE
1224 Jupiter Street
Patrick AFB FL 32925-3343

SUBJECT: Informal Section 7 Consultation for Shoreline Stabilization for Rescue Road and Runway 11, Patrick Air Force Base (PAFB), Florida

1. The 45th Space Wing (45 SW) is proposing to stabilize approximately 1,000 linear feet of shoreline with upland rock revetment, breakwaters, and filling of 0.63 acres (1,017 cubic yards of clean sand fill) of the Banana River to repair evolusive erosion that has eroded the PAFB shoreline at this location for over 20 years with recent erosion of more than 100 feet of loss since 2009. Heavy wind and wave action is continuing to erode PAFB land and the shoreline is now only 30 feet from the edge of Rescue Road at its closest and 230 feet from the edge of Runway 11. Additionally, this project will provide better protection for an underground sewer pipe that is close to the shoreline. The pipe had been exposed in 2014 after high wave energy through storm events; revetment was installed along the shoreline just along the exposed pipe location under an emergency project to protect the pipe in the interim until this long-term stabilization project was designed and permitted. The fill for the long-term project will be clean sand which will be planted with marsh grasses and sloped (1:14) to allow for hydrologic connection with the lowest waterward section of the restored shoreline. The primary, waterward rock breakwaters will be installed in 70 foot sections with 5 foot gaps in between to allow for reduction of wave energy while not impeding wildlife and fish movements at the waterward edge. The secondary rock breakwaters would be in 15 feet sections set back five feet behind the primary staggered to overlap behind portions of the primary. Turbidity curtains will be used during installation to protect the Banana River and provide a barrier to prevent wildlife access to the work zone. The associated 90% drawings are enclosed.

2. In accordance with the Endangered Species Act, this consultation is initiated to ensure minimum impacts to the listed manatee. The work is not within a manatee WWAA, calving, or foraging area, but the area is considered an IMA. Manatees have been observed in this area historically with calves present generally during breeding season. Seagrass was found in large amounts in the project area as late as 2010, however, seagrass has declined significantly since then. Only roughly 200-400 sq ft of shoal grass (*Halodule wrightii*), has been observed recently during surveys in the project area that will be covered by the fill and breakwater action. Grass bed size has fluctuated dependent on sand movements. It is the Air Force's opinion that this loss of less than one acre of aquatic habitat and a very small amount of seagrass loss at this site is not likely to adversely affect manatee. Since this aquatic habitat used to be land in 2009, it is also not believed that filling this less than one acre area to reclaim PAFB land will adversely affect manatee critical habitat. Sea turtles have not been observed in this area and have not been observed to nest on the intermittent beach along the shoreline. All construction workers will be advised to follow the "Standard Manatee In-Water Work Conditions" and the "Sea Turtle and Smalltooth Sawfish Conditions" to protect these species during in water work. Workers will be advised to maintain awareness of manatees and sea turtles, stop work if these animals are near the work zone, and only re-initiate work when the animal(s) move a safe distance away. With the associated BMPs, it is the Air Force's opinion that this project may affect, but is not likely to adversely affect manatee or their designated critical habitat.

Please review the proposed project in accordance with Section 7 of the Endangered Species Act. If you have any questions or comments, please contact Ms. Keitha Dattilo-Bain at (321) 853-6438, or E-mail: keitha.dattilobain@us.af.mil.

MICHAEL A. BLAYLOCK, GS-13
Chief, Environmental Conservation

Attachments:
1. Design drawings and maps

United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:
FWS Log. No. 04EF1000-2016-I-0404

August 23, 2016

Mr. Michael Blaylock, Chief, Natural Assets
Department of the Air Force
45th Space Wing CES/CEA
1224 Jupiter Street, MS 9125
Patrick AFB, FL 32925-3343
(Attn: Keitha Datillo-Bain)

Re: Section 7 Response on the Proposed Shoreline Stabilization for Rescue Road and Runway 11, Patrick Air Force Base, Brevard County, Florida

Dear Mr. Blaylock:

Our office has reviewed your correspondence and its accompanying information on the proposed Shoreline Stabilization for Rescue Road and Runway 11, dated June 24, 2016, and received on July 7, 2016. Patrick Air Force Base is proposing to stabilize approximately 1,000 linear feet of shoreline with upland rock revetment, breakwaters, and filling of .063 acres of the Banana River. The shoreline stabilization will provide protection for Rescue Road, the edge of Runway 11, and an underground sewer pipe. The project is located along the shoreline of the Banana River at 28.242764, and -80.616487, Patrick Air Force Base. We provide the following comments in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*).

The project occurs within the range of the West Indian (Florida) manatee (*Trichechus manatus latirostris*) and its designated critical habitat. Patrick Air Force Base has agreed to incorporate marsh grass plantings along the shoreline behind the secondary rock breakwaters and implement the latest standard manatee conditions for in-water work into the project plans and specifications. Based on the preceding, we concur with the determination that the proposed project may affect, but is not likely to adversely affect the manatee. In addition, the proposed project will have small impact to critical habitat relative the approximate 843,979 acres of designated critical habitat. Therefore, we concur with the Air Force's determination that the project is not likely to adversely affect the designated critical habitat.

Although this does not represent a biological opinion as described in section 7 of the Act, it does

fulfill the requirements of the Act and no further action is required. Changes to the project, however, may increase the risk of adverse effects to a level at which take is reasonably certain to occur. The Air Force under such circumstances should consider seeking the assistance of this office to ascertain if additional section 7 consultation is needed. If you have any questions regarding this response, please contact Ms. Tera Baird of my staff at (904)-731-3196.

Sincerely,

for Jay B. Herrington
Field Supervisor