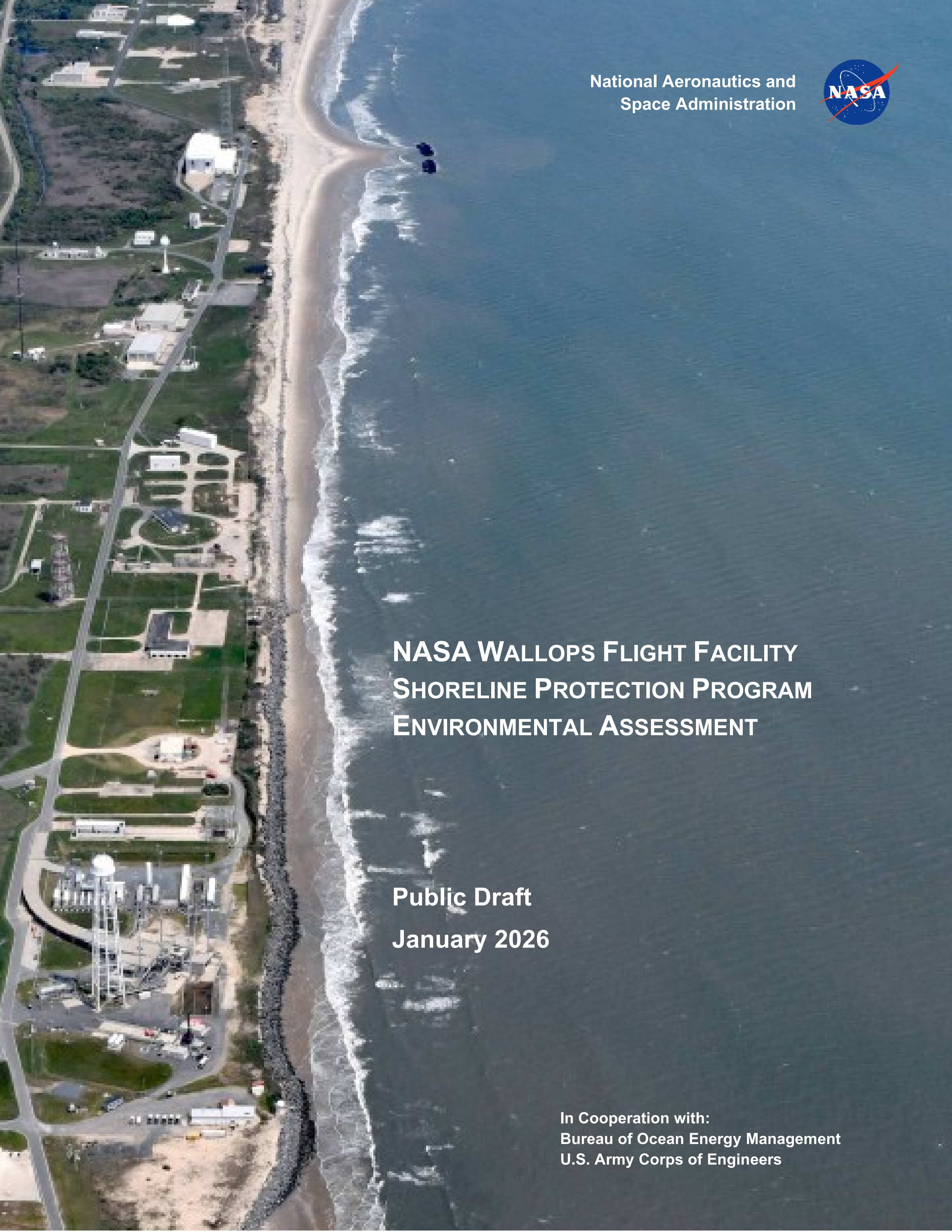

National Aeronautics and
Space Administration

NASA Wallops Flight Facility Shoreline Protection Program Environmental Assessment

Public Draft

January 2026

In Cooperation with:
Bureau of Ocean Energy Management
U.S. Army Corps of Engineers

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DRAFT
NASA WALLOPS FLIGHT FACILTY SHORELINE PROTECTION PROGRAM ENVIRONMENTAL ASSESSMENT

Lead Agency: National Aeronautics and Space Administration (NASA)

Cooperating Agencies: U.S. Bureau of Ocean Energy Management
U.S. Army Corps of Engineers

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Abstract: In accordance with the National Environmental Policy Act, NASA has prepared this Shoreline Protection Program Environmental Assessment to evaluate the potential environmental effects of enhancing and protecting the shoreline on Wallops Island at the Wallops Flight Facility, located in Accomack County, Virginia. Under the Proposed Action, NASA would renourish Wallops Island with sand dredged from Unnamed Shoal A. Additionally, NASA could construct a series of parallel breakwaters approximately 200 feet offshore from the renourished Wallops Island beach and repair and extend the existing seawall.

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TABLE OF CONTENTS

1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION....1-1

1.1 Introduction....1-1
1.2 Background....1-1
1.3 Purpose of and Need For the Proposed Action....1-6
1.3.1 Purpose....1-6
1.3.2 Need....1-6
1.4 Cooperating Agencies' Purpose and Need....1-6
1.5 Public and Other Agencies Involvement/Engagement....1-7
1.5.1 Scoping....1-7
1.5.2 Draft EA....1-8
1.5.3 Final EA....1-8

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES....2-1

2.1 Introduction....2-1
2.2 Proposed Action....2-1
2.2.1 Renourishment Processes....2-2
2.2.1.1 Beach Fill Mobilization....2-3
2.2.1.2 Dredging and Sand Placement Process....2-4
2.2.2 Breakwater Construction....2-4
2.2.2.1 Build Breakwaters by Barge....2-5
2.2.2.2 Build Breakwaters Using Temporary Bulkheads....2-5
2.2.2.3 Build Breakwaters Using Temporary Trestle System....2-6
2.2.3 Element Common to All Alternatives....2-6
2.2.3.1 Seawall Repair and Extension....2-6
2.2.3.2 Construction Monitoring....2-6
2.3 Alternatives Carried Forward for Detailed Analysis....2-7
2.3.1 No Action Alternative....2-7
2.3.2 Alternative 1: Beach Renourishment and Breakwater Construction....2-7
2.3.3 Alternative 2: Beach Renourishment....2-7
2.3.4 Alternative 3: Breakwater Construction....2-8
2.4 Alternatives Considered but Not Carried Forward....2-8
2.4.1 Beach Renourish Via Backpassing from North Wallops Island....2-8
2.4.2 Constructing Breakwaters Outside the Proposed Limits....2-8

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES....3-1

3.1 Analysis Approach....3-1
3.1.1 Affected Resources....3-1
3.2 Coastal Geology and Processes....3-2
3.2.1 Affected Environment....3-2
3.2.1.1 Consideration of Storm Events and Coastal Flooding....3-3
3.2.2 Environmental Consequences....3-3
3.2.2.1 No Action Alternative....3-3

3.2.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-3
3.2.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-5
3.2.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-5
3.3 Water Quality 3-5
3.3.1 Regulatory Context and Permitting 3-5
3.3.2 Affected Environment 3-6
3.3.3 Environmental Consequences 3-6
3.3.3.1 No Action Alternative 3-6
3.3.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-6
3.3.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-7
3.3.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-7
3.4 Coastal Zone Management 3-8
3.4.1 Regulatory Context and Permitting 3-8
3.4.2 Affected Environment 3-8
3.4.3 Environmental Consequences 3-9
3.4.3.1 No Action Alternative 3-9
3.4.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-9
3.4.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-10
3.4.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-10
3.5 Air Quality 3-10
3.5.1 Affected Environment 3-10
3.5.1.1 Criteria Pollutants 3-10
3.5.2 Environmental Consequences 3-13
3.5.2.1 No Action Alternative 3-13
3.5.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-13
3.5.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-15
3.5.2.4 Alternative 3 –Breakwater Construction and Seawall Repair and Extension 3-16
3.5.2.5 Hazardous Air Pollutants 3-17
3.5.2.6 Greenhouse Gases 3-17
3.6 Noise 3-17
3.6.1 Affected Environment 3-17
3.6.1.1 Airborne Noise 3-17

3.6.1.2 Underwater Noise 3-18
3.6.2 Environmental Consequences 3-19
3.6.2.1 No Action Alternative 3-19
3.6.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-19
3.6.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-20
3.6.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-20
3.7 Benthos 3-20
3.7.1 Affected Environment 3-20
3.7.2 Environmental Consequences 3-21
3.7.2.1 No Action Alternative 3-21
3.7.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-21
3.7.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-22
3.7.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-22
3.8 Wildlife 3-22
3.8.1 Affected Environment 3-23
3.8.1.1 Onshore 3-23
3.8.1.2 Offshore 3-24
3.8.2 Environmental Consequences 3-24
3.8.2.1 No Action Alternative 3-24
3.8.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-24
3.8.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-25
3.8.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-25
3.9 Fisheries and Essential Fish Habitat 3-25
3.9.1 Regulatory Context 3-25
3.9.2 Affected Environment 3-25
3.9.2.1 Fisheries 3-26
3.9.2.2 Essential Fish Habitat 3-26
3.9.2.3 Habitat Areas of Particular Concern 3-27
3.9.3 Environmental Consequences 3-28
3.9.3.1 No Action Alternative 3-28
3.9.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-28
3.9.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-29

3.9.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-29

3.10 Marine Mammals 3-30

3.10.1 Regulatory Context 3-30

3.10.2 Affected Environment 3-30

3.10.3 Environmental Consequences 3-31

3.10.3.1 No Action Alternative 3-31

3.10.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-31

3.10.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-33

3.10.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-33

3.11 Special Status Species 3-33

3.11.1 Regulatory Context 3-33

3.11.2 Affected Environment 3-33

3.11.2.1 Onshore 3-34

3.11.2.2 Offshore 3-36

3.11.3 Environmental Consequences 3-36

3.11.3.1 No Action Alternative 3-36

3.11.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-37

3.11.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-40

3.11.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-40

3.12 Cultural Resources 3-40

3.12.1 Regulatory Context 3-40

3.12.2 Affected Environment 3-40

3.12.3 Environmental Consequences 3-41

3.12.3.1 No Action Alternative 3-41

3.12.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension 3-41

3.12.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension 3-41

3.12.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension 3-42

4.0 REASONABLY FORESEEABLE FUTURE ACTIONS AND MITIGATION MEASURES 4-1

4.1 Reasonably Foreseeable Future Actions 4-1

4.2 Mitigation Measures 4-2

4.2.1 Physical Effects Mitigation 4-2

4.2.2 Threatened and Endangered Species Effects Mitigation 4-2

4.2.2.1 Onshore 4-2
4.2.2.2 Offshore...4-3

5.0 REFERENCES..5-1

6.0 AGENCIES AND PERSONS CONSULTED 6-1

7.0 PREPARERS AND CONTRIBUTORS..7-1

List of Tables

Table 1.5-1 Summary of Scoping Comments 1-7
Table 3.1-1 Resources Considered in this SPP EA 3-1
Table 3.5-1 State Adopted Federal Air Quality Standards...3-11
Table 3.5-2 Total Criteria and GHG Emissions for Alternative 1 in Tons/Year...........3-13
Table 3.5-3 Total HAP Emissions for Alternative 1 in Tons/Year 3-14
Table 3.5-4 Total Criteria and GHG Emissions for Alternative 2 in Tons/Year...........3-15
Table 3.5-5 Total HAP Emissions for Alternative 2 in Tons/Year 3-16
Table 3.5-6 Total Criteria and GHG Emissions for Alternative 3 in Tons/Year...........3-16
Table 3.5-7 Total HAP Emissions for Alternative 3 in Tons/Year 3-17
Table 3.9-1 Essential Fish Habitat in the Project Area 3-26
Table 3.10-1 Marine Mammals Likely to Occur Offshore of Wallops Island 3-30
Table 3.10-2 Acoustic Threshold Criteria for Marine Mammals from Non-Impulsive Underwater Noise 3-32
Table 3.11-1 Historic Piping Plover Nesting on Wallops Island 3-35
Table 3.11-2 Historic Rufa Red Knot Counts on Wallops Island 3-35
Table 3.11-3 Auditory Injury and Behavioral Thresholds for Sea Turtles Exposed to Non-Impulsive Sounds..3-39

List of Figures

Figure 1.2-1 Shoreline Infrastructure Protection Area in 2019 Before Breakwater Construction and Renourishment..1-3
Figure 1.2-2 Shoreline Infrastructure Protection Area in 2021 After Breakwater Construction and Renourishment..1-4
Figure 1.2-3 Shoreline Infrastructure Protection Area in 2023 1-5
Figure 2.2-1 Project Area and Components 2-2
Figure 2.2-2 Beach Fill Mobilization/Onshore Staging (left) and Offshore Equipment (right) 2-3
Figure 2.2-3 Dredging and Sand Placement Process with Trailing Suction Hopper (left) and Bulldozers Grading Discharged Sand (right) 2-3
Figure 3.5-2 2024 Virginia Region Design Values as a Percentage of NAAQS.............3-12

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
Air Force	United States Department of the Air Force
APE	Area of Potential Effects
BMP	best management practice
BO	Biological Opinion
BOEM	Bureau of Ocean Energy Management
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CWA	Clean Water Act
CZM	Coastal Zone Management
dB	decibel
dBA	A-weighted decibel
dBpeak	instantaneous peak sound pressure level
dBRMS	root mean square sound pressure level
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCD	Federal Consistency Determination
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
HAP	hazardous air pollutant
HAPC	Habitat Area of Particular Concern
km	kilometer
MARS	Mid-Atlantic Regional Spaceport
MEC	munitions and explosives of concern
MHW	mean high water
MMPA	Marine Mammal Protection Act
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA	National Oceanographic and Atmospheric Administration
NPR	NASA Procedural Requirement
NRHP	National Register of Historic Places
O_3	ozone
OCS	Outer Continental Shelf
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppt	parts per thousand
ROD	Record of Decision
SERP	Shoreline Enhancement and Restoration Project
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPL	sound pressure level
SPP	Shoreline Protection Program
SRIPP	Shoreline Restoration and Infrastructure Protection Program
U.S.	United States
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VDEQ	Virginia Department of Environmental Quality
VDHR	Virginia Department of Historic Resources
VDWR	Virginia Department of Wildlife Resources
VMRC	Virginia Marine Resources Commission
VSA	Virginia Spaceport Authority
WFF	Wallops Flight Facility

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1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

The National Aeronautics and Space Administration (NASA) has prepared this Environmental Assessment (EA) to evaluate the potential environmental effects of enhancing and protecting the shoreline on Wallops Island. This Shoreline Protection Program (SPP) Tiered EA has been prepared by NASA in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States [U.S.] Code [U.S.C.] 4321–4347); NASA procedures for implementing NEPA (14 Code of Federal Regulations [CFR] 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1A). The U.S. Department of Interior Bureau of Ocean Energy Management (BOEM) and U.S. Army Corps of Engineers (USACE), Norfolk District are Cooperating Agencies with NASA in preparation of this EA, with NASA serving as the lead agency.

NASA has prepared this EA as a document tiered from the *2010 Final Shoreline Restoration and Infrastructure Protection Program (SRIPP) Final Programmatic Environmental Impact Statement* (*PEIS)* with information and project components as presented in the *2013 Final Post-Hurricane Sandy Shoreline Repair EA* and the *2019 Final Shoreline Enhancement and Restoration Project EA*. The *2010 Final SRIPP PEIS* (NASA 2010a)*, 2013 Final Wallops Island Post-Hurricane Sandy Shoreline Repair EA* (NASA 2013), and *2019 Final Shoreline Enhancement and Restoration Project EA* (NASA 2019a) are incorporated by reference with new information and analysis provided, as appropriate.

1.2 BACKGROUND

On December 13, 2010, NASA issued a Record of Decision (ROD) for the Wallops Flight Facility (WFF) *2010 Final SRIPP PEIS*. The U.S. Department of the Interior's BOEM[1] and the USACE Norfolk District were Cooperating Agencies. The primary goal of the SRIPP is to reduce direct damage to Wallops Island's infrastructure; however, its primary benefit is the continued use of the island to support the aerospace programs that are at the core of WFF's mission (NASA 2010a). The *2010 Final SRIPP PEIS* analyzed three Action Alternatives including structural and non-structural options, varying beach berm widths, and multiple sources of fill material. In its ROD, NASA selected *Alternative 1: Full Beach Fill, Seawall Extension* and adopted a suite of mitigation and monitoring protocols to both reduce potential environmental effects and track project performance. Implementing the initial phase of Alternative 1 entailed: (1) the placement along the Wallops Island shoreline of approximately 3.2 million cubic yards of sand material dredged from Unnamed Shoal A, an offshore sand ridge located approximately 11 miles northeast of Wallops Island on the Outer Continental Shelf (OCS) in the Atlantic Ocean under BOEM jurisdiction; and (2) an initial 1,430-foot southerly extension of the Wallops Island rock seawall with future extensions completed as funds are available to a maximum length of 4,600 feet.

The *2010 Final SRIPP PEIS* ROD stated that fill material for future renourishment cycles could be taken from either OCS Unnamed Shoal A, OCS Unnamed Shoal B (another offshore sand ridge located approximately 13 miles northeast of Wallops Island), or north Wallops Island beach and left the specifics

[1] BOEM adopted the 2010 Final SRIPP PEIS ROD and signed its own ROD on March 2, 2011. The BOEM ROD authorized the use of Outer Continental Shelf (OCS) sand for the initial beach fill and stated each subsequent beach fill proposal would require a new negotiated contract and an updated environmental analysis (U.S. Department of the Interior, BOEM 2011).

of how and when the fill material was obtained to be addressed in future action-specific NEPA documentation.

The initial nourishment, plus up to nine renourishment cycles at approximately five-year intervals over the 50-year life of the SRIPP, would be anticipated (NASA 2010a).

The initial beach renourishment (3.2 million cubic yards) was completed in August 2012. A second renourishment was required shortly thereafter when, in October 2012, Hurricane Sandy made landfall. Monitoring surveys following the storm event identified the need to repair a section of the seawall and the southern two-thirds of the recently nourished beach. NASA signed a Finding of No Significant Impact (FONSI) on June 6, 2013, for the *Wallops Island Post-Hurricane Sandy Shoreline Repair Final EA* (NASA 2013). Repairs to the seawall and second beach renourishment of 650,000 cubic yards of sand were completed in September 2014[2]. Subsequent storms in 2015 (Hurricane Joaquin), in 2016 (Winter Storm Jonas), and in 2018 (Winter Storm Riley) resulted in a reduction of over a million cubic yards of sand in the southern portion of the island as compared to volumes present after the 2014 shoreline repair (USACE 2018a).

In 2018, NASA requested the USACE Norfolk District Hydraulics and Hydrology Section to evaluate the effectiveness of constructing a breakwater or series of breakwaters along the Wallops Island shoreline to reduce the intensity of wave action and the rate of sediment transport since previous renourishments provided only temporary protection. The USACE modeled seven alternative configurations with varying placement, size, and number of breakwaters and calculated how each alternative affected shoreline stabilization and sediment transport. The analysis employed numerical modeling to determine the size and placement of breakwater(s) that would address the erosion issues. Modeling indicated the placement of detached parallel breakwater structures approximately 200 feet offshore from the mean high water (MHW) line would be most effective (USACE 2018b).

On July 16, 2019, NASA signed a FONSI for the *Final Shoreline Enhancement and Restoration Project EA* (NASA 2019a) to implement a third renourishment[3]. The project placed approximately 1.1 million cubic yards of sand sourced from the north Wallops Island beach. Prior to renourishment, a total of five breakwaters were constructed approximately 200 feet offshore from the MHW line of the Wallops Island shoreline infrastructure protection area. Two breakwaters were constructed in front of the Horizontal Integration Facility (HIF; Building X-079) and three breakwaters were constructed in front of Launch Pad 0-B.

The following figures provide a visualization of the shoreline infrastructure protection area prior to renourishment in 2019 (**Figure 1.2-1**), post-renourishment in 2021 with the initial breakwaters in place (**Figure 1.2-2**), and in May 2023 (**Figure 1.2-3**). The recent image indicates a noticeable retention in sand material in front of the HIF and Launch Pad 0-B north of where breakwater structures were placed in 2020/2021, and along the remaining shoreline area.

[2] BOEM, as a cooperating agency, signed a FONSI on July 5, 2013, supporting the decision to issue a negotiated agreement for use of OCS sand supporting nourishment in 2014 (U.S. Department of the Interior, BOEM 2013).
[3] BOEM, as a cooperating agency, signed a FONSI on February 6, 2019, supporting the decision to issue a negotiated agreement for use of OCS sand supporting nourishment in 2020. However, sand was transferred from North Wallops Island Beach and OCS sand was never required.

Figure 1.2-1 Shoreline Infrastructure Protection Area in 2019 Before Breakwater Construction and Renourishment
(Photo courtesy of Patick J. Hendrickson)

Figure 1.2-2 Shoreline Infrastructure Protection Area in 2021
After Breakwater Construction and Renourishment
(Photo courtesy of Patick J. Hendrickson)

Figure 1.2-3 Shoreline Infrastructure Protection Area in 2023
(Photo courtesy of Patick J. Hendrickson)

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 PURPOSE

The purpose of NASA's Proposed Action is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extension of the existing seawall in order to reduce the potential for damage to, or loss of, NASA, U.S. Navy (Navy), U.S. Air Force (Air Force), and Virginia Spaceport Authority (VSA) Mid-Atlantic Regional Spaceport (MARS) assets on Wallops Island from effects associated with storm events and erosion.

1.3.2 NEED

NASA needs the Proposed Action because the beach berm and dune system that was established to protect NASA's Wallops Island launch range infrastructure in 2012 has been subject to erosion through storm wind and wave damage. The originally designed and constructed beach system served its intended purpose of reducing damage to the range assets; however, a notable portion of sub-aerial (i.e., on land surface) sand is often relocated by storm winds and waves with a majority of this sand volume transported to the north end of Wallops Island. The effects of storms are most apparent within the southern half of the Wallops Island beach, where the majority of the highly critical launch assets are located. Within this area, the seaward half of the beach berm and dune system must be maintained to ensure the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

1.4 COOPERATING AGENCIES' PURPOSE AND NEED

NASA, as the WFF property owner and project proponent, is the lead agency in preparing this EA. As with the *2010 Final SRIPP PEIS, 2013 Final Post-Hurricane Sandy Shoreline Repair EA*, and the *2019 Final Shoreline Enhancement and Restoration Project EA*, BOEM and USACE Norfolk District are serving as Cooperating Agencies because they each possess both regulatory authority and specialized expertise regarding the Proposed Action. Additionally, BOEM and USACE, as cooperating federal agencies, would each undertake its own action related to NASA's Proposed Action.

BOEM has jurisdiction over mineral resources on the OCS. A Negotiated Noncompetitive Agreement pursuant to 30 CFR part 583, would be negotiated among BOEM, USACE, and NASA to allow the dredging of sand from the OCS. Under Section 404 of the Clean Water Act (CWA), the USACE Regulatory Program has jurisdiction over the disposal of dredged and fill material in waters of the U.S. Similarly, under Section 10 of the Rivers and Harbors of Act of 1899, the USACE has jurisdiction over the placement of structures and work conducted in navigable waters of the U.S. NASA would require authorizations from both the BOEM and the USACE to undertake the proposed project. BOEM's purpose is to authorize the use of sand/sediment resources from Offshore Shoal A to facilitate the protection of the Wallops Island shoreline through beach renourishment. The proposed borrow area location is on the OCS and, therefore, within BOEM's jurisdiction. BOEM's need is to respond to a request from NASA for OCS sand, according to its authority under Public Law 103-426 [43 U.S.C. 1337(k)(2)] to negotiate rights to OCS sand resources for shore protection projects.

In addition to their regulatory role in the project, the USACE Norfolk District is involved in project design, construction, and monitoring of SRIPP on NASA's behalf. Since issuing their 2010 ROD and 2013 and 2019 FONSIs, NASA and USACE oversaw the initial seawall extension, construction of breakwaters, and renourishment of the beach three times (2012, 2014, and 2021). The purpose of

USACE's Proposed Action is to consider NASA's request for authorization to: 1) discharge fill material into waters of the U.S. under Section 404 of the CWA; and 2) conduct work in navigable waters of the U.S. under Section 10 of the Rivers and Harbors Act. The USACE Proposed Actions are needed to fulfill its jurisdictional responsibilities under the CWA and the Rivers and Harbors Act.

1.5 PUBLIC AND OTHER AGENCIES INVOLVEMENT/ENGAGEMENT

1.5.1 SCOPING

Scoping letters were sent to federal, state, tribal, and local agencies on January 19, 2024, requesting comments on the SPP project. **Table 1.5-1** provides a brief summary of the issues raised during the scoping period. In addition, a project website has been established to keep interested parties informed and to encourage public input: https://www.nasa.gov/goddard/memd/nepa/shoreline/

Table 1.5-1 Summary of Scoping Comments

Comment	Addressed in EA?	If yes, location in EA; if no, rationale
EA should include a discussion of purpose and need and the success of previous shoreline protection efforts	Yes	1.0
Alternatives with and without beach nourishment should be considered	Yes	2.0
Evaluate optimal configuration and placement of breakwaters to retain sediments and minimize impacts to transport and hydrodynamics in the project vicinity	Yes	2.2.2
Recommend alternate configuration and placement of breakwaters be evaluated	Yes	2.2.2
EA should highlight how the various components will be designed, constructed, and operated to avoid and minimize impacts where possible, including dredging locations and methods	Yes	2.0
EA should include sea level rise projections	Yes	3.2.1.1
Joint Permit Application is required	Yes	3.3
Seawall extension could affect Assawoman Island	Yes	3.4
Evaluate greenhouse gas emissions	Yes	3.5
Evaluate environmental justice impacts	No	No longer required, relevant EOs have been rescinded
Likely impacts to benthic habitat, Essential Fish Habitat (EFH), migratory birds, tidal and nontidal vegetation, marine mammals, and species of special concern should be fully assessed.	Yes/No	3.7 (Benthos) 3.8 (Wildlife) 3.9 (Fisheries and EFH) 3.10 (Marine Mammals) 3.11 (Special Status Species) Vegetation would not be affected
Coordination with USFWS is required	Yes	3.11
Recommend monitoring and surveys	Yes	4.2
EA must include mitigation measures	Yes	4.2
Potential impacts to submerged aquatic vegetation (SAV) and shellfish beds	No	There are no SAV or shellfish beds in the project area.

Legend: EA = Environmental Assessment

NASA sent scoping letters to six federally recognized Native American tribes and one affiliated Native American tribe with potential cultural affiliation to the project site on January 19, 2024. These tribes were the Catawba Indian Nation, Chickahominy Indian Tribe, Nansemond Indian Tribal Association, Pamunkey Indian Nation, Rappahannock Tribe of Virginia, Chickahominy Indians Eastern Division, and Pocomoke Indian Nation.

1.5.2 DRAFT EA

NASA placed an advertisement in the *Eastern Shore Post, Shore Daily News,* and *The Daily Times* to announce the availability of the Draft EA. Federal, state, and local agencies and members of the public will be invited to provide written comments on the Draft EA over a 30-day period. Print copies of the Draft EA will be available for review at the following locations: Chincoteague Island Library, Chincoteague, Virginia; Eastern Shore Public Library, Parksley, Virginia; and the WFF Visitor Center, Rt. 175, Wallops Island, Virginia (open to the public Fridays and Saturdays). Print copies will also be available upon request.

1.5.3 FINAL EA

The Final EA will incorporate changes, as appropriate, resulting from substantive comments. Changes would include supplementing, improving, or modifying the analyses, and factual corrections. NASA will place an advertisement in the *Eastern Shore Post, Shore Daily News,* and *The Daily Times* to announce the availability of the Final EA and the FONSI (if warranted). Electronic versions of the Final EA and FONSI (if warranted) will be available on the NASA public website. Print copies will be available upon request.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This section provides a discussion of the alternatives under consideration to restore the Wallops Island shoreline infrastructure protection area. The initial cycle of the 50-year SRIPP project was completed in August 2012, the second cycle that repaired the damaging effects from Hurricane Sandy was completed in September 2014, and the third and most recent cycle was completed in 2021. The Proposed Action in this EA is to perform additional beach renourishment, breakwater construction, and/or seawall repair and extension taking into consideration new information. This Action is needed to maintain the function of the Wallops Island beach berm and dune system, which is vital to protecting critical NASA, Navy, Air Force, and VSA MARS assets.

2.2 PROPOSED ACTION

Consistent with the Action Alternatives described in detail in the *2010 Final SRIPP PEIS* (NASA 2010a), reexamined in the *2013 Final Post-Hurricane Sandy EA* (NASA 2013), and implemented following completion of the *2019 Final Shoreline Enhancement and Restoration Project EA* (NASA 2019a), NASA's Proposed Action would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. **Section 2.3**, **Alternatives Carried Forward for Detailed Analysis**, presents the descriptions of three Action Alternatives. The Proposed Action could involve a combination of the following (see **Figure 2.2-1**):

- sand renourishment within an approximate 15,000-foot section of shoreline from the south property line on Wallops Island north to the location of the fire station;
- construction of up to 12 breakwaters in the nearshore area between the existing breakwaters;
- repairs and extension of the existing seawall.

Figure 2.2-1 Project Area and Components

Shoreline stabilization activities would occur in phases depending on a number of factors, including infrastructure prioritized for protection, the pace and location of erosion, and the availability of funding. For example, a section of beach that experiences rapid erosion in a storm event could be renourished followed by construction of breakwaters in one year, and in another year additional renourishment, breakwaters construction, or both, could occur in another area.

2.2.1 RENOURISHMENT PROCESSES

Renourishment processes (i.e., beach fill mobilization, dredging and sand placement) under the Proposed Action are described in **Sections 2.2.1.1 to 2.2.1.3 (Figures 2.2-2 and 2.2-3)**. These processes would be consistent with those described in detail in previous NEPA analyses (NASA 2010a; NASA 2013; NASA 2019a). For this Proposed Action, sand material for beach renourishment would come from OCS Unnamed Shoal A. All equipment placement and laydown areas would be in areas previously surveyed (NASA 2010a, 2013, 2019a).

Figure 2.2-2 Beach Fill Mobilization/Onshore Staging (left) and Offshore Equipment (right)

Figure 2.2-3 Dredging and Sand Placement Process with Trailing Suction Hopper (left) and Bulldozers Grading Discharged Sand (right)

2.2.1.1 Beach Fill Mobilization

The renourishment process would begin with the dredge contractor transporting equipment and materials to the project site. Offshore equipment would include several miles of discharge pipe, pumpout buoys, and multiple barges, tugboats, derricks, and smaller crew transportation vessels. It is expected that the discharge lines would be assembled inside the protected waters of Chincoteague Inlet, rafted together, and then positioned by mechanical means at their ultimate placement site, as weather conditions allow. Onshore, it is expected that sections of the discharge lines would be trucked in, staged, and placed using a front-end loader or crane. Other onshore support equipment would be trucked in and may include multiple bulldozers, several all-terrain vehicles, an office trailer, mobile generators, construction site lighting, and mobile fuel tanks. The mobilization is expected to take 30 to 45 days. Laydown areas would be located on previously cleared areas and would not involve additional disturbance.

Once the dredge hopper is filled, the dredge would transport the material to a pump-out station that would be placed at a water depth of approximately 30 feet, approximately 2 miles offshore of the placement area. The pathway from Unnamed Shoal A to the pump-out buoy is not a straight line, but a dogleg shape with a turning point, for the purpose of avoiding Chincoteague Shoal and Blackfish Bank. The distance from the turning point to the pump-out buoy is approximately 8 miles. The one-way distance from Unnamed Shoal A to the pump-out buoy is approximately 14 miles. It is estimated that the pump-out station would be moved up to 10 times to accommodate transit by the dredge. Booster pumps may be needed to aid the offloading of sand from the pump-out buoy to the shoreline.

2.2.1.2 Dredging and Sand Placement Process

Upon receipt of all necessary authorizations, the USACE (on NASA's behalf) would contract for the dredging and placement of sand. Munitions and explosives of concern (MEC) screens would be added to the dragheads of trailing hopper dredges during use. The dredging process would be cyclical in nature, with the vessel transiting to the borrow site, lowering its drag arms, filling its hopper, and returning to a discharge site. The dredge would connect to the floating end of the submerged pipeline offshore of the beach renourishment area. The sand/water slurry would be pumped from the dredge site through this pipeline to the beach. Up to several miles of submerged steel pipeline would be temporarily placed on the seafloor in areas previously cleared for cultural resources and/or on hardbottom. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010a, 2013, 2019a).

Nearshore, it is expected that the contractor would employ one or more anchored pump-out stations. As the sand slurry is discharged onto the shoreline, bulldozers would grade the material to the desired design template.

Dredging would be conducted in a manner consistent with the recommendations of two publications examining the effects of dredging of offshore shoals in the mid-Atlantic as presented in the *2010 Final SRIPP PEIS* (CSA International Inc. et al. 2009; Dibajnia and Nairn 2010). More specifically, NASA would at a minimum:

- Dredge offshore sand from Unnamed Shoal A sub-area A-1 (an accretional area);
- Dredge over a large area and not create deep pits;
- Require that dredge cut depth not be excessive;
- Require that dredging not occur over the entire length of the shoal;
- Require MEC screening at the drag head;
- Require a lookout bridge watch be present on the dredge at all times from April 1–November 30; and
- If a listed whale is spotted within 1 kilometer (km) (0.62 mile) of the dredge, stop dredging until the whale is farther than 1 km from the dredge.

Sand would be placed onshore along 15,000 feet of beach extending from just north of the southern property line to the north near the fire station. The tidal cycle would influence the location on the beach within which the equipment would work for a given dredge load. During low tide, the equipment would likely concentrate on the intertidal and subtidal zones, whereas, during high tide, work would be focused on the upper beach berm and dune. After each section of beach is confirmed to meet design criteria, the process would continue in the longshore direction, with sections of discharge pipe added as it progressed. At the conclusion of dredging and beach fill, the construction contractor would begin the demobilization phase of the project, the largest task of which would be the disassembly, staging, and loading of discharge piping for transport off-site.

2.2.2 BREAKWATER CONSTRUCTION

Up to 12 breakwaters would be constructed nearshore between the two existing sets of breakwaters. Breakwaters would vary in height and width depending on the elevation of the sea bottom. Each breakwater covers between 11,000 and 12,000 square feet of bottom, for a total of up to approximately 144,000 square feet (3.30 acres). Breakwaters could be placed in sets of 2–3 or individually, approximately 200 feet offshore (USACE 2025). Though construction materials may vary over the life of this project, previously at Wallops Island breakwaters have been constructed with a 6-foot layer of Type I Armor Stone, a center core of Virginia Department of Transportation Class II stone. Breakwaters may be placed on underlying 12-inch marine filter mattresses and/or a layer of geotextile fabric.

The specific size, number, and placement of breakwaters would be a function of available funding, local conditions, and modeling by the USACE to determine maximum effectiveness and minimizing impacts to sediment transport and hydrodynamics in the project vicinity.

Breakwater construction via barge would be consistent with that evaluated in the *2010 Final SRIPP PEIS* and *2019 Final Shoreline Enhancement and Restoration Project EA*. In 2020, fall and winter storm and surf conditions created a potential risk to personnel and equipment and the project schedule. To mitigate the risks, several breakwaters were constructed using temporary bulkheads. Under this Proposed Action, breakwater construction may include the use of barges, temporary trestle system, or temporary bulkheads. Since construction by temporary bulkhead would be the most impactful method of installing the breakwaters, this construction method has been used to analyze effects. If breakwaters are constructed by barge or temporary trestle, it is anticipated that any effects would be of a lesser magnitude than temporary bulkheads. Construction of each breakwater is estimated to take approximately 2 months. The materials and equipment would be transported by truck to and from the island via State Road 803 to South Bypass Road to a staging area. The staging area location and size would be the same as was established in 2021 and used during construction of the temporary bulkhead.

2.2.2.1 Build Breakwaters by Barge

The rocks and other materials for constructing each breakwater would be transported to the breakwater construction area by rail, offloaded, and then barged to the handling or placement site offshore of Wallops Island. Placement would occur in the water using a barge and heavy lifting equipment. These breakwaters would be permanent structures as removal would be impractical and cost prohibitive (NASA 2010a).

2.2.2.2 Build Breakwaters Using Temporary Bulkheads

The equipment would be transported via truck from contractor staging sites and delivered through the Wallops Island gate into the staging area (as described above). The existing access would be maintained with gravel to minimize any effect to the NASA Erosion and Sediment Control plan. The installation of temporary bulkhead structures would be through using a steel sheet pile. Each temporary bulkhead would be roughly 130 feet long by 30 feet wide and use approximately 1,000 cubic yards of temporary sand (same as used for beach fill) per access. All equipment and remaining materials after installation would be trucked off-site to the contractor staging area. The process to build each breakwater using temporary bulkheads would include the following steps or similar:

- place equipment (e.g., crawler crane, hydraulic excavator, and vibratory hammer) and material (e.g., steel sheet piles, timber mats, high density polyethylene mats, marine mattresses, armor stone, and core stone) in the staging area;
- fill a sand template;
- install steel pilings using vibratory hammer and crane to create wall (i.e., bulkhead) at each breakwater location;

- place mats and marine mattress;
- transfer armor stone and core stone from staging area to placement site per design plan; and
- extract steel pilings using vibratory hammer and crane, move to the next breakwater location, and repeat the construction process.

2.2.2.3 Build Breakwaters Using Temporary Trestle System

The breakwater materials and construction equipment would be transported by truck to and from the island via State Road 803 to South Bypass Road to a staging area (as described above). The process to build each breakwater using a temporary trestle system would include each of the steps listed above, with the exception of creating a bridge (i.e., trestle) at each breakwater location. Instead, a series of steel pilings would be installed and beams placed across the top of the piles to form temporary piers. Once the piers were constructed, beams would be placed and span pier to pier with the beam placement aligning with the chosen crane/lifting equipment's track or wheelbase. The system would be designed as 30 feet to 40 feet wide with decking material comprised of crane mats and would be placed next to the breakwater location.

Following construction of the last breakwater, the steel pilings would be removed using vibratory hammer and crane and placed in the staging area prior to transport off-site. Regular beach profile monitoring of the project site and biannual monitoring of the constructed breakwaters would be conducted.

2.2.3 Element Common to All Alternatives

2.2.3.1 Seawall Repair and Extension

The existing rock seawall is located along 15,900 feet of the Wallops Island shoreline . Construction of this seawall began in 1992 and continues to protect WFF infrastructure within the eroding portion of the shoreline from damage due to storms and large waves. The wall has prevented overwash and storm damage, but erosion of the shoreline seaward of the wall has continued, resulting in an increased risk of damage to the seawall and the missions and infrastructure it protects. The SRIPP analyzed potential effects from repairing and extending the seawall to a maximum length of 4,600 feet south of its southernmost point (NASA 2010a). During the first SRIPP cycle, the seawall was extended approximately 1,430 feet south with the premise that the remaining 3,170 feet extension would be implemented with future funding. The seawall extension would consist of the placement of rocks weighing approximately 5 to 7 tons on a 1 to 1.5 slope. The top of the seawall would be approximately 14 feet above the normal high-tide water level after completion, depending on the extent of existing shoreline retreat at that time. The seawall may be repaired at any location.

2.2.3.2 Construction Monitoring

Should work be conducted between March 15 and August 31, NASA would ensure that the work site and adjacent areas would be surveyed for nesting birds and sea turtles by a biological monitor on a daily basis. Survey protocols would be the same as those developed for the initial beach fill and seawall extension (NASA 2025a). The biological monitor would coordinate directly with on-site project employees to ensure that all parties are made aware of nesting status and the potential need to suspend or relocate work activities within 1,000 feet of a nest until chicks have fledged and/or sea turtles have hatched.

Beach profile monitoring of the project site would continue to be conducted biannually, in the spring and fall (or as funding allows) of the previously constructed beach and breakwaters.

2.3 ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

2.3.1 NO ACTION ALTERNATIVE

NEPA requires that an agency "include the alternative of no action" as one of the alternatives it considers. The No Action Alternative serves as a baseline against which the effects of the Proposed Action are compared. Under the No Action Alternative for this SPP Tiered EA, NASA would not renourish the Wallops Island shoreline infrastructure protection area beach and dune system; provide additional breakwaters to reduce the potential for damage to, or loss of, NASA, Navy, Air Force, and VSA MARS assets on Wallops Island from storm events and erosion; or repair or extend the existing seawall.

2.3.2 ALTERNATIVE 1: BEACH RENOURISHMENT AND BREAKWATER CONSTRUCTION

Alternative 1 would renourish the beach along the Wallops Island shoreline infrastructure protection area using sand material sourced from Unnamed Shoal A. Beach renourishment would involve employing the steps for preparing, executing, and completing a renourishment cycle as described in **Section 2.2.1**. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010a, 2013, 2019a).

Under Alternative 1, approximately 3 million cubic yards of sand material from Unnamed Shoal A may be placed in the shoreline areas, over the next seven years. Because of overflow from the hopper dredge at the borrow site during dredging and losses during discharge and placement, a larger volume of material would need to be dredged to meet the targeted fill volume. Sediment losses during dredging and placement operations are assumed to be up to 50 percent. Using this estimate, the dredged volume for the proposed renourishment would be approximately 4.5 million cubic yards of sand. The dredging and beach fill portion of the project would take approximately 3 months as described in **Section 2.2.1**.

Alternative 1 would also involve constructing up to 12 new detached breakwaters and repair and extension of the seawall. The breakwaters would be positioned offshore along the shoreline infrastructure protection area. See **Section 2.2.2** for the description of the materials and the mode of transport to the construction site. **Figure 2.2-1** illustrates the project area and Proposed Actions.

2.3.3 ALTERNATIVE 2: BEACH RENOURISHMENT

Alternative 2 would renourish the beach along the Wallops Island shoreline infrastructure protection area using material from Unnamed Shoal A. **Section 2.2.1** provides a detailed description of the process for preparing, executing, and completing a renourishment cycle. Under Alternative 2, up to 3.0 million cubic yards of sand material from Unnamed Shoal A may be placed in the shoreline areas. Refer to **Figure 2.2-1** for an illustration of the potential beach renourishment area. Because of overflow from the hopper dredge at the borrow site during dredging and losses during discharge and placement, a larger volume of material would need to be dredged to meet the targeted fill volume. Sediment losses during dredging and placement operations are assumed to be up to 50 percent. Using this estimate, the dredged volume for the proposed renourishment under Alternative 2 would be approximately 4.5 million cubic yards of sand. The dredging and beach fill portion of the project would take approximately 3 months. As described in **Section 2.2.3.2**, pre- and post-dredging surveys and regular beach profile monitoring of the project site would be conducted. Periodic monitoring of the previously constructed breakwaters, as described in **Section 2.2.2**, would continue to be conducted. Alternative 2 would also involve repair and extension of the seawall.

2.3.4 Alternative 3: Breakwater Construction

Alternative 3 would involve the construction of up to 12 new breakwaters, over the next seven years, without beach renourishment. The breakwaters would be positioned offshore along the shoreline infrastructure protection area between the existing sets of breakwaters. Refer to **Figure 2.2-1** for an illustration of the potential breakwater construction area. **Section 2.2.2** provides the description of the materials and the mode of materials transport to the construction site, and the construction processes that may be used. As described in **Section 2.2.3.2**, periodic monitoring of the constructed breakwaters would be conducted. Alternative 3 would also involve repair and extension of the seawall.

2.4 Alternatives Considered but Not Carried Forward

2.4.1 Beach Renourish Via Backpassing from North Wallops Island

In 2021, sand excavated to the mean low water line from north Wallops Island beach was used for the renourishment of the shoreline infrastructure protection area. While this area is expected to continue to accrete as a result of the littoral transport of sand from the beach, as well as from Assateague Island, recovery is expected to take from five to six years (NASA 2019a). In addition, the terms of the June 2019 U.S. Fish and Wildlife Service (USFWS) biological opinion (BO) anticipated backpassing would not be expected for 10 years from the date of the BO, but rather an offshore shoal would be used for interim renourishments (USFWS 2019). Therefore, this alternative was not considered for analysis.

2.4.2 Constructing Breakwaters Outside the Proposed Limits

NASA proposed a larger area of shoreline for construction of breakwaters, including offshore areas north and south of the existing breakwaters. The USACE Engineering Research and Development Center conducted modeling to determine the shoreline response over a 5-year period to placing new breakwaters 200 feet offshore at specific locations. These specific locations were identified as Areas 1–3 by NASA. Area 2 is located approximately 1,500 feet south of the southernmost set of three breakwaters. Based on modeling results, placing breakwaters in this area would result in erosion along the southern portion of NASA’s property and the USFWS Assawoman Island property south of Wallops Island. Based on the modeling results, NASA would not place breakwaters south of the existing southernmost set, and this alternative is not carried forward for analysis.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS APPROACH

NEPA requires focused analysis of the areas and resources potentially affected by an action or alternative. It also provides that an EA should consider, but not analyze in detail, those areas or resources not potentially affected by the proposal. NEPA also requires a comparative analysis that allows decision-makers and the public to differentiate among the alternatives and for an EA to discuss effects in proportion to their significance and present only enough discussion of other than significant issues to show why more study is not warranted.

The analysis in this EA considers the existing conditions of the affected environment and compares those to conditions that might occur should NASA implement the alternatives, including the No Action Alternative.

The *2010 Final SRIPP PEIS* presented a complete description of all project-related resource areas with relevant, updated descriptions and information presented in the *2013 Post-Hurricane Sandy EA* and *2019 Shoreline Enhancement and Restoration EA*. As such, only those resources that have measurably changed or would be notably affected are discussed in this EA; all other resources are incorporated by reference.

3.1.1 AFFECTED RESOURCES

Resources that have the potential to be affected by implementing the Proposed Action are carried forward for detailed analysis in this SPP EA. **Table 3.1-1** provides the list of resources carried forward for detailed analysis, the section the analysis is located, and regulatory permits that would be required prior to implementing the Proposed Action. Numerous other resources were considered; however, the potential effects would be negligible, as documented in the *2010 Final SRIPP PEIS*. As such, the list of resources not carried forward for detailed analysis warrant no further evaluation. **Table 3.1-1** also provides the list of resources not carried forward for detailed analysis.

Table 3.1-1 Resources Considered in this SPP EA

Resource	Detailed Analysis in this EA?	EA Section	Regulatory Consultation or Permit
Coastal Geology and Processes	Yes	Section 3.2	none
Water Quality	Yes	Section 3.3	Individual Permit from USACE Dune and Subaqueous Permits from VMRC
Coastal Zone Management	Yes	Section 3.4	Federal Consistency Determination with DEQ
Air Quality	Yes	Section 3.5	none
Noise	Yes	Section 3.6	none
Benthos	Yes	Section 3.7	none
Wildlife	Yes	Section 3.8	none
Fisheries and Essential Fish Habitat (EFH)	Yes	Section 3.9	EFH Assessment with NOAA Fisheries
Marine Mammals	Yes	Section 3.10	none
Special Status Species	Yes	Section 3.11	ESA Consultation with NOAA Fisheries and USFWS
Cultural Resources	Yes	Section 3.12	NHPA Consultation with SHPO and tribes

<table>
<tr><th>Resource</th><th>Detailed Analysis in this EA?</th><th>EA Section</th><th>Regulatory Consultation or Permit</th></tr>
<tr><td>Floodplains</td><td>No</td><td colspan="2" rowspan="10">The 2010 Final SRIPP PEIS concluded there would be a negligible effect to each of these resources. The 2010 Final SRIPP PEIS analyses for these resources remain current and valid.</td></tr>
<tr><td>Hazardous Materials and Waste</td><td>No</td></tr>
<tr><td>Vegetation</td><td>No</td></tr>
<tr><td>Plankton</td><td>No</td></tr>
<tr><td>Invertebrate Nekton</td><td>No</td></tr>
<tr><td>Land Use</td><td>No</td></tr>
<tr><td>Infrastructure and Utilities</td><td>No</td></tr>
<tr><td>Socioeconomics</td><td>No</td></tr>
<tr><td>Health and Safety</td><td>No</td></tr>
<tr><td>Recreation Resources</td><td>No</td></tr>
</table>

Legend: DEQ = Virginia Department of Environmental Quality; EA = Environmental Assessment; EFH = Essential Fish Habitat; NOAA = National Oceanic and Atmospheric Administration; PEIS = Programmatic Environmental Impact Statement; SHPO = State Historic Preservation Office; SRIPP = Shoreline Restoration and Infrastructure; USACE = US Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service; VMRC = Virginia Marine Resources Commission

3.2 Coastal Geology and Processes

The interaction of wave, wind, and tidal energies determines how erosional and depositional processes shape coastlines. Sections 3.1.4 and 3.1.5 of the *2010 Final SRIPP PEIS* describe in detail the coastal processes influencing the project area and updated information is presented in Section 3.1.1 of the *2013 Final Post-Hurricane Sandy EA* and Section 3.2 of the *2019 Final Shoreline Enhancement and Restoration Project (SERP) EA.* This section provides a summary of information presented in these documents with information and sources updated where applicable, and describes effects expected to result from the Proposed Action.

3.2.1 Affected Environment

Wallops Island is one of the 12 Virginia barrier islands that front the Atlantic Ocean. Though it is morphologically similar to neighboring islands and is shaped by the interplay of waves and tide, localized processes occurring over both the short and long term have led to Wallops Island being distinct from other barrier islands in Virginia. Generally, net sediment transport along the Virginia barrier islands is from north to south. However, along much of Wallops Island, the direction of net longshore sediment transport is toward the north, due primarily to the growth and resulting wave sheltering effects of Fishing Point at the south end of Assateague Island (King et al. 2010). In addition to the northerly sediment transport, the westward drift of Chincoteague Inlet ebb shoals in the cross-shore direction contributes to the rapid growth of north Wallops Island beach. This sediment accumulation is changing the existing north-south shoreline orientation to one that is oriented more east-west.

Of the Virginia barrier islands, Wallops Island is the only one that has been developed or nourished. With the exception of federally sponsored recreational beach parking area repairs on south Assateague Island, the other islands are managed for conservation and are driven by natural forces. Sediment samples collected on Wallops Island in 2007 and 2009 indicated native median grain sizes ranging from approximately 0.18 to 0.27 millimeter, corresponding to fine sand per the American Society for Testing and Materials unified classification system. Samples collected during the initial beach fill indicate that the sediment within the nourished portion of the beach is coarser, with median grain sizes between approximately 0.28 and 0.54 mm, corresponding to fine to medium sand per American Society for Testing and Materials (NASA 2013).

Unnamed Shoal A, around 1,800 acres (over 2.5 square miles), is an unvegetated, offshore sand ridge located roughly 7 miles east of Assateague Island and 11 miles northeast of Wallops Island. Approximately 515 acres of the sub-area A-1 were dredged for the initial beach renourishment in 2012. In both 2012 and 2014, material was removed in a generally uniform manner and the majority of the borrow area experienced changes in shoal elevation of less than 6 feet.

3.2.1.1 Consideration of Storm Events and Coastal Flooding

Coastal environments are highly dynamic and particularly vulnerable to frequent flooding, and increasingly intense, unevenly distributed rain events result in detrimental impacts to WFF infrastructure. Most of Wallops Island is less than 10 feet above mean sea level (MSL), with the sandy area approximately 6.9 feet above MSL and the highest elevation approximately 15 feet above MSL. Coastal flooding, storm surge, hurricanes, and nor'easters increasingly make natural and built systems vulnerable to disruption or damage.

For the purposes of projecting changes affecting Wallops Island, MSL data collected by the National Oceanic and Atmospheric Administration (NOAA) from two nearest stations (Wachapreague, Virginia, and Ocean City, Maryland) were examined. Data collected from long-term tidal gauges in Wachapreague indicate that between 1978 and 2024, the relative sea level trend is 5.75 millimeters per year (+/-0.58 mm/year), the equivalent to a change of 1.89 feet in 100 years (NOAA 2024a). At Ocean City, data indicate the relative sea level trend is 5.28 mm/year (+/- 0.69 mm/year) based on monthly MSL data from 1975 to 2024, which is equivalent to a change of 1.73 feet in 100 years (NOAA 2024b).

3.2.2 ENVIRONMENTAL CONSEQUENCES

3.2.2.1 No Action Alternative

Under the No Action Alternative, Unnamed Shoal A would not be dredged, the Wallops Island shoreline infrastructure protection area beach and dune system would not be renourished, additional breakwaters would not be constructed, and the existing seawall would not be repaired or extended. Without implementation of these protection measures, the shoreline would continue to erode, and the existing seawall would eventually fail to provide infrastructure protection.

3.2.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

As with previous renourishment projects, removal of material from Unnamed Shoal A would be done in a uniform manner in accordance with the mitigation requirements described in **Section 2.2.1.2**. Survey area cross-section profiles collected of the shoal before and after the 2012 and 2014 dredge events show the effectiveness of these measures (Bonsteel 2015).

Modeling performed in support of the *2010 Final SRIPP PEIS* indicated that if a 2-square-mile area of the shoal was "planed" to an elevation necessary to obtain up to 10 million cubic yards of material, the induced effects on the Assateague Island shoreline could not be distinguished from those changes occurring as a result of natural variation in sediment transport. An estimated 3.42 million cubic yards of sediment were removed for the 2012 and 2014 renourishments. Modeling conducted from the 2012 post-dredging survey and the 2014 pre-dredging survey, concluded that approximately 238,000 cubic yards of sand had accreted between the 2012 and 2014 renourishments (Bonsteel 2015). More recent bathymetric survey data are not available at this time. It is not expected that the additional lowering of the shoal would cause any effects to the Assateague Island shoreline. Dredging the borrow area would again create steeply sloped areas of micro-topography, which would be smoothed by tidal and wave energy in the years following the dredge event. The lowering of the shoal's topography would be a longer-term effect, with the shoal maintaining the same general morphology but at a lower elevation and different profile. The use of draghead screen to preclude the uptake of unexploded ordnance would also cause larger material to be screened from uptake and left on the bottom, potentially resulting in a "hardening" of the sediments. Overall, consequences to the offshore shoal would be further reduced because of NASA's commitment to implementing the minimization measures detailed in **Section 2.2.1.2**.

Renourishment of the beach at the Wallops Island shoreline infrastructure protection area would result in a new shoreline extending several hundred feet offshore from the current shoreline. The new beach profile would increase wave dissipation and provide onshore infrastructure protection from storm events. After the initial placement, there would be an equilibration period during which there would be a rapid loss of sand offshore to fill in deeper portions of the beach profile. The new beach profile would continue to adjust to the minor changes in borrow material sediment size, local wind and wave, climate and tidal action. Adjustments may be episodic as spring tides and/or storms result in transport of the borrow material.

Over time, the new beach would be reshaped until it is in equilibrium with the natural forces and assume a normal profile (Wilson et al. 2017). However, this profile would shift with seasonal differences in wave action. Higher wave energy during the winter would likely steepen the beach profile with some of the sand moved offshore into a bar system. During the lower energy summer months, the beach profile would tend to flatten out as sand from the offshore bar system is moved back onto the beach face. The offshore beach dynamics would also be influenced by the littoral transport of the sand both to the north and to the south depending upon the direction of incident wave action. Transport to the north should be recaptured at the north end as wave action is diminished in the lee of Assateague Island. Transport to the south would eventually provide additional sand resources to the barrier islands south of Wallops Island.

The primary offshore effects of the beach renourishment would likely be the formation of an offshore sand bar system and changes in local bathymetry that reduce the slope of the offshore portion of the beach profile. Any offshore bar system that may form would be both dynamic and seasonal. Wave action would constantly form and reform these bars moving them onshore, offshore, and along the shore. They may also appear and disappear depending on wind and wave action and storm events. There would also be a seasonal component to their location and configuration with bars being more prominent during the winter and less pronounced during the summer, as described above.

Breakwater Construction

Construction of nearshore breakwater structures would result in a build-up of sediment along the shoreline perpendicular to the breakwaters. Temporary and minor adverse effects on sediments are anticipated in the immediate vicinity of the breakwater during the construction period. Use of offshore parallel breakwaters in conjunction with beach renourishment would allow an accumulation of the sand landward of the breakwaters without substantially interrupting the normal littoral transport. The greatest amount of erosion and accretion would occur immediately adjacent to each breakwater and would exponentially decrease with distance from the breakwater series. The fact that the breakwaters are designed to "leak" sand would help prevent the structures from impeding the normal transport of the sand south to Assawoman Island or to the north end of Wallops Island.

The offshore effects of the breakwaters would be temporary alterations to littoral transport that diminish as the system approaches equilibration. Relatively minor permanent changes in bathymetry adjacent to the breakwaters would be measurable as slight depressions immediately seaward of the breakwaters as the nearest sand bars would tend to be displaced toward the up-coast and downcoast ends of the structures. Potential effects to Chincoteague Inlet were discounted from the breakwater analysis, design, and modeling based upon biannual monitoring conducted by USACE, Norfolk District (USACE 2018b).

Seawall Repair and Extension

The *2010 Final SRIPP PEIS* assessed extending the seawall by 4,600 feet to the south of the seawall constructed in 1992. To date, approximately 1,430 feet of this has been constructed. The remaining 3,170 feet extension could be implemented with future funding during the next seven years. The extension of the existing rock seawall would limit shoreline retreat along its length, preventing overwash and storm damage. Erosion of the shoreline seaward of the wall has continued, resulting in an increased risk of damage to the seawall.

3.2.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are similar to those described for Alternative One for Beach Renourishment and Seawall Repair and Extension. Without the breakwaters, loss of placed sand during storm events could be exacerbated.

3.2.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 would be similar to those described for Alternative One for Breakwater Construction and Seawall Repair and Extension. Without renourishment, breakwaters would be placed closer to the existing shoreline and there would be less overall beach widening.

3.3 WATER QUALITY

This section briefly describes the surface and marine waters in and around Wallops Island. See Section 3.1.6 of the *2010 Final SRIPP PEIS* for the detailed description of the water resources within and adjacent to the project area. Updated information is presented in Section 3.1.2 of the *2013 Final Post-Hurricane Sandy EA* and Section 3.3.1 of the *2019 Final SERP EA.* This section provides a summary of information presented in these documents with information and sources updated where applicable and describes effects expected to result from the Proposed Action.

3.3.1 REGULATORY CONTEXT AND PERMITTING

The CWA of 1972 is the primary federal law that protects the nation's waters, including coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. Section 404 of the CWA established a permit program to regulate the discharge of fill material into waters of the U.S. Managed jointly by the USACE and the U.S. Environmental Protection Agency (EPA), the primary intent of the program is to minimize adverse effects to the aquatic environment. USACE is responsible for day-to-day administration and permit review, while EPA provides program oversight.

This project would take place in phases over the next seven years based on need and availability of funding. For each phase, a Joint Permit Application would be submitted to USACE, Virginia Department of Environmental Quality (VDEQ), Virginia Marine Resources Commission (VMRC), and Accomack County.

3.3.2 AFFECTED ENVIRONMENT

Numerous tidal inlets, marshes, bays, and creeks are found in and around Wallops Island. A section of the Virginia Inside Passage, a federally maintained navigation channel, separates Wallops Island and Wallops Mainland. The Atlantic Ocean lies to the east of Wallops Island. Surface waters in the vicinity of Wallops Island are primarily saline to brackish and are influenced by the tides and surface runoff (NASA 2019b). Marine waters in the affected environment, away from inlets, maintain a fairly uniform salinity range (32 to 36 parts per thousand [ppt]) throughout the year (NASA 2003). Winter surface water temperatures average 57 degrees Fahrenheit (°F) and average summer temperature is 77°F (Paquette et al. 1995). The salinity over the continental shelf ranges from 28 to 36 ppt, with lower salinities found near the coast and highest salinities found near the continental shelf break. Salinities are highest in continental shelf waters during winter and lowest in the spring (U.S. Navy 2009). As reported in the *2013 Post-Hurricane Sandy EA*, Unnamed Shoal A shows bedforms (i.e., ripples) on its surface, indicating that wave energy reaches the seafloor and mixing occurs throughout the water column.

3.3.3 ENVIRONMENTAL CONSEQUENCES

3.3.3.1 No Action Alternative

Under the No Action Alternative, the proposed beach renourishment, breakwater construction, and seawall repair and extension would not occur. Therefore, there would be no project-related effects to water quality.

3.3.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Sand placement in the shoreline infrastructure protection area could have short-term, minor effects on nearshore water quality resulting from the accidental release of petroleum products, or other contaminants from construction vehicles and heavy equipment used to transport and deposit the sand. The potential for such construction-related effects to occur would be minimal, as contractors would implement best management practices (BMPs) for vehicle and equipment fueling and maintenance, as well as site-specific spill prevention and control measures (NASA 2010a).

The *2010 Final SRIPP PEIS*, *2013 Final Post-Hurricane Sandy EA* and *2019 Final SERP EA* provided an analysis of the potential offshore water quality effects that could result from proposed dredging and pump-out buoy operations, which would cause sediment to be suspended in the water column. The length and shape of the plume depends on the hydrodynamics of the water column and the sediment grain size. Given that the dominant substrate material at the borrow site is fine to medium sand, it is expected to settle steadily and cause less turbidity and oxygen demand than finer-grained sediments would cause. No appreciable effects on dissolved oxygen, pH, or temperature are anticipated because the dredged material has low levels of organics and low biological oxygen demand. Additionally, dredging activities would occur within the open ocean where the water column is subject to constant mixing and exchange with oxygen-rich surface waters. Turbidity resulting from the dredging would be short-term (i.e., present for approximately an hour) and would not be expected to extend more than several thousand feet from the dredging operation. Accordingly, it is anticipated that the project would have only temporary minor effects on offshore water quality from beach replenishment activities.

Breakwater Construction

Construction of the breakwaters would have the potential to result in sediment suspension during placement of the materials and the movement of construction barges and vessels. Increases in suspended sediment would be temporary, localized, and would dissipate upon cessation of sediment disturbing activities. Rocks used for armoring and to construct the breakwaters would be made of “clean” material, further minimizing the potential for release of suspended material into the water column. Crane barges would be continually moved during construction, as would vessels carrying construction materials. Construction vessels would maintain at least two feet of clearance from the bottom of the ocean or work only at tide levels sufficient to keep the barges off the ocean bottom to further minimize sediment disturbance.

Assembling temporary bulkheads (or tresses) for constructing the breakwaters, instead of performing the work from a barge, would eliminate the potential risk of schedule delays and hazard to personnel and equipment from barge construction during fall and winter storm events or poor surf conditions.

Expected increases to suspended sediment concentrations related to vessel activity during construction would likely be minimal relative to background levels. Breakwater construction and temporary bulkhead installation activities may result in the accidental release of petroleum products or other contaminants to offshore waters from the barge/tenders or onshore in the construction area. Construction-related effects from breakwaters would be considered temporary in nature and would not likely be adverse; NASA would require its contractors to implement BMPs as well as site-specific spill prevention and control measures for the onshore and water-based activities.

Seawall Repair and Extension

Effects on nearshore water quality from seawall repair and construction are similar to those described for beach renourishment. There could be temporary effects on the nearshore environment and surface water resources due to the presence of construction vehicles on existing roads and during the use of heavy machinery on the beach from seawall construction. These construction activities may result in the introduction of petroleum products, heavy metals, or other contaminants to nearshore waters. However, BMPs for vehicle and equipment fueling and maintenance, as well as site-specific spill prevention and control measures, would be implemented during the repair and extension process (NASA 2010a). Therefore, it is anticipated that the seawall repair and extension activities would only have short-term, minor effects on nearshore water quality.

3.3.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative One for Beach Renourishment and Seawall Repair and Extension.

3.3.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative one for Breakwater Construction and Seawall Repair and Extension.

3.4 COASTAL ZONE MANAGEMENT

The following discussion specifically refers to compliance with the Coastal Zone Management Act of 1972 (16 U.S.C. sections 1451, et seq., as amended). In accordance with Section 307 of the Coastal Zone Management Act and 15 CFR 930 subpart C, federal agency activities affecting a land or water use or natural resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state's coastal management program.

Section 3.1.8 of the *2010 Final SRIPP PEIS* describes the coastal zone management within the project site and updated information is presented in Section 3.1.3 of the *2013 Final Post-Hurricane Sandy EA* and Section 3.4.2 of the *2019 Final SERP EA.* This section provides a summary of information presented in these documents with information and sources updated where applicable, and describes effects expected to result from the Proposed Action.

NASA prepared a Federal Consistency Determination (FCD) in conjunction with the *2019 Final SERP EA*. VDEQ concurred with NASA's determination of consistency; however, new FCDs are required for each shoreline protection cycle, including this Proposed Action. An FCD has been prepared for this project and submitted to VDEQ.

3.4.1 REGULATORY CONTEXT AND PERMITTING

VDEQ is the lead agency for the Virginia Coastal Zone Management (CZM) Program. Although federal lands are excluded from Virginia's CZM Program, any activity on federal land that has reasonably foreseeable coastal effects must be consistent with the enforceable policies of the CZM Program. The enforceable policies of the Virginia CZM Program were developed based on the laws and regulations of the Commonwealth (VDEQ 2021). Enforceable policies of the CZM Program that must be considered when making an FCD include the following:

- Tidal and Non-Tidal Wetlands
- Subaqueous Lands
- Dunes and Beaches
- Chesapeake Bay Preservation Areas
- Marine Fisheries
- Wildlife and Inland Fisheries
- Plant Pests and Noxious Weeds
- Commonwealth Lands
- Point Source Air Pollution
- Point Source Water Pollution
- Nonpoint Source Water Pollution
- Shoreline Sanitation

Definitions and administrative agencies for each enforceable policy of the Virginia CZM Program are described in the *Virginia Coastal Zone Management Program Enforceable Policies* (VDEQ 2021).

3.4.2 AFFECTED ENVIRONMENT

Barrier islands, such as Metompkin, Assawoman, Wallops, and Assateague Islands, are elongated, narrow landforms that consist largely of unconsolidated and shifting sand and lie parallel to the shoreline between the open ocean and the mainland. These islands provide protection to the mainland, recreation resources, important natural habitats, and valuable economic opportunities for the county. The northern end of Wallops Island also contains coastal primary sand dunes that serve as protective barriers from the effects of flooding and erosion caused by coastal storms. The Coastal Barrier Resources Act (Public Law 97-348, 16 U.S.C. 3501–3510), enacted in 1982, designated various undeveloped coastal barrier islands as units in the Coastal Barrier Resources System. Designated units are ineligible for direct or indirect federal financial assistance programs that could support development on coastal barrier islands; exceptions are made for certain emergency and research activities.

3.4.3 Environmental Consequences

3.4.3.1 No Action Alternative

Under the No Action Alternative, the proposed beach renourishment, breakwater construction, and seawall repair and extension would not occur. Therefore, there would be no project-related effects to Virginia's CZM Program.

3.4.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Under Alternative 1, the proposed beach renourishment, breakwater construction, and seawall repair and extension would occur as described in **Section 2.3.2**. The proposed activities would affect resources within Virginia's Coastal Zone. NASA would prepare an FCD consistent with the enforceable policies of Virginia's CZM Program for each implementation phase during the next seven years. The enforceable policies of the CZM Program that have the potential to be affected by Alternative 1 include: Subaqueous Lands, Dunes and Beaches, Marine Fisheries, Wildlife and Inland Fisheries, and Point Source Air Pollution. The following analysis of these enforceable policies for each proposed activity is described below.

Beach Renourishment

The proposed beach renourishment would affect existing subaqueous areas in the nearshore ocean environment. Elevated turbidity in marine waters would occur during and immediately after beach renourishment. There would be short-term, site-specific adverse effects on fish habitat within the fill placement areas due to temporary burial of existing benthic habitat and increased levels of turbidity during and immediately after sand placement. Benthic habitats would recover post-project. The renourishment process would also have minor, short-term effects on wildlife, resulting primarily from the removal of habitat, as well as disturbance and displacement by fill activities. The Proposed Action would not prevent or delay the continued propagation of any population, community, or species. The use of fossil fuel-burning equipment for the movement of sand would generate emissions of both criteria pollutants and greenhouse gases (GHGs). However, the project activities would not violate federal or Virginia air quality standards.

Breakwater Construction

The proposed breakwater construction would have similar effects to subaqueous lands, fish habitat, wildlife, and emissions of criteria pollutants as beach renourishment activities. Construction of breakwaters would take place in the water using a barge and heavy lifting equipment resulting in a build-up of sediment along the shoreline perpendicular to the breakwaters. The use of heavy lifting equipment would generate emissions of both criteria pollutants and GHGs. Since the location of breakwater construction is directly in water, elevated turbidity could potentially affect marine habitat and subaqueous lands in the construction area. Similarly, aquatic species would experience minor, short-term effects resulting from proposed in water construction work.

Seawall Repair and Extension

The proposed seawall repair and construction would have similar effects to subaqueous lands, fish habitat, wildlife, and emissions of criteria pollutants as beach renourishment activities. Maintenance of the existing seawall may include operation of heavy equipment and placing or replacing dirt and rock in previously disturbed areas behind the seawall. The equipment could generate emissions of both criteria pollutants and GHGs and could create elevated turbidity, affecting the marine fisheries and subaqueous lands within the area. Operations would also affect wildlife from habitat removal, as well as disturbance and displacement.

3.4.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension.

3.4.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension.

3.5 AIR QUALITY

The discussion of air quality is focused on the atmospheric layer at or below 3,000 feet above ground level, which the EPA accepts as the nominal height of the atmosphere mixing layer in assessing contributions of emissions to ground level ambient air quality under the Clean Air Act (CAA) (EPA 1992) for criteria and hazardous air pollutants (HAPs).

Section 3.1.9 of the *2010 Final SRIPP PEIS* describes in detail the regulatory context and types and quantities of air pollutants emitted from NASA's activities on Wallops Island. This section provides both a summary and updated information obtained since that time.

3.5.1 AFFECTED ENVIRONMENT

The region of influence for the air quality analysis includes Accomack County, which is part of the Northeastern Virginia Intrastate Air Quality Control Region, as defined in 40 CFR part 81.144 and the location of Wallops Island, which is where the construction activity would occur both onshore and offshore. Additionally, off-site emissions from mobile sources carrying materials would occur in other locations in Virginia due to the transport of materials, primarily from the Norfolk-Virginia Beach-Newport News (Hampton Roads), Virginia region. The mobile sources could include trucks, rail, and barges.

3.5.1.1 Criteria Pollutants

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The significance of the pollutant concentration is determined by comparing it to the federal and state ambient air quality standards. The CAA, and its subsequent amendments, established the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 (PM_{10}) and 2.5 ($PM_{2.5}$) microns in diameter, and lead. These standards represent the maximum allowable atmospheric concentrations that may occur while ensuring protection of public health and welfare, with a reasonable margin of safety. The CAA requires states to develop a general plan to attain and maintain the NAAQS and a specific plan for each non-attainment or maintenance pollutant. These plans detail how a state will ensure attainment and compliance with the NAAQS for that pollutant. These plans, known as State Implementation Plans, are developed by state and local air quality management agencies and after submitted to the EPA for approval. Areas that exceed a federal air quality standard are designated as non-attainment areas. Accomack County, where Wallops Island is located, is in attainment for all criteria pollutants. For this reason, General Conformity does not apply and is not addressed in this document. **Table 3.5-1** lists the NAAQS standards for each criteria pollutant. Lead is not included in **Table 3.5-1** or in the air quality analysis because there are no attainment issues for the region and no sources of lead associated with the proposed action.

Table 3.5-1 State Adopted Federal Air Quality Standards

Air Pollutant	Averaging Time	Federal Primary Standard	Federal Secondary Standard
CO	1-hour 8-hour	35 ppm 9 ppm	None
NO_2	1-hour Annual	100 ppb 53 ppb	None 53 ppb
PM_{10}	24-hour Annual	150 µg/m^3 None	150 µg/m^3 None
$PM_{2.5}$	24-hour Annual	35 µg/m^3 9 µg/m^3	35 µg/m^3 15 µg/m^3
O_3	8-hour	0.070 ppm	0.070 ppm
SO_2	1-hour 3-hour 24-hour Annual	75 ppb None None None	None None None 10 ppb

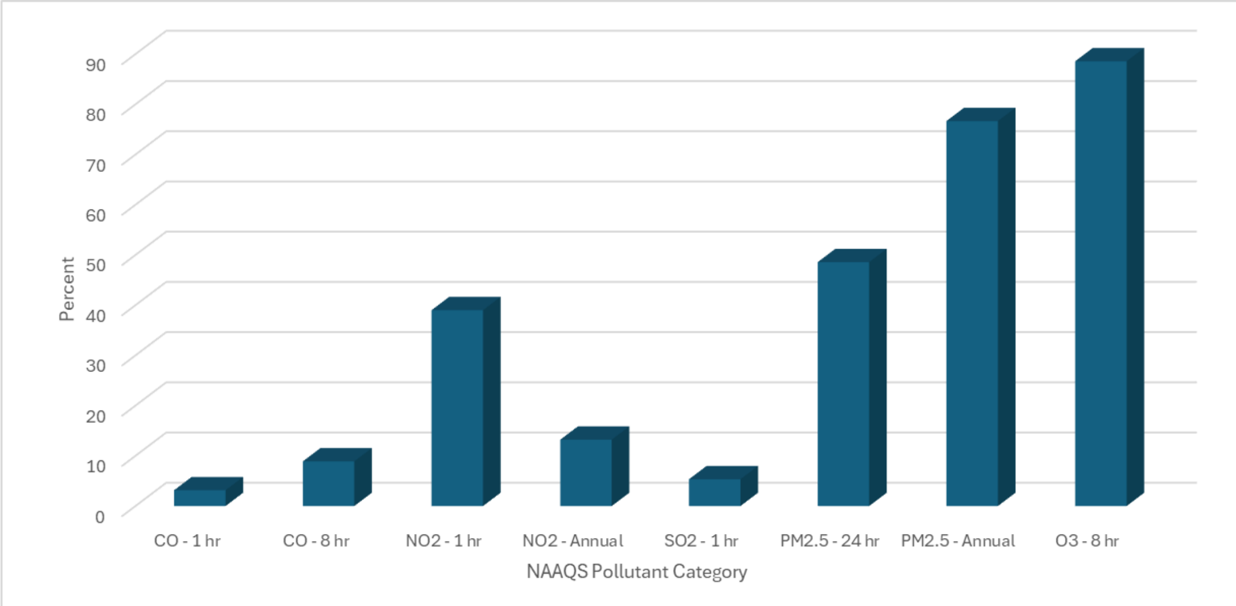
Notes: (1) The period over which pollutant concentrations are measured.
(2) Primary Standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
(3) Secondary Standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Legend: µg/m^3 = microgram per cubic meter; CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; ppb = parts per billion; ppm = parts per million; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_2 = sulfur dioxide

Source: EPA 2024a.

Due to the rural nature of Wallops Island, the nearest air monitoring station for O_3 is at the Blackwater National Wildlife Refuge near Cambridge, Maryland, approximately 56 miles northwest of the site. The nearest monitoring stations for NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2 are in the Hampton Roads, Virginia, metropolitan statistical area, approximately 88 miles south of the project area. **Figure 3.5-2** presents published design values based on the most current ambient monitoring levels (2024) for the region and demonstrates that emission levels are below the most stringent NAAQS. A design value is a statistic that describes the air quality status of a given location relative to the NAAQS and can be used to assess whether an attainment area is approaching a nonattainment threshold or vice versa. Design values are computed and published annually by EPA's Office of Air Quality Planning and Standards and reviewed in conjunction with the EPA regional offices (EPA 2025a).

Figure 3.5-2 2024 Virginia Region Design Values as a Percentage of NAAQS



Legend: CO = carbon monoxide; NAAQS = National Ambient Air Quality Standards; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; O_3 = ozone; SO_2 = sulfur dioxide

Source: EPA 2025a.

<u>Hazardous Air Pollutants</u>

In addition to the criteria pollutants, the EPA currently designates 188 substances as HAPs under the federal CAA. HAPs are air pollutants known or suspected of causing cancer or other serious health effects, or adverse environmental and ecological effects (EPA 2024b). NAAQS are not established for these pollutants; however, the EPA developed rules that limit emissions of HAPs from specific industrial sources.

HAP emissions are typically one or more orders of magnitude smaller than concurrent emissions of criteria air pollutants and only become a concern when large amounts of HAP-containing chemicals are used, or large amounts of HAP-emitting processes occur during a single activity or in one location.

Greenhouse Gases

Greenhouse Gases (GHGs) are compounds that contribute to the greenhouse effect, a natural phenomenon in which gases trap heat within the lowest portion of the earth's atmosphere, causing heating at the surface of the earth. The EPA has identified carbon dioxide (CO_2), methane, nitrous oxide, and fluorinated gases as the most common GHGs (EPA 2025b). The dominant GHG emitted in the United States is CO_2 (79.7 percent), mostly from fossil fuel combustion (EPA 2025c). CO_2, methane, and nitrous oxide occur naturally in the atmosphere.

Each GHG is assigned a heat-trapping capacity and is standardized to CO_2, which has a value of one. The heat-trapping capacity of the other primary GHGs are as follows: 28 for methane, 265 for nitrous oxide, 124 to 12,400 for hydrofluorocarbons, 7,390 to 11,100 for perfluorocarbons, and up to 23,500 for sulfur hexafluoride. Emissions of a GHG are multiplied by its heat-trapping capacity to calculate the total equivalent emissions of carbon dioxide (CO_2e).

3.5.2 ENVIRONMENTAL CONSEQUENCES

The primary emissions from the Proposed Action would result from the burning of fossil fuels in mobile sources (e.g., dredges, earth moving equipment). For the purposes of evaluating air quality effects in this EA, emissions are considered significant if the Proposed Action would result in a violation of the NAAQS for any criteria pollutant, or an exceedance of major source HAP thresholds (10 tons per year of any HAP; 25 tons per year of any combination of HAPs). The estimated criteria pollutant emissions are compared to a threshold of 250 tons per year or less for any criteria pollutant, the value used by the EPA as an indicator for effects analysis in its New Source Review Prevention of Significant Deterioration standards for major stationary sources in areas that meet the NAAQS. No similar regulatory thresholds are available for mobile source emissions. Lacking any mobile source emission regulatory thresholds, this threshold is used to equitably assess and compare mobile source emissions. Emission-assumptions and calculations are provided in **Appendix A**.

3.5.2.1 No Action Alternative

Under this alternative, the Proposed Action would not occur. The beach would not be renourished, no breakwaters would be constructed, and the seawall would not be extended. Under this alternative, there would be no changes to air quality. Therefore, no effects would be anticipated with the implementation of the no action alternative.

3.5.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

This alternative includes beach renourishment, construction of up to 12 breakwaters, and seawall repair and extension. All emissions would be due to construction activities; there would be no operational effects once construction is complete.

Beach Renourishment

Total criteria and GHG air pollutant emission estimates from proposed beach renourishment activities are provided in **Table 3.5-2**. This includes barge and marine vessel traffic to dredge sand, and on-land mobile sources to place and spread sand on the beach. HAP emission estimates are provided in **Table 3.5-3**.

Table 3.5-2 Total Criteria and GHG Emissions for Alternative 1 in Tons/Year

Activity	Location	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Beach Renourishment	On-site	35.41	110.24	675.33	0.75	17.78	17.24	76,973
	Off-site	0.26	0.82	5.05	0.01	0.13	0.13	558
Breakwater Construction	On-site	2.04	6.52	27.79	0.03	1.31	1.27	10,427
	Off-site	107.99	592.33	2,667.82	2.08	72.28	66.23	207,049
Seawall Extension	On-site	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Off-site	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal On-site		37.52	117.13	704.42	0.79	19.16	18.57	88,526
On-site exceed 250-ton comparative threshold?		No	No	Yes	No	No	No	NA
Subtotal Off-site		125.84	689.63	3,108.37	2.43	83.83	77.10	241,301
Total		163.36	806.76	3,812.79	3.21	102.98	95.67	329,827

Legend: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO_x = nitrogen oxide; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Source: Appendix A Air Emission Calculations

Table 3.5-3 Total HAP Emissions for Alternative 1 in Tons/Year

Activity	Location	Formaldehyde	Benzene	Total HAPs
Beach Renourishment	On-site	1.51	0.19	1.70
	Off-site	0.01	0.00	0.01
Breakwater Construction	On-site	0.08	0.52	0.61
	Off-site	0.07	0.01	0.07
Seawall Extension	On-site	0.00	0.02	0.02
	Off-site	0.01	0.00	0.01
Subtotal On-site		1.60	0.73	2.33
On-site exceed 10-ton individual HAP comparative threshold?		No	No	NA
On-site exceed 25-ton total HAP comparative threshold?		NA	NA	No
Subtotal Off-site		0.08	0.01	0.09
Total		1.68	0.74	2.42

Legend: HAP = hazardous air pollutant; NA = Not Applicable
Source: Appendix A Air Emission Calculations

Emissions would occur both at the installation and off-site. On-site emissions include those that would be generated by marine vessels operating in the vicinity of Wallops Island, as well as construction equipment on the beach to spread the sand. Off-site emissions include marine vessels operating near and further distant from Wallops Island, as in the case of transport of the equipment.

Breakwater Construction

The breakwater construction method was assumed to be the temporary bulkhead option, as this method would have the highest air emissions due to the operation of nonroad equipment to place and remove sand from the temporary bulkhead, as well as the emissions from transportation of the breakwater stone via rail (breakwater stone could be delivered via barge; delivery via rail is assumed for this analysis, as it would have higher emissions than delivery via barge). A vibratory hammer, crawler crane, and hydraulic excavator would be used to install parallel steel sheet pilings and fill between them with sand. The crane would then be maneuvered to lower the mats, marine mattresses, core and armor stone into place. After the breakwater is constructed, the vibratory hammer and crane would be used to dismantle the bulkhead and the sand would be spread with a hydraulic excavator. All equipment would then be driven to the next breakwater location to repeat the process. Emissions from the actual construction of up to twelve breakwaters would be similar regardless of the option chosen. Total criteria and GHG air pollutant emission estimates from proposed breakwater construction activities are provided in **Table 3.5-2**. This includes rail and truck traffic to bring materials to the site, on-land mobile sources to place the bulkhead components and to place and remove sand from the temporary bulkhead, and operation of mobile sources to place the stones that constitute the breakwater. HAP emission estimates are provided in **Table 3.5-3.**

Emissions would occur off-site and at the installation. Off-site emissions include those that would be generated by rail and road vehicles used to transport materials to the site, and on-site emissions from construction equipment on the beach to move the sand required for the temporary bulkhead, as well as equipment used to place the stones.

Seawall Repair and Extension

Total air pollutant emission estimates from the proposed seawall extension are provided in **Table 3.5-2**. This includes rail and truck traffic to bring materials to the site, and on-land mobile sources to place the stones that constitute the seawall. Stones for the seawall could also be delivered via barge; delivery via rail is assumed for this analysis, as emissions would be higher than delivery via barge. HAP emission estimates are provided in **Table 3.5-3**.

Emissions would occur off-site and at the installation. Off-site emissions include those that would be generated by rail (or barge) and road vehicles used to transport materials to the site, and on-site emissions from construction equipment on-land, used to place the stones.

Alternative 1 would result in substantial on-site NO_X emissions from beach renourishment. In the case of a stationary source, NO_X controls would be required to keep emissions below 250 tons per year. As this is not a stationary source, as a mitigation measure, the beach renourishment could be spread out over three or more years in order to keep annual emissions below the 250-ton threshold. Alternative 1 using rail to deliver the breakwater and seawall stones would result in substantial off-site emissions. However, these emissions would be of a shorter duration and a much longer distance than a major stationary source, which typically would operate for many years. Additionally, the action could be phased into smaller increments over seven years. The Accomack County region is in attainment with the NAAQS and is not approaching exceedance for any of the NAAQS. Therefore, during the construction period, while substantial emissions would be generated by fuel-burning mobile sources, these are unlikely to be large enough to exceed any NAAQS. Additionally, due to wind conditions in the coastal environment, the emissions from the mobile sources would be rapidly dispersed. Rail emissions would be a fraction of existing rail traffic in the area. On-road truck emissions would be a small fraction of the total off-site emissions, would occur over a large area, and, as a result, would not cause an exceedance of any NAAQS standards. Finally, as mobile sources of air pollutants that would not remain in the same location for 12 months, these sources are not subject to air permitting.

3.5.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension but would be reduced in comparison to Alternative 1 as no breakwaters would be built under Alternative 2. Criteria and GHG air pollutant emission estimates for Alternative 2 are provided in **Table 3.5-4**. HAP emission estimates are provided in **Table 3.5-5**.

Table 3.5-4 Total Criteria and GHG Emissions for Alternative 2 in Tons/Year

Activity	Location	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Beach Renourishment	On-site	35.41	110.24	675.33	0.75	17.78	17.24	76,973
	Off-site	0.26	0.82	5.05	0.01	0.13	0.13	558
Seawall Extension	On-site	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Off-site	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal On-site		35.49	110.61	676.63	0.76	17.85	17.30	78,099
On-site exceed 250-ton comparative threshold?		No	No	Yes	No	No	No	NA
Subtotal Off-site		17.85	97.30	440.54	0.35	11.54	10.87	34,252
Total		53.34	207.91	1,117.18	1.10	29.39	28.17	112,351

Legend: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO_x = nitrogen oxide; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Source: Appendix A Air Emission Calculations

Table 3.5-5 Total HAP Emissions for Alternative 2 in Tons/Year

Activity	Location	Formaldehyde	Benzene	Total HAPs
Beach Renourishment	On-site	1.51	0.19	1.70
	Off-site	0.01	0.00	0.01
Seawall Extension	On-site	0.00	0.02	0.02
	Off-site	0.01	0.00	0.01
Subtotal On-site		1.51	0.21	1.72
On-site exceed 10-ton individual HAP comparative threshold?		No	No	NA
On-site exceed 25-ton total HAP comparative threshold?		NA	NA	No
Subtotal Off-site		0.02	0.00	0.02
Total		1.53	0.21	1.74

Legend: HAP = hazardous air pollutant; NA = Not Applicable
Source: Appendix A Air Emission Calculations

Alternative 2 would result in substantial on-site and off-site emissions. As with Alternative 1, the on-site emissions from beach renourishment could be spread out over three or more years, in order to keep annual emissions below the 250-ton threshold. For off-site emissions, these emissions would be of a shorter duration than a major stationary source, which typically would operate for many years. Additionally, the action could be phased into smaller increments over seven years. Total emissions under Alternative 2 would be less than under Alternative 1, as no breakwaters would be constructed under Alternative 2.

3.5.2.4 Alternative 3 –Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension but would be reduced compared to Alternative 1 because no beach renourishment would occur under Alternative 3. Criteria and GHG pollutant emission estimates for Alternative 3 are provided in **Table 3.5-6**. HAP emission estimates are provided in **Table 3.5-7**.

Table 3.5-6 Total Criteria and GHG Emissions for Alternative 3 in Tons/Year

Activity	Location	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Breakwater Construction	On-site	2.04	6.52	27.79	0.03	1.31	1.27	10,427
	Off-site	107.99	592.33	2,667.82	2.08	72.28	66.23	207,049
Seawall Extension	On-site	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Off-site	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal On-site		2.11	6.90	29.09	0.04	1.38	1.34	11,553
On-site exceed 250-ton comparative threshold?		No	No	No	No	No	No	NA
Subtotal Off-site		125.58	688.81	3,103.32	2.42	83.69	76.97	240,743
Total		127.69	695.70	3,132.41	2.46	85.07	78.31	252,296

Legend: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO_x = nitrogen oxide; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound
Source: Appendix A Air Emission Calculations

Table 3.5-7 Total HAP Emissions for Alternative 3 in Tons/Year

Activity	Location	Formaldehyde	Benzene	Total HAPs
Beach Renourishment	On-site	0.08	0.52	0.61
	Off-site	0.07	0.01	0.07
Seawall Extension	On-site	0.00	0.02	0.02
	Off-site	0.01	0.00	0.01
Subtotal On-site		0.09	0.54	0.63
On-site exceed 10-ton individual HAP comparative threshold?		No	No	NA
On-site exceed 25-ton total HAP comparative threshold?		NA	NA	No
Subtotal Off-site		0.07	0.01	0.08
Total		0.16	0.55	0.71

Legend: HAP = hazardous air pollutant; NA = Not Applicable
Source: Appendix A Air Emission Calculations

Alternative 3 would result in substantial off-site emissions. As with Alternative 1, these emissions would be of a shorter duration than a major stationary source, which typically would operate for many years. Additionally, the action could be phased into smaller increments over seven years. Total emissions under Alternative 3 would be less than under Alternative 1, as no beach nourishment would occur under Alternative 3.

3.5.2.5 Hazardous Air Pollutants

All three alternatives would result in the emissions of HAPs. The major source thresholds for HAPs are 10 tons of a single HAP, or 25 tons of combined HAPs. Alternative 1 would have the highest HAP emissions, with 2.42 tons of HAPs. Alternative 2 would emit 1.74 tons of HAPs, which is 28 percent less than Alternative 1. Alternative 3 would emit 0.71 tons of HAPs, which is 71 percent less than Alternative 1. HAP emissions would not be considered significant, as they are below the 10- and 25-ton thresholds for each alternative.

3.5.2.6 Greenhouse Gases

All three alternatives would result in the emissions of GHGs. Alternative 1 would have the highest GHG emissions, with 329,827 metric tons of CO_2e. This is equivalent to the emissions from 9,218 cars driving the national average annual mileage of 11,600 miles per year for seven years. Alternative 2 would emit 112,351 metric tons of CO_2e, which is 66 percent less than Alternative 1. Alternative 3 would emit 252,296 metric tons of CO_2e, which is 24 percent less than Alternative 1.

3.6 NOISE

Noise is often defined as any undesirable sound. The effect of noise is described through the use of noise metrics which depend on the nature of the event and who or what is affected by the sound. The following section provides metrics for in-air and underwater noise.

3.6.1 AFFECTED ENVIRONMENT

3.6.1.1 Airborne Noise

Airborne noise is represented by a variety of metrics that are used to quantify the noise environment. Human hearing is more sensitive to medium and high frequencies than to low and very high frequencies, so it is common to use maximum A-weighted decibel (dBA) metrics to represent the maximum sound level over a duration of an event such as an aircraft overflight. A-weighting provides a good approximation of the response of the average human ear and correlates well with the average person's judgment of the relative loudness of a noise event.

The U.S. Occupational Safety and Health Administration (OSHA) regulates noise impacts on workers. OSHA regulations on in-air noise standards ensure that workers are not exposed to noise levels higher than 85 dBA. Exposure to 85 dBA is limited to 15 minutes or less during an eight-hour work shift. Exposure to impulsive or impact noise (loud, short duration sounds) is not to exceed 140 decibels (dB) peak sound pressure level.

Background noise levels measured on Wallops range from 30 to almost 50 dBA, with a constant, ambient low level of low frequency sound likely caused by wind and waves (NASA 2013). Noise levels increase during rocket launch activities and other operations at WFF; however, these noise levels are occasional and temporary in nature.

3.6.1.2 Underwater Noise

Underwater noise behaves much like noise in the air but, due to the denser medium, the sound waves can propagate much farther. Unlike airborne noise, underwater noise is not weighted to match frequencies that can be heard by the human ear. Three common descriptors of underwater noise are instantaneous peak sound pressure level (dBpeak), cumulative sound exposure level (dB SELcum), and the Root Mean Square (dB RMS) sound pressure level during the impulsive/non-impulsive sound. The dB peak is the instantaneous maximum noise level observed during each sound pulse and can be presented in Pascals or sound pressure level in dB, referenced to a pressure of 1 micropascal at 1 meter (dB re:1µPa-m). The SELcum is dB re: 1µPa squared seconds (dB re 1 µPa2-s) and is the sound exposure level over a 24-hour period. Potential injury, also referred to as Onset of Mortality and Recoverable Injury to fish from noise is estimated using the dB peak and dB SELcum metrics (Popper et al. 2014). The dB RMS is the square root of the energy divided by the duration of the sound pulse. This level is often used by NOAA Fisheries to describe disturbance-related effects to marine mammals from underwater non-impulsive sounds. There are no established criteria thresholds for impacts to fishes from non-impulsive noise sources.

In 2012, NASA partnered with BOEM and USACE to record background in-water noise levels at both the offshore borrow area and the nearshore pump-out area during the initial beach fill (Reine et al. 2014). Data were collected at two listening depths at each site: approximately 10- and 30-foot depths at Unnamed Shoal A and 10- and 20-foot depths at the nearshore site. During the study, the majority of data were collected when winds were at least four to seven miles per hour, and wave heights were at least one to two feet. Therefore, the data do not reflect "calm" sea conditions. Background sound pressure levels (SPLs) averaged 117 dB across all sampling days, sites, water depths, and weather conditions. Minimum measured SPLs ranged from 91 dB to 107 dB depending on sampling location and water depth; maximum levels ranged from approximately 128 dB to just under 148 dB (Reine et al. 2014). Highest SPLs were found at frequencies of less than 200 hertz. The authors note that sea state and the associated sounds generated by waves interacting with the survey vessel likely contributed to the elevated readings.

3.6.2 Environmental Consequences

3.6.2.1 No Action Alternative

Under the No Action Alternative, none of the activities associated with Wallops Island shoreline protection program would occur. The existing ambient noise levels created by the sound of wind and wave action would remain unchanged.

3.6.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Under Alternative 1, there would be temporary increases in ambient noise levels from the operation of heavy equipment on Wallops Island during the beach nourishment activities. However, none of the project activities would occur near occupied facilities, so noise effects on WFF employees and tenants would be minimal. Noise effects to species are discussed below in **Sections 3.8** through **3.11**.

Ambient underwater sound levels at Unnamed Shoal A would increase during dredge operations. It is expected that in-water noise levels generated would be similar to those reported by Reine et al. (2014), which summarizes recorded noise levels from hopper dredges operating in the nearshore waters off Wallops Island. Based upon attenuation rates observed by Reine et al. (2014), it would be expected that, at distances approximately 1.6 to 1.9 miles from the source, underwater noise generated by the dredges would attenuate to background levels.

Breakwater Construction

Breakwater construction may involve the use of a barge and excavator to place large stones in the water to construct the breakwater. Consistent with the analysis of noise in the *2019 Final SERP EA*, the airborne noise generated during the construction process would be localized and temporary, and the intensity and duration of potential noise effects to the underwater environment would be low and temporary.

Breakwater construction could occur from the shore utilizing temporary bulkheads or trestles, which would involve the use of vibratory hammers to install and extract steel sheet piles. Vibratory hammers produce non-impulsive noise as the hammer continuously operates using counterweights that spin to create vibration. The vibrating pile causes the sediment it contacts to liquefy, allowing the pile to move easily into or out of the sediment. The average sound pressure level for steel sheet piles installed by vibratory hammer is 163 dB (Caltrans 2020).

Seawall Repair and Extension

Under Alternative 1, there would be temporary increases in ambient noise levels from the operation of heavy equipment on Wallops Island, during the construction repair and extension of the seawall.

OSHA limits noise exposure for workers to 115 dB for a period of no longer than 15 minutes in an eight-hour work shift, and to 90 dB for an entire 8-hour shift. Workers near activities producing unsafe noise levels, both on land and water, would be required to wear hearing protection equipment. Therefore, effects on the occupational health of construction workers as a result of construction noise are not expected.

3.6.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension.

3.6.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension.

3.7 BENTHOS

Bottom dwelling invertebrates provide a critical link in the productivity of the marine waters off Wallops Island. The benthos includes organisms that live on the sediment surface (epifauna), such as starfish and sand dollars (*Echinarachinus parma*), as well as organisms that live within the sediment (infauna), such as clams and worms. The majority of the benthos live in or on the upper six inches of sediment. Benthic organisms are an important food resource for fish, including those caught by recreational and commercial fishermen.

Section 3.2.5 of the *2010 Final SRIPP PEIS* describes in detail the benthic organisms that inhabit the project site. This section provides a summary.

3.7.1 AFFECTED ENVIRONMENT

Air-breathing crustaceans, such as ghost crabs (*Ocypode quadrata),* dominate the uppermost zone of the Wallops Island beach, while the swash zone is dominated by isopods, amphipods, polychaetes, and mole (*Emerita talpoida*) and ghost (*Ocypode quadrata*) crabs. Below the mid-tide line is the surf zone where coquina clams (*Donax variabilis*) and a variety of amphipods are prevalent. All such organisms are important prey species for a variety of waterbirds and fish. Presence of benthos within manually nourished beaches vary by sediment type in that soft-bottom benthic habitats typically recolonize rapidly (six to eight months for mud habitats) and two to three years for sand and gravel substrate (Wilber and Clarke 2021).

As presented in Section 3.2.5 of the *2010 Final SRIPP PEIS*, 2009 underwater photographic studies conducted of Unnamed Shoal A during the development of the *2010 Final SRIPP PEIS* determined that the dominant epifaunal benthos included sand dollars, hermit crabs (*Pagurus* spp.), crabs (*Libinia* spp., *Cancer* spp.), moon shell (*Polinices* spp.), and whelk (*Busycon* spp.).

Similar to the discussion regarding onshore benthic resources, while the dredged area may not have fully recovered to 2014 pre-dredge conditions, at least some recovery of benthic communities is expected given the time elapsed since dredging. Published studies of sand mining recovery in U.S. Atlantic and Gulf of Mexico coastal waters indicate recolonization generally occurs within 3 months to 2.5 years, with community changes persisting up to 5 years in some cases (Brooks et al. 2006; Turbeville and Marsh 1982). Recovery rates also vary by taxonomic group, with polycheates and crustaceans recolonizing relatively quickly (within several months), while deep-burrowing mollusks may require several years (Brooks et al. 2006). Considering these documented recovery periods and the years that have passed since dredging, it is reasonable to expect that the benthos in the affected area have recovered to some degree.

3.7.2 ENVIRONMENTAL CONSEQUENCES

Section 4.3.5 of the *2010 Final SRIPP PEIS* describes in detail the expected effects of dredging and beach nourishment on benthic organisms. This section provides both a summary and updated information obtained since its publication.

3.7.2.1 No Action Alternative

Under the No Action Alternative, the proposed breakwater construction, dredging, and beach renourishment would not occur. Therefore, there would be no project-related effects on benthos.

3.7.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

In the nearshore area of Wallops Island, the placement of sand for beach nourishment can cause a smothering effect, likely to result in the loss of some immobile benthic species. The number of individuals lost would depend on factors such as the size of the area to be dredged, the amount of sand removed, and the time of year that the beach nourishment takes place. The loss of these benthic invertebrates would create a loss of prey for local wildlife, including some managed fish species. This is expected to cause only a temporary reduction in prey, as the area is expected to become repopulated by benthic organisms from neighboring areas within approximately two to five years (Diaz et al. 2004; Brooks et al., 2006). The placement of fill would bury existing benthic habitat, therefore reducing its foraging value for a period of time ranging from several months to a year following placement. Additionally, elevating the beach from intertidal to sub-aerial (dry beach) would immediately reduce the availability of in-water habitat; however, from a regional perspective, the size of the area would not be substantial, and the area would return over time as the beach erodes (NASA 2013).

Adverse effects within the dredged area would include removal and modification of benthic assemblages upon which managed species feed, modification of shoal topography, and an increase in water turbidity and sedimentation. Of these effects, the duration would be temporary in nature, with turbidity on the order of hours and benthic recovery on the order of several years. Recovery of shoal topography may be a longer process. However, a net increase of approximately 238,000 cubic yards of sand deposition was documented on Unnamed Shoal A via natural sediment transport processes between 2012 (after dredging) and 2014 (before dredging). Morphological changes over time would also influence recovery time and ecosystem resilience in that establishment of the benthic community would be influenced by seasonal variation such as from storm events ranging from severe to episodic. Surface-dwelling fauna are most vulnerable whereas deep burrowing fauna are not expected to significantly change (Posey et al. 1996). In addition, the use of draghead screens during dredging may alter the sediment composition of the borrow area. By preventing larger material from entering the dredge, screens can leave behind a coarser fraction of materials, a process known as "hardening" of the borrow area. This temporary change in substrate characteristics may prolong benthic recovery until natural sediment transport processes restore the pre-dredge grain-size distribution.

Benthos may also be temporarily affected by the use of construction vehicles and heavy machinery on the beach for seawall construction. The heavy equipment and construction activities may result in the introduction of petroleum products or other contaminants to nearshore waters due to a leak or spill. Construction-related effects would be temporary and would not likely be adverse because any accidental release of contaminants or liquid fuels would be addressed in accordance with the existing WFF Integrated Contingency Plan emergency response and clean-up measures. Implementation of BMPs for vehicle and equipment fueling and maintenance, and spill prevention and control measures, would reduce potential effects on nearshore waters and benthos during construction. These BMPs apply to benthos, wildlife, fisheries and Essential Fish Habitat (EFH), marine mammals, and special status species, but will not be rediscussed again after this section.

Breakwater Construction

Under Alternative 1, effects on benthos living nearshore and onshore would include bottom disturbance from the construction of the breakwaters. Direct mortality of all benthos within the footprint of breakwater construction would be likely. The footprint of each breakwater would permanently convert approximately 0.275 acre from sand to new hardbottom habitat (for a total of 3.3 acres for 12 breakwaters). However, because the regional coastline has very little hardbottom habitat in the surf zone, the concept of recovery is not applicable, and colonization of the breakwaters would provide habitat for an essentially novel community of benthos. Potential direct benefits to native benthos would be minimal, but the breakwaters would provide attachment points for sessile creatures, as well as refuge and cover for mobile macrobenthos, such as polychaete worms or amphipods and could offer some minor beneficial effects in the long term (NASA 2019b).

Seawall Repair and Extension

Repair and extension of the seawall would result in a direct and permanent adverse effect on the local benthic community within the immediate footprint of the seawall. The construction of the seawall extension would bury sandy, subtidal benthic habitat and replace it with hard substrate. The benthos within the construction limits of the seawall would not be covered with rock. However, the seawall would have a minor effect on the benthic community within the region as the footprint of the structure is small compared to the overall available area of similar unconsolidated sediment throughout the nearshore shelf.

3.7.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2, Beach Renourishment only, are the same as those described for Beach Renourishment under Alternative 1.

3.7.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3, Breakwater Construction only, are the same as those described for Breakwater Construction under Alternative 1.

3.8 WILDLIFE

This discussion of wildlife addresses the variety of species found on and near the onshore and offshore environments of Wallops Island. Section 3.2.2 of the *2010 Final SRIPP PEIS* describes the wildlife species that may inhabit the project site, and updated information is presented in Section 3.2.2 of the *2013 Final Post-Hurricane Sandy EA* and Section 3.8.1 of the *2019 Final SERP EA.* This section provides a summary of information presented in these documents with information and sources updated where applicable, and describes effects expected to result from the Proposed Action.

3.8.1 AFFECTED ENVIRONMENT

Wallops Island is home to a diverse array of wildlife species. The National Parks Service's Assateague Island National Seashore extends from the northern (Maryland) portion of Assateague Island through Virginia. The USFWS's Chincoteague National Wildlife Refuge is compromised of the southern (Virginia) portion of Assateague Island, located north of Wallops Island across the Chincoteague Inlet, and Assawoman Island located adjacent to Wallops Island's southern border. Assawoman Island to the south of Wallops is also owned by the USFWS and is part of Chincoteague National Wildlife Refuge. Both protected areas provide a high-quality habitat for a variety of wildlife.

3.8.1.1 Onshore

Avifauna: The Wallops Island beach provides important nesting and foraging habitat for a number of migratory waterbirds, including gulls, terns, and sandpipers. Waterbird numbers on the beach peak during the fall and spring migrations. The beach provides stopover habitat for resting and feeding as the birds transit between breeding and wintering grounds. Important food sources on the beach include fish, mollusks, insects, worms, and crustaceans.

Recently filled beaches may take six to eight months or two to three years for invertebrates to repopulate, depending on beach replenishment material (Wilber and Clarke 2021). However, since the previous beach fill, recruitment has likely replenished the invertebrate food sources for foraging avifauna to near normal levels. Also noteworthy is that, following the initial fill cycle, the most northern end of Wallops Island (which would remain unaffected by the Proposed Action) has developed an expansive area of tidal pools; these are expected to be important sources of forage for bird species.

NASA continues to conduct regular monitoring of the Wallops Island beach between March 15 and August 31 to determine the level of bird nesting activity within and adjacent to the project area. Protected Species Monitoring Reports indicated that one American oystercatcher (*Haematopus palliatus*) nest was observed in 2017, but no chicks survived to fledge the following year (NASA 2017, 2018). Another failed American oystercatcher nest was found in the 2023 and five failed nests in 2024. Since monitoring began in 2010, American oystercatcher nests have had a 0 percent success rate on Wallops Island (NASA 2023a, 2024b). No Wilson's plover (*Charadrius wilsonia*) nests have been observed since initial monitoring in 2010 (NASA 2023a). Wallop's staff also monitor for piping plover (*Charadrius melodus*) and the rufa red knot (*Caladris canutus rufa*), and these are discussed in **Section 3.11, Special Status Species**. Until 2024, no colonial waterbird nesting activity has been observed on the Wallops Island beach since NASA began its regular beach nesting bird surveys in spring 2010 (NASA 2023a). In 2024, a colony of six least tern nests was documented and monitored. There were 12 eggs and ten fledglings, an 83 percent success rate (NASA 2024b).

Herpetofauna: Though Wallops Island is home to a number of amphibians and reptiles, the species most likely affected by activities on or adjacent to the beach is the diamondback terrapin (*Malaclemys terrapin*), which in the past has regularly nested on the north beach and locations on the west (bay) side of the island. During the initial 2012 beach fill, the diamondback terrapin was observed frequently within the project site during late May to early June. Sea turtles are discussed in **Section 3.11, Special Status Species.**

3.8.1.2 Offshore

As noted in the 2010 EIS, seabirds, including scoters, loons, and gannets, use the offshore portion of the project area as foraging grounds during winter months. Seabirds target offshore shoals because fish tend to school around shoals. Noise and turbidity caused by the proposed dredging could cause seabirds to avoid the area during dredge operations. Removal of sediment would reduce the availability of benthos, which could in turn reduce foraging opportunities for seabirds that feed directly on benthos or on fish species that do. This effect could last for two to five years until such communities recover (Brooks et al. 2006; Turbeville and Marsh 1982).

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No Action Alternative, erosion would continue along with resulting effects to wildlife and wildlife habitat. There would be no project-related effects to wildlife onshore or offshore Wallops Island.

3.8.2.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Dredging Unnamed Shoal A would be done in a way to not substantially change shoal topography and to minimize the effect to the availability of seabird food sources, as considered in the *2010 Final SRIPP PEIS* and *2019 Final SERP EA*. Though the additional dredging would increase the water depths at the borrow area, diving species could still effectively forage on the shoal. As discussed in **Section 3.7, Benthos**, forage sources would most likely recover within two years. Sand would be removed within areas already disturbed; therefore, it would not expand the footprint of the area. Both adjacent undisturbed areas on Unnamed Shoal A and neighboring shoals would provide adequate forage should seabirds avoid the directly affected area. Additionally, effects from disturbance would be limited to that active dredging phase.

Onshore, temporary noise and visual disturbances from construction equipment and personnel could adversely affect beach foraging and nesting birds. Direct effects could include eliciting a startle or flee response, which could temporarily interrupt feeding activities or cause individuals to relocate to other areas of the beach. If nesting birds were to flush from nests, it could lead to an elevated risk of egg overheating or predation. It would also be possible for equipment to inadvertently crush or bury nests or chicks if the nests were undetected. However, as stated in **Section 2.2.3.2**, if activities occur during the nesting season, a biological monitor would survey the area daily and 1,000-foot nest buffers would be established to prevent direct effects to nests.

Adverse effects could also occur from a reduction in available food sources during and following the placement of sand on the Wallops Island shoreline. Beach renourishment would increase the availability of nesting habitat. However, beach renourishment would occur south of the areas of the beach that have historically hosted the greatest level of nesting activity. It is unknown to what extent the newly created Wallops Island beach in the shoreline infrastructure protection area would be used by shorebirds for nesting. The actual usage patterns would play a large role in dictating potential effects. Effects on prey availability are expected to be a contributing factor and, given that the newly placed beach is likely in a biologically suppressed state, it is possible that bird species would congregate closer to more forage-rich areas outside of the affected area. As discussed in **Section 3.7, Benthos**, available forage would most likely recover within two years. Long-term, the renourished beach could create suitable waterbird nesting habitat.

Breakwater Construction

The breakwaters would alter the nearshore bottom and create adverse effects from direct disturbance during construction. After construction, the breakwaters would potentially provide resting and foraging areas for avifauna. It is unlikely that the breakwaters would contribute to any lasting negative effects to wildlife.

Seawall Repair and Extension

The effects of seawall repair and extension would be temporary noise and visual disturbances from construction equipment and personnel, similar to those described for beach renourishment.

3.8.2.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension.

3.8.2.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension.

3.9 FISHERIES AND ESSENTIAL FISH HABITAT

3.9.1 REGULATORY CONTEXT

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act of 1976, federal agencies must consult with NOAA Fisheries for activities that may adversely affect EFH that is designated in a federal Fisheries Management Plan. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Both the offshore borrow area and the nearshore renourishment and breakwater locations are designated EFH for multiple life stages of managed fish species; therefore, the EFH consultation requirement applies to the Proposed Action.

For each implementation phase of this project that has the potential to affect EFH, An *Essential Fish Habitat Assessment* is being prepared for this project. Previous EFH consultations concurred that beach restoration and breakwater construction would not substantially adversely affect EFH. With implementation of NOAA Fisheries Conservation Recommendations (see Section 4.2.1) effects to EFH are expected to be localized and short term and would not substantially adversely affect EFH.

3.9.2 AFFECTED ENVIRONMENT

Most major invertebrate groups are found on inshore and nearshore sandy areas, including mollusks (e.g., clams and whelks), crustaceans (e.g., crabs, shrimp, and amphipods), and polychaetes (marine worms). Inshore tidal marsh grasses act as nursery grounds for a variety of fish species, including the spot (*Leiostomus xanthurus*), the northern pipefish (*Syngnathus fuscus*), the dusky pipefish (*Syngnathus floridae*), and bay anchovy (*Anchoa mitchilli*) (USFWS 2015). Salinity and water depth play major roles in determining which coastal fish species are present in bays and inlets. An example of this is the sandbar shark (*Carcharhinus plumbeus*), which is common in summer months if the inshore channels are at least 12 feet deep and the salinity is at least 30 ppt (Chesapeake Bay Program 2009).

Common finfish in both inshore and nearshore waters include the Atlantic croaker (*Micropogonias undulates*), sandbar shark, sand shark (*Carcharisa taurus*), smooth dogfish (*Mustelus canis*), smooth butterfly ray (*Gymnura micrura*), bluefish (*Pomatomidae saltatrix*), spot, and summer flounder (*Paralichthys dentatus*) (NASA 2019a).

The Endangered Species Act (ESA)-listed Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Giant Manta Ray (*Mobula birostris*) are discussed briefly in **Section 3.11, Special Status Species**. They could be present, but their low abundance and distribution makes project-related effects possible but not plausible.

3.9.2.1 Fisheries

Unnamed Shoal A is geographically coincident with nine managed fishery species. Commercially important shellfish fisheries include the sea scallop (*Plactopecten magellanicus*) and blue crab (*Callinectes sapidus*). Other nearshore shellfish fisheries species include decapod crustaceans, stomatopod crustaceans, and cephalopods. Common finfish fisheries include the menhaden (*Brevoortia tyrannus*), Atlantic croaker (*Micropogonias undulatus*), summer flounder, and bluefish.

Chincoteague is one of six major ports in Virginia where large, ocean-going fishing vessels unload their catches (McCay and Cieri 2000). Throughout Virginia, the total value of the commercial fishery is dominated by two species: sea scallop and menhaden. Other commercial and recreational fishery species also include blue crab, northern quahog clam (*Mercenaria mercenaria*), Atlantic croaker, summer flounder, and striped bass (*Morone saxatilis*) (NOAA 2018a, 2018b).

3.9.2.2 Essential Fish Habitat

The proposed project area includes a variety of EFH habitat types including (but not limited to) pelagic and epibenthic habitats, inshore estuaries, the ocean floor, and unconsolidated sand substrates of the intertidal zone. NOAA Fisheries provides an interactive, online EFH Mapper tool for viewing officially designated habitats that the agency deems necessary for managed fish species to breed, feed, and grow to maturity. It displays spatial representations of fish species, their life stages, and important habitats, and is used to identify EFH that may potentially be affected by in-water activities. Users can input a project area in the mapper to discover which managed fish species spawn, grow, or live there, and the tool generates a report with supporting documentation. **Table 3.9-1** presents the EFH designations for species identified by the EFH Mapper query within the project area, which encompasses the shoreline and extends seaward to Unnamed Shoal A (located at 37.8477839°N, 75.2102609°W).

Table 3.9-1 Essential Fish Habitat in the Project Area

Species name	Life Stage	Habitat
Mid-Atlantic and New England EFH Species		
Atlantic butterfish (*Peprilus triacanthus*)	A, J, E	Sandy, muddy substrates
Atlantic herring (*Clupea harengus*)	A, J	Pelagic waters, bottom habitats
Atlantic surfclam (*Spisula solidissima*)	A, J	Medium to fine-grained sand 30–80 feet deep
Black sea bass (*Centropristus striata*)	A, J, L	Structured habitats (natural and manmade) such as shipwrecks, submerged aquatic vegetation, etc.
Bluefish (*Pomatomus saltatrix*)	A, J, L, E	Estuarine and nearshore waters

Species name	Life Stage	Habitat
Clearnose skate (*Raja eglanteria*)	A, J	Soft bottoms along the continental shelf
Longfin inshore squid (*Doryteuthis pealeii*)	E	Continental shelf waters; muddy and sandy bottoms
Monkfish (*Lophius americanus*)	E, L	Sand, mud, and shell habitats
Red hake (*Urophycis chuss*)	A, E, L, J	Sandy sediments for juveniles; muddy substrates for adults
Scup (*Stenotomus chrysops*)	A, J	Smooth and rocky bottoms; around piers, rocks, and other underwater infrastructure
Spiny dogfish (*Squalus acanthias*)	Sub-adult female; sub-adult male; adult male	Bottom dwellers; inshore and estuaries
Summer flounder (*Paralichthys dentatus*)	A, J	Sandy habitats, estuaries
Windowpane flounder (*Scopthalmus aquosus*)	A, J, E, L	Estuaries and nearshore waters
Winter skate (*Leucoraja ocellata*)	A, J	Sandy and gravelly bottoms
Witch flounder (*Glyptocephalus cynoglossus*)	E	Sea surface temperatures below 55°F, over deep waters with high salinity
Highly Migratory Species EFH Species		
Albacore tuna (*Thunnus alalunga*)	J	Subtropical or tropical waters; often found near surface or around floating objects
Atlantic angel shark (*Squatina dumerili*)	ALL	Bottom habitats in coastal waters
Atlantic sharpnose shark (Atlantic stock) (*Rhizopriondon terraenovae*)	A	Estuaries, sandy beaches, deep offshore waters
Blacktip shark (Atlantic stock) (*Carcharhinus limbatus*)	A, J	Coastal waters worldwide
Common thresher shark (*Alopias vulpinus*)	ALL	Along continental shelf, temperate and tropical waters
Dusky shark (*Charcharhinus obscurus*)	N	Shallow inshore waters to beyond the continental shelf; feeds near bottom
Sand tiger shark (*Carcharias taurus*)	A, J, N	Shallow bays, reefs and wrecks
Sandbar shark (*Charcharhinus plumbeus*)	A, J, N	Bottom dwellers; deep ocean banks and sandbars
Skipjack Tuna (*Katsuwonus pelamis*)	A	Open ocean, at depths during the day
Smooth Dogfish (*Mustelus canis*)	ALL	Coastal and estuarine waters along continental shelf
Tiger shark (*Galeocerdo cuvieri*)	A, J	Coastal and pelagic waters of continental shelf
Yellowfin tuna (*Thunnus albacares*)	J	Open waters within epipelagic zone

Legend: A = Adult; EFH = Essential Fish Habitat; J = Juvenile; N = Neonate; E = Eggs; L = Larvae
Sources: NOAA Fisheries 2025a

3.9.2.3 Habitat Areas of Particular Concern

Habitat Areas of Particular Concern (HAPCs) are discrete subsets of EFH identified by the Mid-Atlantic and New England Fishery Management Councils as areas that are ecologically important, sensitive to disturbance, exposed to development pressures, or are rare in occurrence. While HAPC designations do not create additional regulatory requirements beyond those already applicable to EFH, they highlight habitats of elevated conservation concern and focus management attention on areas most in need of protection. In the vicinity of Wallop's Island, VA, HAPCs include submerged aquatic vegetation beds within estuarine and nearshore environments that function as crucial nursery habitat for summer flounder (*Paralichthys denatus*) (63 Federal Register 1778; NOAA Fisheries 2025a). These submerged aquatic vegetation habitats, when present in estuarine and high-salinity lagoonal systems such as Chincoteague Bay, provide important cover and foraging habitat for juvenile fish (NOAA Fisheries 2025b). However, no submerged aquatic vegetation, or other HAPCs, are within the project area.

3.9.3 Environmental Consequences

3.9.3.1 No Action Alternative

Under the No Action Alternative, the proposed breakwater construction, dredging, and beach renourishment would not occur. Therefore, there would be no project-related effects to fisheries or to EFH.

3.9.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Nearshore

In the nearshore area of Wallops Island, the placement of sand for beach nourishment would cause a smothering effect, likely to result in the loss of some immobile benthic species. The number of individuals lost would depend on factors such as the size of the area to be nourished (15,000 linear feet of shoreline) and the time of year. The loss of benthic invertebrates would create a loss of prey for local wildlife, including some managed fish species, but the effect would be localized and temporary. The area is expected to become repopulated by benthic organisms from neighboring areas within approximately two years (Diaz et al. 2004). Fish species and EFH in the nearshore waters of Wallops Island could conceivably be temporarily affected by turbidity and vessel traffic, but no other direct or indirect stressors would be imposed by the Proposed Action.

Offshore

The nature and intensity of turbidity and water quality stressors and physical strike and disturbance stressors imposed from the dredging at Unnamed Shoal A under Alternative 1 would be identical to prior permitted actions. Most motile fishery species would be displaced from the project area without injury or mortality under Alternative 1.

The disturbance of bottom sediments associated with dredging could interfere with feeding, predation, and avoidance patterns of fish species. However, adverse effects are expected to be temporary and highly localized. Dredging operations would not cause significant adverse effects to EFH. For any demersal species, there is a possibility that it may become entrained in the dredge. However, no permanent effects to the species or the shallow water habitat are anticipated. Any adverse effects, such as increased turbidity or loss of benthic prey would be highly localized and temporary. The increased turbidity may temporarily clog the gills of fish, preventing them from extracting oxygen from the water and interfering with feeding ability. It can also slow egg growth and impair the survival of larvae (Gordon et al. 1972). However, any adverse effects due to increased turbidity and decreased dissolved oxygen in the water column would be minor and short-term. This turbidity may temporarily cause difficulty in locating prey, but this would not cause adverse effects to any species in the area, as they can easily migrate to another area to feed.

Alternative 1 would affect offshore shoal habitat, where 100 percent mortality for sessile species in the area dredged would occur. Most motile fish species would be displaced without injury or mortality. The probability of large-bodied animals being entrained is low. The overall magnitude of adverse effects is expected to be minimal, temporary, and localized.

Beach renourishment activities would result in temporary adverse effects to fisheries and EFH within the region.

Breakwater Construction

Most motile fishery species would be displaced from the entire breakwater footprint, temporarily during breakwater construction and in the long term in the area where the breakwaters are constructed. Recovery could begin almost immediately after completion of the action. Most motile fish species are attracted to structures, and the breakwaters would likely cause localized increases in fish density. Sessile fishery species (e.g., clams) are conservatively assumed to have 100 percent mortality within the breakwater footprint. Potential direct benefits to native fishery species and EFH would be minimal. Becchi et al. (2014), who analyzed the ecological effects of breakwater systems on soft-bottom assemblages along the North Tyrrhenian coast, found that breakwater effects were limited to only a small, restricted area.

EFH would be temporarily affected by the localized increase in turbidity during breakwater construction. Each individual breakwater would convert up to 12,000 square feet of unconsolidated sand into hardbottom seafloor EFH. If all twelve breakwaters were constructed, a total of 3.30 acres of unconsolidated sand would be converted into hardbottom seafloor EFH. However, because the regional coastline has very little hardbottom habitat in the surf zone, the potential direct benefits to designated EFH or managed species would be minimal. For a discussion of effects on benthos, refer to **Section 3.7.**

Seawall Repair and Extension

Temporary disruption of benthic habitat would occur during the proposed construction activities, affecting prey availability to certain fish species. EFH may also be temporarily affected from the use of construction vehicles and heavy machinery on the beach for seawall construction. The heavy equipment and construction activities may result in the introduction of petroleum products, heavy metals, or other contaminants to nearshore waters due to a leak or spill. Construction-related effects would be temporary and would not likely be adverse because any accidental release of contaminants or liquid fuels would be addressed in accordance with the existing WFF Integrated Contingency Plan emergency response and clean-up measures. Implementation of BMPs for vehicle and equipment fueling and maintenance, and spill prevention and control measures, would reduce potential effects on nearshore waters and EFH during construction. Therefore, construction of the seawall may temporarily affect nearshore EFH.

3.9.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2, Beach Renourishment only, are the same as those described for Beach Renourishment under Alternative 1.

3.9.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3, Breakwater Construction only, are the same as those described for Breakwater Construction under Alternative 1.

3.10 MARINE MAMMALS

3.10.1 REGULATORY CONTEXT

Marine mammals are protected under the Marine Mammal Protection Act (MMPA) of 1972. The MMPA protects all marine mammals and prohibits, with certain exceptions, the “take” of marine mammals in U.S. waters and by U.S. citizens on the high seas. The NOAA Fisheries’ maintains jurisdiction of the majority of the marine mammal species found worldwide. The USFWS has jurisdiction for eight marine mammal species that are not regulated by NOAA Fisheries (i.e., walrus, polar bear, two marine otter species, three manatee species, and the dugong) (USFWS 2018).

Under the MMPA, NOAA Fisheries has defined noise-related levels of harassment for marine mammals. NOAA Fisheries *2024 Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* identifies criteria to assess auditory injury (Level A harassment) to different marine mammal groups (based on hearing sensitivity) as a result of exposure to sound from impulsive and non-impulsive sources (NOAA 2024c). The current Level B (disturbance) threshold for underwater impulse noise (e.g., pile driving) for both cetaceans and pinnipeds is 160 dBRMS from impulsive noise sources. The Level B (disturbance) threshold for continuous noise (e.g., dredging) is 120 dBRMS for both cetaceans and pinnipeds.

3.10.2 AFFECTED ENVIRONMENT

Section 3.2.9 of the *2010 Final SRIPP PEIS* describes in detail the marine mammals that may occur within the project area. This section provides a summary. Of the approximately 19 marine mammal species not listed by ESA that could occur within or adjacent to the project area, the bottlenose dolphin is the most common, with the potential to occur at any time of year but most commonly encountered during non-winter months. Those individuals encountered would be expected to be the coastal morphotype; the offshore morphotype are primarily found farther offshore. **Table 3.10-1** lists potential marine mammals that can be found offshore of Wallops Island, including ESA listed species.

Table 3.10-1 Marine Mammals Likely to Occur Offshore of Wallops Island

Species Common Name	Scientific Name	Habitat
Humpback Whale*	*Megaptera novaeangliae*	Along the coasts of all oceans
Fin Whale*	*Balaenoptera physalus*	Temperate and cool offshore waters, all oceans worldwide
North Atlantic Right Whale*	*Eubalaena glacialis*	Atlantic coastal waters on the continental shelf
Sperm Whale*	*Physeter macrocephalus*	Deep open water, or around islands or coastal areas
Sei Whale*	*Balaenoptera borealis*	Deep offshore subtropical, temperate, and subpolar waters
Blue Whale*	*Balaenoptera musculus*	All oceans but the Arctic; polar waters for feeding in summer and equatorial waters in winter
Florida Manatee*	*Trichechus manatus latirostrus*	Coastal waters, rivers, and springs
Dwarf Sperm Whale	*Kogia simus*	Tropical and temperate waters
True’s Beaked Whale	*Mesoplodon mirus*	Deep, warm, temperate waters
Cuvier’s-Beaked Whale	*Ziphius cavirostris*	Typically deeper waters, but sometimes close to shore
Melon-Headed Whale	*Peponocephala crassidens*	Deep tropical and subtropical waters

Species Common Name	Scientific Name	Habitat
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	Tropical and temperate waters
Long-Finned Pilot Whale	*Globicephala melas*	Deep offshore environments
Bottlenose Dolphin	*Tursiops truncatus*	Harbors, bays, gulfs, estuaries, nearshore and offshore waters
Atlantic Spotted Dolphin	*Stenella frontalis*	Warm temperate waters, nearshore and offshore
Common Dolphin	*Delphinus spp.*	Warm temperate waters, nearshore and offshore
Risso's Dolphin	*Grampus griseus*	Deep, tropical and temperate waters
Spinner Dolphin	*Stenella longirostris*	Tropical and subtropical coastal waters
Seals	*Pinniped spp.*	Coastal waters, islands, shores, or ice floats
Harbor Seal	*Phoca vitulina*	Temperate coastal habitats; estuaries, sandbars, beaches

Note: * = Species protected under the ESA
Source: NASA 2022a

3.10.3 ENVIRONMENTAL CONSEQUENCES

3.10.3.1 No Action Alternative

Under the No Action Alternative for this EA, NASA would not renourish the Wallops Island shoreline infrastructure protection area beach and dune system, provide additional breakwaters, or repair or extend the existing seawall. Therefore, under the No Action Alternative, there would be no project-related effects to marine mammals.

3.10.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Nearshore

Beach renourishment activities in the nearshore area would be limited to land and only the very shallow waters of the intertidal zone. Sand placement would occur along the beach and a small amount in the water, making this a land-based activity. Marine mammals would not be adversely affected by any renourishment activities that occur in the nearshore areas as they would not come into contact with these activities.

Offshore

Potential adverse effects to marine mammals would be associated with physical disturbance to habitats during dredging and placement of material which would result in temporary increases in water turbidity, a reduction in prey availability, vessel strike, and increased noise from vessel activities. However, given the relatively slow speed of the dredge, the limited extent of habitat affected, and with the implementation of mitigation measures described below, potential effects would be reduced. NASA would ensure that a bridge lookout would be onboard from April 1–November 30 as described in **Section 2.2.1.2.**

At all times, the vessel must maintain a minimum 500-foot buffer to any North Atlantic right whales. Additionally, if the vessel is actively dredging, and a whale is identified, the vessel must turn off all pumps until the animal is farther than 1 kilometer (km) (0.62 mile), upon which the dredging activity could resume. If pumps are turned off, it would be highly unlikely that marine mammals within or adjacent to the project area would be subjected to noise levels in excess of those prescribed by the MMPA. The level B disturbance threshold for marine mammals from continuous noise is 120 dBRMs. Maximum noise levels from the vessel would range from 128 dB to 148 dB (Reine et al. 2014). The potential of marine mammals to be exposed to behavioral harassment from vessel noise or at risk of vessel strikes would be mitigated by operating the dredge vessel at speeds below 14 knots whenever marine mammals are spotted on the horizon. Therefore, the Proposed Action would not result in the behavioral harassment to non-listed marine mammals.

Breakwater Construction

During breakwater construction, barge-mounted heavy equipment would place mats, geotextile mattresses, and large stones, per the breakwater design. Due to the shallow water, larger marine mammals would likely not be in the vicinity and, therefore, would not be affected. Bottlenose dolphins may be found at these water depths, but would likely avoid the area due to construction activity and noise. Disturbances to any potential foraging or movement of bottlenose dolphins would be temporary, and there would be no long-term effects to marine mammals under Alternative 1.

For purposes of analyzing underwater noise impacts, the average sound pressure level 163 dB was used as well as the assumptions that four piles would be driven/extracted each day and it would take 30 minutes to drive/extract each pile. The NOAA Fisheries uses underwater sound exposure thresholds to determine when an activity could result in Level A impacts to a marine mammal, those resulting in auditory injury, or Level B, those resulting in behavioral changes. **Table 3.10-2** illustrates the auditory injury thresholds for various groups of whales (characterized by the frequency of their communications) (NMFS 2024). The behavioral disturbance threshold is 120 db RMS. As sound travels through water, levels decrease with increasing distance from the source. This is known as transmission loss. Maximum distances from the noise source (i.e., steel sheet pile being driven by a vibratory hammer) to the impact thresholds were calculated (**Table 3.10-2**). Outside these distances auditory injury would not occur. Additionally, noise dampening would be expected as noise waves encounter shallow bottom sediments and are masked by the sound of crashing waves.

Table 3.10-2 Acoustic Threshold Criteria for Marine Mammals from Non-Impulsive Underwater Noise

Species Group	Sound Level Threshold for Auditory Injury (dB SELcum)	Maximum Distance to Threshold (feet)
Low-frequency whales	197	65.3
High-frequency whales	201	25 ft
Very high-frequency whales	181	84 ft

Legend: SEL_{cum} = cumulative sound exposure level (decibel referenced to 1 microPascal squared per second [dB re 1 µPa2 µPa2•s]) over 24 hours
Source: NMFS 2024.

Given that noise levels would fall below those that could cause auditory injury fairly close to shore, it is unlikely that marine mammals would experience injury. Any marine mammals that encounter noise from vibratory pile driving may avoid the area. Individual responses to noise are expected to be variable, depending on baseline conditions and the sensitivity of the individuals present. Since pile installation and removal would only occur during daylight hours, marine mammals transiting a project area or foraging or resting in a project area at night would not be affected. Behavioral disturbance to marine mammals would be localized and temporary and would not cause population-level effects.

Seawall Repair and Extension

Marine mammals would not be affected by seawall repair and extension as these activities would occur on land.

3.10.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2, Beach Renourishment only, are the same as those described for Beach Renourishment under Alternative 1.

3.10.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3, Breakwater Construction only, are the same as those described for Breakwater Construction under Alternative 1.

3.11 SPECIAL STATUS SPECIES

Special status species include any species which is listed, or proposed for listing, as threatened or endangered by the USFWS or NOAA Fisheries under the provisions of the ESA; species protected under other federal laws, including the Bald and Golden Eagle Protection Act; species that are considered to be threatened or endangered under Virginia's ESA; or those species or habitats of conservation concern identified by the Commonwealth of Virginia. Marine mammals are also protected under federal regulations and are discussed in **Section 3.10, Marine Mammals.**

During the preparation of the *2010 SRIPP PEIS*, the *2013 Hurricane Sandy EA,* and the *2019 SERP EA*, NASA consulted with both USFWS and NOAA Fisheries regarding potential effects on these activities on listed species and critical habitat. Ultimately, the USFWS consultations, as well as ongoing launch operations from Wallops Island, were combined and a single amended Biological Opinion (BO) was provided in March of 2021 (USFWS BO; Project #2015-F-3317). NOAA Fisheries offered a revised BO in August of 2012 and confirmed in 2014 and 2020 that reinitiation was not warranted. Correspondence with USFWS and NOAA Fisheries can be found in **Appendix B**.

3.11.1 REGULATORY CONTEXT

Section 7 of the ESA requires federal agencies to evaluate the effects of their actions on listed species and consult with either the USFWS or NOAA Fisheries, as appropriate, if the agency determines that its action "may affect" a listed species or designated critical habitat. The Virginia ESA (29 Virginia Administrative Code 1-563–29.1-570) is administered by Virginia Department of Wildlife Resources (VDWR) and prohibits the taking, transportation, processing, sale, or offering for sale of any federally or state-listed threatened or endangered species. As a federal agency, NASA voluntarily complies with Virginia's ESA.

3.11.2 AFFECTED ENVIRONMENT

Since the preparation of the 2019 BO, there have been new federal or state ESA species listings and status elevations*:* the proposed endangered tricolored bat (*Perimyotis subflavus*), northern long-eared bat (*Myotis septentrionalis*), threatened eastern black rail (*Laterallus jamaicensis* ssp. *Jamaicensis*), and the proposed threatened monarch butterfly (*Danaus Plexippus*) (USFWS 2025a). A summary of species potentially affected by the proposed activities is provided here.

3.11.2.1 Onshore

In preparing the *2019 Final SERP EA*, NASA determined that project activities *may affect, are likely to adversely affect* the loggerhead sea turtle (*Caretta caretta*), piping plover (*Charadrius melodus*), and rufa red knot and *may affect, not likely to adversely affect* seabeach amaranth (*Amaranthus pumilus*), roseate tern (*Sterna dougallii dougallii*), and several species of nesting sea turtles, including leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), and green (*Chelonia mydas*) (USFWS 2019).

While habitat does exist on Wallops Island for the endangered northern long-eared bat (*Myotis septentrionalis*), it has not been detected during acoustical surveys, and no habitat exists within the project area. (NASA 2024a). There is suitable seabeach amaranth habitat present on the Wallops Island beach; however, annual biological surveys have not identified any of these listed plants (NASA 2023a). The monarch butterfly, which recently became a candidate for federal listing, also has no suitable habitat within the project area since the area is unlikely to provide habitat for milkweeds, their preferred host species. Therefore, seabeach amaranth, the northern long-eared bat, and the monarch butterfly are not discussed further, and this section will focus on piping plovers, red knots, eastern black rails, and sea turtles.

The VDWR maintains a listing of state endangered and threatened species (VDWR 2024). No other state-listed plants, reptiles, or mammals have been documented in the project area. However, two state-listed birds, Wilson's plover (*Charadrius wilsonia*) and gull-billed tern (*Sterna nilotica*), are present. Florida thoroughwort (*Eupatoriu anomolum*), the peregrine falcon (*Falco peregrinus*), and the loggerhead shrike (*Lanius ludovicianus*) are also state-listed as species that may occur on or within the vicinity of Wallops Island; however, they are located outside the project area and are only found on Wallops Main Base, Wallops Mainland, and north Wallops Island (NASA 2022a).

NASA continues to conduct regular monitoring of the Wallops Island beach between March 15 and August 31 to determine the level of federally listed bird and sea turtle nesting activity within and adjacent to the project area. Additionally, when prior renourishment occurred during the nesting season, NASA increased monitoring to seven days a week.

Tri-colored bat: The tricolored bat (*Perimyotis subflavus*) is one of the smallest bats native to North America. The once common species is wide ranging across the eastern and central United States and portions of southern Canada, Mexico, and Central America. During the winter, tricolored bats are found in caves and mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts. During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves. This bat species is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip. On September 13, 2022, the USFWS announced a proposal to list the tricolored bat as endangered under the ESA. The bat faces extinction due to the effects of white-nose syndrome, a deadly disease affecting cave-dwelling bats across the continent. Habitat does exist on Wallops Island for the tricolored bat, and though this species was not detected during acoustic surveys in 2024, it was in 2018 and is included here (NASA 2024b).

Piping Plover: Since 2010, NASA has conducted annual piping plover surveys three to four times weekly between March 15 and August 31, or when the last chick fledges. Additionally, when prior renourishment occurred during the nesting season, NASA increased monitoring to seven days a week. **Table 3.11-1** illustrates historic nest data.

Table 3.11-1 Historic Piping Plover Nesting on Wallops Island

Year	Nests	Chicks Fledged
2017	6	4
2018	3	3
2019	7	5
2020	7	0
2021	3	0
2022	4	0
2023	3	3
2024	7	1
2025	3	8

Sources: NASA 2017, 2018, 2019c, 2020, 2021, 2022c, 2023a, 2024d, 2025b

Rufa Red Knot: NASA has observed and recorded the presence of red knots on the north end of Wallops Island during their May spring migrations since 2010. **Table 3.11-2** illustrates historic rufa red knot counts at Wallops Island. In 2021 and 2023, the USFWS proposed critical habitat for the rufa red knot, including two areas on Wallops Island: one 540-acre area on northern Wallops Island and a 31-acre area on southern Wallops Island. Although the project area overlaps the proposed critical habitat, the designation has not been finalized.

Table 3.11-2 Historic Rufa Red Knot Counts on Wallops Island

Year	Count
2017	415
2018	393
2019	2,020
2020	117
2021	0
2022	622
2023	186
2024	53
2025	1,744

Sources: NASA 2017, 2018, 2019c, 2020, 2021, 2022c, 2023a, 2024d, 2025b

Sea Turtles: In accordance with the Protected Species Monitoring Plan (NASA 2025a), NASA monitors for sea turtle nesting in conjunction with piping plover monitoring. If a nest is discovered, monitoring continues through November 30, or until the last hatchling leaves the nest. While NASA has observed loggerhead sea turtles and sea turtle nesting activity in the past, numbers are low, and some years have no observations of sea turtle nesting. Between 2010 and 2013, NASA observed a total of eight nests and five false crawls on Wallops Island beach. DNA analysis determined that all four nests in 2010 were dug by a single female loggerhead sea turtle (NASA 2010b; USFWS 2016). No sea turtle nesting activity has been observed on Wallops Island since monitoring began in 2013. Historically, only loggerhead sea turtles have been found on Wallops (NASA 2025b). The area offshore of Wallops Island would be considered to be marginal as sea turtle habitat, and observations of sea turtles in these waters are infrequent.

Eastern Black Rail: The eastern black rail is federally listed as threatened and state-listed as endangered. In the northeastern U.S., the eastern black rail typically occurs in salt and brackish marshes with dense cover but can also be found in upland areas of these marshes. Farther south along the Atlantic coast, eastern black rail habitat includes impounded and unimpounded salt and brackish marshes (USFWS 2025b). NASA completed two sets of visual and auditory surveys to capture peak potential eastern black rail activity during the breeding season. The first set of surveys was conducted from June 10 to July 13, 2021 (Ritzert, Stein, and Bartok 2021) and the second set was conducted from May 1 to June 6, 2022 (Stein, Bartok, and Ritzert 2022). No visual or auditory observations of eastern black rails were recorded during surveys. No eastern black rail habitat (wetlands) exists in the project area, and no wetlands would be affected by the Proposed Action.

Gull-billed Terns and Wilson's Plovers: Since 2010, no nesting activity has been observed on Wallops Island for gull-billed terns or Wilson's plovers (NASA 2023a).

3.11.2.2 Offshore

In preparing the *2010 Final SRIPP PEIS*, NASA determined that project activities have the potential to affect in-water sea turtles (species listed above under **Section 3.11.2.1, Onshore**) and several whale species, including right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*), sperm whale (*Physeter macrocephalus*), sei whale (*Balaenoptera borealis*), and blue whale (*Balaenoptera musculus*). Effects to marine mammals are discussed in **Section 3.10.3.** Atlantic sturgeon was added into the Supplemental Biological Assessment (NASA 2011, BO: NOAA 2012), and the *2013 Post-Hurricane Sandy EA*. While Bermuda petrels (*Pterodroma cahow*) may be present in the Atlantic Ocean, they are not expected to occur in the Action Area. It is unlikely that activities would encounter this species offshore as water depths are shallower than those in which the species is usually found. The NOAA Fisheries issued a revised 2012 BO based on the best available information and concluded that the effects of dredge noise on listed species of whales are discountable. Protected species monitoring conducted by observers onboard the three dredges during the post-Sandy beach fill cycle reported no in-water sightings of listed species. A study by BOEM passively monitored telemetered fish in the Sandbridge Shoal Marine Minerals Lease Area off the southeast coast of Virginia, south of Offshore Shoal A, from 2016 to 2019. Atlantic sturgeon were the most commonly detected fish, with detections ranging from 109 to 134 individuals per year and occurring on between 96 and 103 days per year. Detections varied greatly by month with the fewest from June to September (no detections in July and August) and the largest number of detections in March–April and November–December (BOEM 2024).

The VDWR maintains a listing of endangered, threatened, and species of greatest conservation need, including marine animals (VDWR 2024). Federal-level listings are mirrored in state-level listings, and there are no other state-level listed marine plants or animals known from the proposed project area (NASA 2022a).

3.11.3 Environmental Consequences

NASA is consulting with USFWS and NOAA Fisheries. More information will be added as the consultations progress.

3.11.3.1 No Action Alternative

Under the No Action Alternative, there would be no project-related effects to any special status species onshore or offshore at Wallops Island.

3.11.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Beach Renourishment

Avifauna: Potential effects on listed avian species from beach renourishment would be generally the same as those discussed for non-listed avian species in **Section 3.8, Wildlife** of this EA. In summary, these effects would include the potential for startle or disruption of foraging, reduction in prey availability, and for plovers, the potential for disruption of beach habitat during the placement of sand on Wallops Island shoreline, which may temporarily disturb breeding, nesting, and feeding activities. The 2019 BO requires the following measures to minimize effects on these species.

- Preparation and distribution of a fact sheet containing this information to all project personnel.
- Minimization of foot traffic during construction.
- Inspection of all vehicles for leaks immediately prior to work in beach habitat.
- Notification to the USFWS regarding the projected and actual start dates, progress, and completion of the project and confirmation that all conservation measures were followed.
- Submission of an annual report summarizing the survey and monitoring efforts, location and status of all occurrences of listed species recorded, and any additional relevant information to the USFWS by December 31 of each year.

During the 2021 permit and consultation modifications to revise breakwater construction from in-water barge to temporary bulkheads, VMRC issued a permit that prescribed a number of terms that also aim to reduce effects on special status species as detailed in the conditions listed below.

- Activities shall not begin until the last piping plover or American oystercatcher chicks have fledged or the last sea turtle nest has hatched or been deemed nonviable by VDWR staff, whichever is later.
- Every effort shall be made to complete activities by March 15 of any year. If work must continue past the March 15 deadline, daily monitoring for red knot migrants and nesting piping plovers and American oystercatchers shall begin on March 15 and continue until the last chicks of either species fledges. Daily sea turtle nest patrols shall begin on May 1 and continue until the last nest hatches or is deemed nonviable by VDWR staff.
- If a piping plover or sea turtle nest is found before renourishment activities are completed, all activities must cease until the WFF staff has notified the USFWS and VDWR, and VDWR has completed an on-site determination about whether or not construction activities may continue.
- Predator screens would be placed over sea turtle nests and predator exclosures shall be erected around all piping plover nests.
- Equipment and materials shall be staged in upland areas westward of the beach and outside of sensitive habitats (e.g., marshes, mudflats, dunes).

Turtles: Potential effects on nesting sea turtles could include interference with nesting attempts during nighttime construction activity (particularly artificial lighting) on the beach, unintentional burial of a newly dug nest if it were to go undetected, disorientation of hatchlings (due to project-related light sources), or obstruction to hatchlings during their emergence and subsequent trip to the ocean. It is unlikely that the replenished beach would prove unsuitable to nesting turtles because the beach fill material is not substantially different from nearby native beaches. Moreover, as evidenced by the sea turtle nesting that occurred on the Wallops Island beach during the initial beach fill cycle, it is possible that the additional elevated beach would provide suitable nesting habitat, a net benefit to these species. Potential effects on in-water sea turtles could include entrainment in the dredge, interaction with the sediment plume, reduction in available forage, direct strike, and disturbance due to vessel-created noise. However, the probability of interaction is very low because turtle numbers in the area are low.

Bats. Effects to tricolored bats would be similar to birds as described above. Bats within the vicinity of launch activity would react to visual disturbances and noise and are expected to exhibit a startle response that could interfere with normal behaviors. Due to the lack of documented bat habitat within the project area, the potential for interaction is limited, and any behavior modifications would be temporary.

Atlantic Sturgeon: Potential effects on the Atlantic sturgeon from beach renourishment would be similar to those of in-water sea turtles and could include entrainment in the dredge, interaction with the sediment plume, reduction in available forage, direct strike, and disturbance due to vessel-created noise. However, given the limited portion of available habitat that would be affected, the potential for interaction is limited.

Giant Manta Ray: Potential effects on the giant manta rays would be similar to those of Atlantic sturgeon with the exception of entrainment in the dredge. Considering the behavior and distribution of giant manta rays relative to the operating parameters of hopper dredges, it is not anticipated that dredging entrainment poses a risk. While Atlantic sturgeons are bottom feeders and sea turtles often rest on the sea bottom, giant manta rays feed on planktonic and nektonic species throughout the water column and are less likely to be trapped or crushed by the drag head or entrained in the dredge.

Breakwater Construction

Avifauna: Potential effects on listed avian species from breakwater construction would be generally the same as those discussed for non-listed avian species in **Section 3.8, Wildlife** of this EA**.** In summary, these effects would include the potential for startle or disruption of foraging and reduction in prey availability. The breakwaters are planned to be constructed well south of the historical areas used by piping plover and red knots (NASA 2024b) and would be constructed approximately 200 feet offshore of the renourished shoreline. In addition, the above-water portion of the breakwaters after construction would provide potential roosting and resting area for birds. It is unlikely that there would be any long-term effects from breakwater construction on listed bird species.

Turtles: Although installation of breakwaters may affect in-water sea turtles, it would not affect terrestrial species. Effects on sea turtles could include interaction with the sediment plume, reduction in available forage, disturbance due to vessel-created sounds, and ingress and egress for adult females and hatchlings around the breakwaters. The construction of breakwaters could potentially cause disturbance and area avoidance by sea turtles, depending on the time of year construction was initiated. For example, if work continued throughout the night, lighting would cause confusion for sea turtle hatchlings traveling to the water. Additionally, sea turtles could be affected by noise from the installation of steel sheet piling using a vibratory hammer if that method was used to install breakwaters. **Table 3.11-3** illustrates the sound thresholds for causing effects to sea turtles (Navy 2017, 2018). Maximum distances from the noise source (steel sheet pile being driven by a vibratory hammer) to the turtle impact thresholds were calculated (**Table 3-11-3**). Outside these distances effects would not occur.

Table 3.11-3 Auditory Injury and Behavioral Thresholds for Sea Turtles Exposed to Non-Impulsive Sounds

Effect	Weighted SPL Threshold re µPa2•s	Distance (feet)
Permanent Threshold Shift	220 dB SEL_{cum}	2
Temporary Threshold Shift	200 dB SEL_{cum}	42
Behavioral Change	175 dB RMS	6.6

Legend: µPa = microPascal; µPa2•s = microPascal squared per second; dB = decibel; re = referenced to; RMS = root mean square; SPL = sound pressure level; SEL_{cum} = cumulative sound exposure level over 24 hours, weighted for turtle hearing group based on formula in Navy 2017

Given that noise levels would fall below those that could cause permanent or temporary threshold shifts (hearing impacts) or behavior changes fairly close to shore, it is unlikely that turtles would experience effects from underwater noise. Since pile installation and removal would only occur during daylight hours, sea turtles transiting a project area at night would not be affected. Potential disturbance to sea turtles from underwater noise would be localized and temporary and would not cause population-level effects.

Atlantic Sturgeon: Effects on sturgeons would be similar to those of in-water sea turtles and could include interaction with the sediment plume, reduction in available forage, and disturbance due to vessel-created sounds. However, given the limited number of sturgeons expected to use the breakwater area as habitat and the limited portion of available habitat that would be affected, the potential for interaction would be limited. These species are highly mobile and would likely avoid the breakwater construction area during construction activities. Long-term effects due to breakwater construction would be unlikely.

Giant Manta Ray: As rays do not forage on benthic organisms, construction of breakwaters would not present a direct effect to food sources. These species are highly mobile and would likely avoid the breakwater construction area during construction activities. Those rays that do choose to opportunistically forage in the action area would be physically able to shift to other nearby areas where zooplankton is more readily accessible. Thus, any potential effects of habitat modification to giant manta rays would be too small to be meaningfully measured or detected and are insignificant. Long-term effects due to breakwater construction would be unlikely.

Seawall Repair and Extension

Avifauna: Potential effects on listed avian species for the seawall repair and extension would be generally the same as those discussed for non-listed avian species in **Section 3.8, Wildlife** of this EA. In summary, these effects would include the potential for startle or disruption of foraging, reduction in prey availability, and, for plovers, the potential for disruption of beach habitat during the placing or replacing of dirt and rock in previously disturbed areas.

Turtles: Although seawall repair and expansion may affect terrestrial species, it would not affect in-water sea turtles. Effects on nesting turtles would be generally the same as those discussed for beach renourishment and breakwater construction.

Atlantic Sturgeon and Giant Manta Ray: No effects on sturgeon or rays from the seawall construction and repair are anticipated because the activities would only be on the beach.

3.11.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension.

3.11.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension.

3.12 CULTURAL RESOURCES

Cultural resources are defined as pre-contact or post-contact sites, buildings, structures, objects, or other physical evidence of human activity that are considered important to a culture or community for scientific, traditional, or religious reasons. These include both architectural and archaeological resources. Archaeological resources are places where humans changed the ground surface or left artifacts or other physical remains (e.g., projectile points or bottles).

3.12.1 REGULATORY CONTEXT

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and as implemented by 36 CFR part 800, requires federal agencies to consider the effects of their actions on historic properties before undertaking a project. A historic property is defined as any cultural resource that is included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). The NRHP, administered by the National Park Service, is the official inventory of cultural resources that are significant in American history, prehistory, architecture, archaeology, engineering, and culture. The NRHP also includes National Historic Landmarks. In consideration of the NHPA, federal agencies are required to initiate consultation with the State Historic Preservation Office (SHPO) informing them of the planned action and requesting their comments or concerns.

In accordance with Sections 106 and 110 of the NHPA, NASA is in the process of developing a nationwide Programmatic Agreement with the Advisory Council on Historic Preservation and National Conference Of State Historic Preservation Officers to outline how NASA manages its cultural resources as an integral part of its operations and missions (NASA 2023c). The purpose of this Nationwide Programmatic Agreement is to create a process by which NASA can meet its responsibilities to manage its U.S. real property assets under Sections 106 and 110 of the NHPA in a manner that accommodates NASA's mission and addresses the unique challenges of historic Highly Technical or Scientific Facilities. The discussion of cultural resources in this *SPP EA* is limited to archaeological resources because the Proposed Action would have no potential to affect architectural resources.

3.12.2 AFFECTED ENVIRONMENT

The Area of Potential Effects (APE) for archaeology is defined as the area where ground-disturbing activities would take place. For the *SPP EA*, this includes sand dredging from Unnamed Shoal A, pump-out buoy area, beach renourishment area, and construction of offshore breakwaters.

Two archaeological surveys were completed to investigate the APE for the *2010 Final SRIPP PEIS*. In 2009, an investigation of the proposed groin, breakwater, and shoreline that would be affected by the

SRIPP project was completed. This investigation included pedestrian survey of the Wallops Island shoreline, archaeological monitoring of the installation of geotextile tubes along the shoreline, a diving survey of the proposed groin location, and a remote sensing survey of the proposed breakwater area. The investigation did not identify any archaeological resources in these areas, and no additional work was recommended (Randolph et al. 2009). The second investigation for the *2010 Final SRIPP PEIS* was conducted in 2010. This survey investigated the proposed offshore sand borrow areas using underwater remote sensing. No underwater archaeological resources were identified during the survey, and no additional work was recommended for the borrow area (Randolph et al. 2010).

No previously identified archaeological sites are located in the APE for the project. Three previously identified archaeological sites are located on Wallops Island in the vicinity of the APE. The Military Earthworks site (44AC0089) is a Revolutionary War gun emplacement located at the northern end of Wallops Island. The site was subjected to additional investigations and recommended eligible for listing in the NRHP. Site 44AC0159 is an unnamed site located at the southern end of Wallops Island. The site is described as a shell pile or shell midden and has been determined not eligible for listing in the NRHP. Site 44AC0459 is a trash scatter associated with the Coast Guard Life Saving Station and Observation Tower. This site was also determined not eligible for the NRHP (NASA 2022b).

3.12.3 Environmental Consequences

3.12.3.1 No Action Alternative

The No Action Alternative would have no effects to archaeological resources because none of the activities associated with Wallops Island shoreline protection program would occur.

3.12.3.2 Alternative 1 – Beach Renourishment, Breakwater Construction, and Seawall Repair and Extension

Previous surveys of the APE for archaeological resources did not identify any archaeological resources; therefore, the proposed project would have no effect on NRHP-eligible archaeological sites. The inadvertent discovery of any previously unidentified archaeological resources would result in immediate cessation of work and notification of the WFF Cultural Resources Manager. The WFF Cultural Resources Manager would follow the steps outlined in Stipulation XII, *Post Review Discoveries*, of the executed 2014 Programmatic Agreement (NASA 2014, 2022b).

While preparing this EA, NASA consulted with the Virginia Department of Historic Resources (VDHR) on the potential effects of the Proposed Action on historic properties. NASA requested comments from VDHR regarding potential effects to historic properties by the proposed project. Correspondence between NASA and the VDHR is included in **Appendix C** of this EA.

Nine Tribal Nations were invited to consult on this EA, including the Catawba Indian Nation, Chickahominy Indian Tribe, Chickahominy Indians Eastern Division, Monacan Indian Nation, Nansemond Indian Tribe, Pamunkey Indian Tribe, Pocomoke Indian Nation, Rappahannock Tribe, and Upper Mattaponi Tribe. The contact information for the tribes is listed in Chapter 6.

3.12.3.3 Alternative 2 – Beach Renourishment and Seawall Repair and Extension

The effects of Alternative 2 are the same as those described for Alternative 1 for Beach Renourishment and Seawall Repair and Extension. Alternative 2 would have no effect on NRHP-eligible archaeological sites.

3.12.3.4 Alternative 3 – Breakwater Construction and Seawall Repair and Extension

The effects of Alternative 3 are the same as those described for Alternative 1 for Breakwater Construction and Seawall Repair and Extension. Alternative 3 would have no effect on NRHP-eligible archaeological sites.

4.0 REASONABLY FORESEEABLE FUTURE ACTIONS AND MITIGATION MEASURES

4.1 REASONABLY FORESEEABLE FUTURE ACTIONS

Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a decision maker would take such activities into account in reaching a decision. These federal and non-federal activities that must be taken into account in the analysis of effects include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by the agency. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

NASA WFF, and specifically its launch assets on Wallops Island, support the military, as well as the commercial launch industry upon which NASA, civil, defense, and academic customers rely. As these customers' needs evolve and grow, NASA regularly assesses and expands its capability to support these needs. Activities planned for southern Wallops Island that may occur within the seven-year timeframe of this proposed action include the following.

- Phase IV of the U.S. Department of the Navy Atlantic Fleet Training and Testing (AFTT) EIS/Overseas EIS includes activities in the Virginia Capes (VACAPES) Operating Area which includes the surface and subsurface waters off the Virginia and North Carolina coasts. The document evaluates the environmental effects of continuing military readiness activities and includes updated science and proposed testing and training activities.
- In 2024, the BOEM released an EA that examined the effects of leasing three areas of the mid-Atlantic coast for wind development, including an area identified as B-1 which is off the coast of Wallops Island. This area is more than 25 miles east of Wallops Island and is not expected to affect or be affected by the Proposed Action.
- The Wallops Island Southern Expansion Programmatic EA is being developed to assess effects of expansion of the southern Wallops Island launch area to support military and commercial customers, including constructing and operating new launch pads and facilities, expanding and modifying existing launch pads, increasing launch cadence, and changes to military testing and training. This work is expected to take place beginning in 2027.
- The WFF Causeway Bridge Replacement EA (NASA 2024c) assessed the effects of replacing the existing bridge over Cat Creek, which provides the only vehicular access to Wallops Island. The existing bridge is aging and deteriorating. More frequent and heavier loads by NASA and its customers will continue to traverse the bridge. A new bridge, capable of supporting large load capacity will be constructed to the north of the existing bridge and, once it is completed, the existing bridge will be removed. This new bridge is expected to be completed by 2028, with removal of the existing bridge to follow as funding becomes available.
- The Wallops Island Northern Development EA (NASA 2023b) assessed the effects of constructing a port and operations area on the north end of Wallops Island to support operational capabilities for NASA and its customers. The project includes dredging a vessel approach channel and turning basin; construction of a new pier for barge access and berthing; improvements at the existing unmanned aerial system airstrip, including a new hanger, airstrip lighting, and other runway improvements; installation of new utilities infrastructure; roadway improvements and

construction; and a new support building and vehicle parking lot. These activities are planned to be implemented in phases through 2026.
- Ongoing operations, maintenance, survey, and monitoring activities at Wallops Island.
- The waters at the Offshore Shoal A and around Wallops Island would continue to be used for recreation, and commercial and recreational fishing.

NASA has determined that there would not be combined effects from the Proposed Action and reasonably foreseeable activities because the activities would not coincide temporally or geographically.

4.2 MITIGATION MEASURES

Mitigations are activities undertaken to avoid, minimize, or compensate for negative effects of a proposed project. These can include avoiding impacts by not undertaking some parts of an action; minimizing impacts by implementing protective measures; and repairing, restoring, or compensating for negative effects. The following sections describe mitigation measures that would be implemented with the Proposed Action.

4.2.1 PHYSICAL EFFECTS MITIGATION

Effects to the physical environment associated with dredging and sand placement include removal of sand from the shoal, suspended sediment/turbidity, redistribution of sediment outside the dredge footprint, changes to bathymetry, changes to the nature of the beach, and accidental contamination of soil and sediment from the release of pollutants from construction equipment. To minimize these effects, the following mitigations have been incorporated into the Proposed Action:

- Dredge offshore sand from Unnamed Shoal A sub-area A-1 (an accretional area);
- Dredge over a large area and not create deep pits;
- Dredge cut depth would not be excessive;
- Dredging would not occur over the entire length of the shoal;
- MEC screening at the drag head;
- Ensure dredged materials brought to the beach are comparable sediment type (a similar percentage of sand, silt, and clay), grain size, and color as the existing beach material; and
- Implement erosion and sediment control and spill prevention BMPs.

4.2.2 THREATENED AND ENDANGERED SPECIES EFFECTS MITIGATION

4.2.2.1 Onshore

Effects to threatened and endangered species could include: the potential for startle or disruption of foraging, reduction in prey availability, and for plovers, the potential for disruption of beach habitat during the placement of sand on Wallops Island shoreline, which may temporarily disturb breeding, nesting, and feeding activities. The 2019 BO requires the following measures to minimize effects on these species.

- Preparation and distribution of a fact sheet containing this information to all project personnel.
- Minimization of foot traffic during construction.
- Inspection of all vehicles for leaks immediately prior to work in beach habitat.
- Notification to the USFWS regarding the projected and actual start dates, progress, and completion of the project and confirmation that all conservation measures were followed.

- Submission of an annual report summarizing the survey and monitoring efforts, location and status of all occurrences of listed species recorded, and any additional relevant information to the USFWS by December 31 of each year.
- Should renourishment activities be scheduled between March 15 and August 31, NASA will ensure that a qualified biological monitor conducts daily surveys of the project site and adjacent areas to detect nesting piping plovers and sea turtles, in accordance with established and approved monitoring protocols.
- In accordance with WFF's Protected Species Monitoring Plan (NASA 2025a), if piping plover or sea turtle nests are identified, the nests will be clearly marked using exclosures or signage and rope barriers encircling each site. A qualified biological monitor would conduct daily nest inspections. All on-site personnel would be informed of the nesting status, and all project activities within 1,000 feet of a nest would be suspended or relocated until hatching is complete.

Seawall construction activities could disturb beach habitat for shorebirds and sea turtles. To limit negative effects during construction, NASA would educate all personnel working in the construction area on recognizing protected species and their likely habitat so that appropriate avoidance and minimization measures can be incorporated into activities. If a nest or crawl tracks are found, NASA would confer with USFWS to develop specific mitigation measures.

4.2.2.2 Offshore

As with previous projects that involved dredging, NASA would do the following.

- Ensure that a bridge lookout would be onboard as described in **Section 2.2.1**.
- When a listed whale is spotted within 1 km (0.62 mile) of the dredge, dredging would stop until the whale is farther than 1 km from the dredge. Should an individual be detected within one mile of the vessel, the vessel would be required to reduce speed to below 14 knots.
- The vessel must maintain a minimum 500-foot buffer to any North Atlantic right whales.
- If the vessel is actively dredging, and a whale is identified, the vessel must turn off all pumps until the animal has left the immediate vicinity, upon which the dredging activity could resume.
- As suggested by NOAA Fisheries in a memorandum dated June 18, 2009, the potential of marine mammal strikes would be mitigated by operating the dredge vessel at speeds below 14 knots.

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Appendix A: Air Quality Calculations

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Appendix B: EFH and Special Status Species Consultation
(To be included in Final EA)

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Appendix C: Cultural Resources Consultation for Phase 1
(To be included in Final EA)

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