



**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 FACILITY 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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**Date:** January 2026

**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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## ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit	NHPA	National Historic Preservation Act
Air Force	United States Department of the Air Force	NO <sub>2</sub>	nitrogen dioxide
APE	Area of Potential Effects	NOAA	National Oceanographic and Atmospheric Administration
BMP	best management practice	NPR	NASA Procedural Requirement
BO	Biological Opinion	NRHP	National Register of Historic Places
BOEM	Bureau of Ocean Energy Management	O <sub>3</sub>	ozone
CAA	Clean Air Act	OCS	Outer Continental Shelf
CFR	Code of Federal Regulations	OSHA	Occupational Safety and Health Administration
CO	carbon monoxide	PEIS	Programmatic Environmental Impact Statement
CO <sub>2</sub>	carbon dioxide	PM <sub>2.5</sub>	particulate matter less than 2.5 microns in diameter
CO <sub>2e</sub>	carbon dioxide equivalent	PM <sub>10</sub>	particulate matter less than 10 microns in diameter
CWA	Clean Water Act	ppt	parts per thousand
CZM	Coastal Zone Management	ROD	Record of Decision
dB	decibel	SERP	Shoreline Enhancement and Restoration Project
dBA	A-weighted decibel	SHPO	State Historic Preservation Office
dBpeak	instantaneous peak sound pressure level	SO <sub>2</sub>	sulfur dioxide
dBRMS	root mean square sound pressure level	SPL	sound pressure level
EA	Environmental Assessment	SPP	Shoreline Protection Program
EFH	Essential Fish Habitat	SRIPP	Shoreline Restoration and Infrastructure Protection Program
EPA	U.S. Environmental Protection Agency	U.S.	United States
ESA	Endangered Species Act	U.S.C.	U.S. Code
FCD	Federal Consistency Determination	USACE	U.S. Army Corps of Engineers
FONSI	Finding of No Significant Impact	USFWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas	VDEQ	Virginia Department of Environmental Quality
HAP	hazardous air pollutant	VDHR	Virginia Department of Historic Resources
HAPC	Habitat Area of Particular Concern	VDWR	Virginia Department of Wildlife Resources
km	kilometer	VMRC	Virginia Marine Resources Commission
MARS	Mid-Atlantic Regional Spaceport	VSA	Virginia Spaceport Authority
MEC	munitions and explosives of concern	WFF	Wallops Flight Facility
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		

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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<sup>1</sup> 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

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<sup>1</sup> 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 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 *Wallop 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<sup>2</sup>. 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).

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).

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 Wallop 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<sup>3</sup>. The project placed approximately 1.1 million cubic yards of sand sourced from the north Wallop Island beach. Prior to renourishment, a total of five breakwaters were constructed approximately 200 feet offshore from the MHW line of the Wallop 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.

<sup>2</sup> 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).

<sup>3</sup> 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 Wallop 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 Patrick J. Hendrickson)



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



**Figure 1.2-3 Shoreline Infrastructure Protection Area in 2023**  
(Photo courtesy of Patrick 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 EO's 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

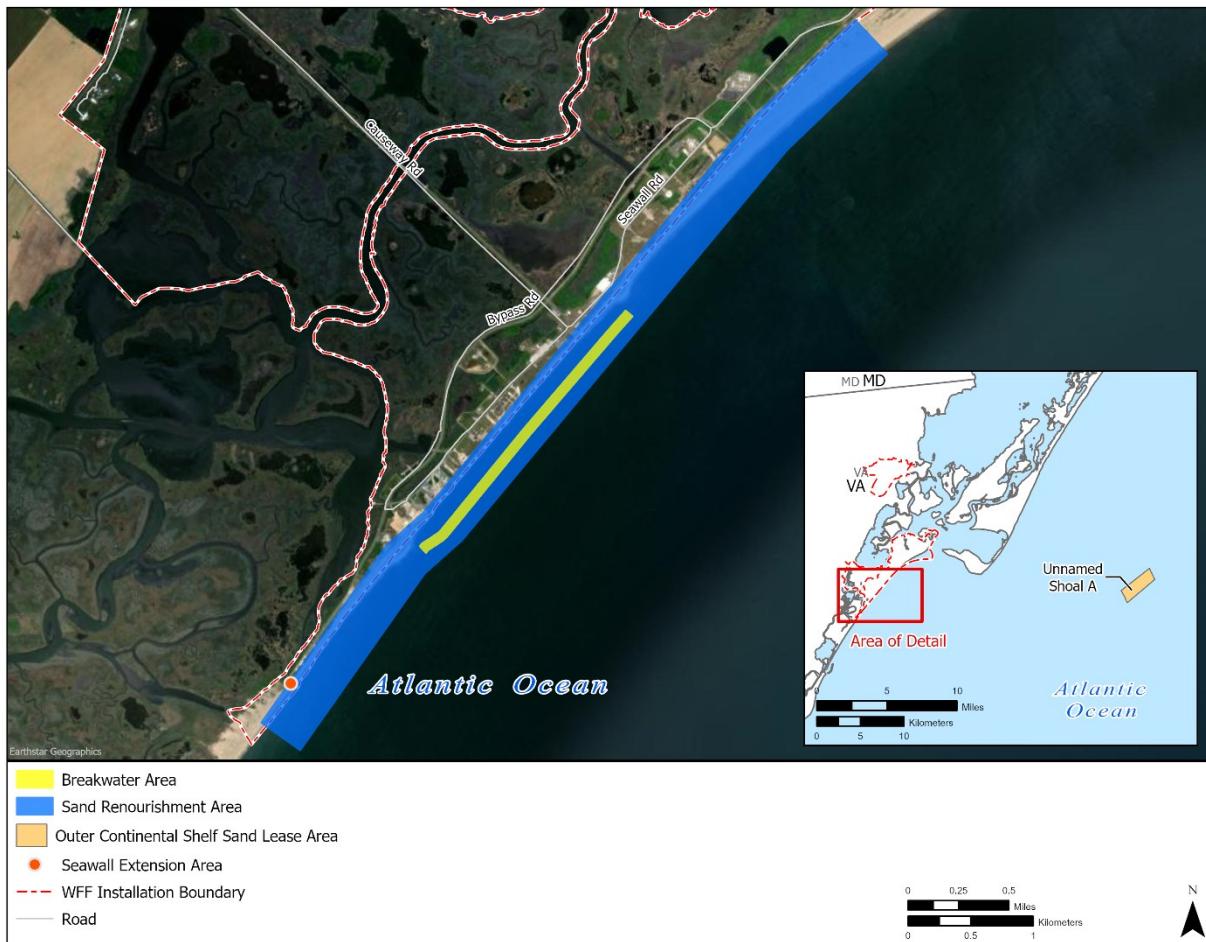
### 2.1 INTRODUCTION

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**

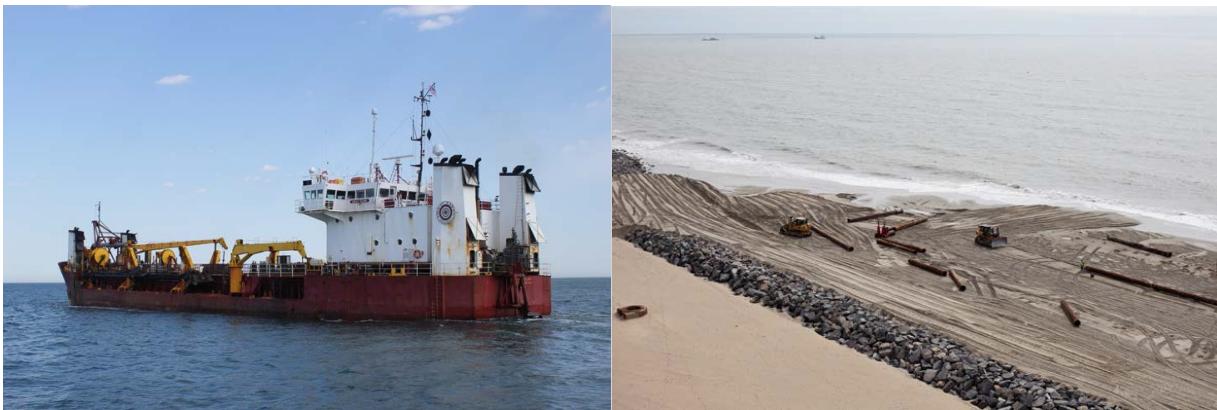
Shoreline stabilization activities would occur in phases depending on a number of factors, including infrastructure prioritized for protection, the pace and location of erosion, and the availability of funding. For example, a section of beach that experiences rapid erosion in a storm event could be renourished 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

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

*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<sub>3</sub>), carbon monoxide (CO),

nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter less than 10 (PM<sub>10</sub>) and 2.5 (PM<sub>2.5</sub>) 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 <sub>2</sub>	1-hour Annual	100 ppb 53 ppb	None 53 ppb
PM <sub>10</sub>	24-hour Annual	150 µg/m <sup>3</sup> None	150 µg/m <sup>3</sup> None
PM <sub>2.5</sub>	24-hour Annual	35 µg/m <sup>3</sup> 9 µg/m <sup>3</sup>	35 µg/m <sup>3</sup> 15 µg/m <sup>3</sup>
O <sub>3</sub>	8-hour	0.070 ppm	0.070 ppm
SO <sub>2</sub>	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.

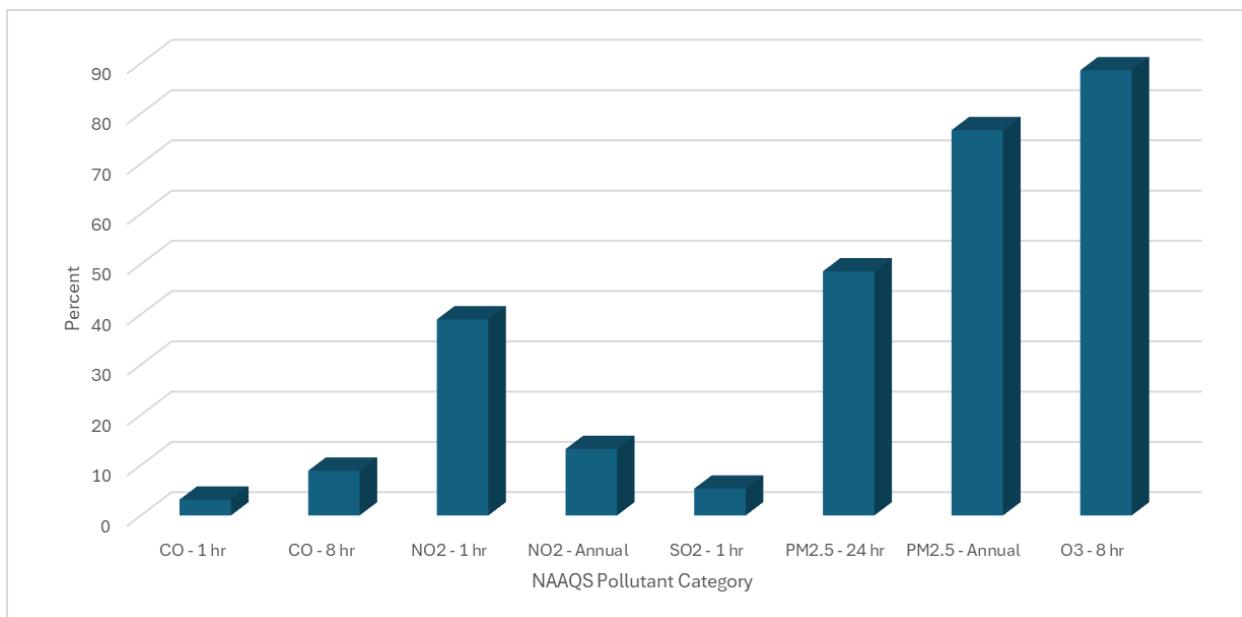
(3) Secondary Standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

*Legend:* µg/m<sup>3</sup> = microgram per cubic meter; CO = carbon monoxide; NO<sub>2</sub> = nitrogen dioxide; O<sub>3</sub> = ozone; ppb = parts per billion; ppm = parts per million; PM<sub>10</sub> = particulate matter less than or equal to 10 microns in diameter; PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter; SO<sub>2</sub> = sulfur dioxide

*Source:* EPA 2024a.

Due to the rural nature of Wallops Island, the nearest air monitoring station for O<sub>3</sub> is at the Blackwater National Wildlife Refuge near Cambridge, Maryland, approximately 56 miles northwest of the site. The nearest monitoring stations for NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> 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<sub>2</sub> = nitrogen dioxide; PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter; O<sub>3</sub> = ozone; SO<sub>2</sub> = sulfur dioxide*

*Source: EPA 2025a.*

### **Hazardous Air Pollutants**

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<sub>2</sub>), methane, nitrous oxide, and fluorinated gases as the most common GHGs (EPA 2025b). The dominant GHG emitted in the United States is CO<sub>2</sub> (79.7 percent), mostly from fossil fuel combustion (EPA 2025c). CO<sub>2</sub>, methane, and nitrous oxide occur naturally in the atmosphere.

Each GHG is assigned a heat-trapping capacity and is standardized to CO<sub>2</sub>, 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<sub>2</sub>e).

### 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 <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
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<sub>2e</sub> = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO<sub>x</sub> = nitrogen oxide; PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter; PM<sub>10</sub> = particulate matter less than or equal to 10 microns in diameter; SO<sub>2</sub> = 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<sub>x</sub> emissions from beach renourishment. In the case of a stationary source, NO<sub>x</sub> 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 <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
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	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<sub>2e</sub> = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO<sub>x</sub> = nitrogen oxide; PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter; PM<sub>10</sub> = particulate matter less than or equal to 10 microns in diameter; SO<sub>2</sub> = 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 <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2e</sub>
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<sub>2e</sub> = carbon dioxide equivalent; GHG = greenhouse gas; NA = Not Applicable; NO<sub>x</sub> = nitrogen oxide; PM<sub>2.5</sub> = particulate matter less than or equal to 2.5 microns in diameter; PM<sub>10</sub> = particulate matter less than or equal to 10 microns in diameter; SO<sub>2</sub> = 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<sub>2</sub>e. 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<sub>2</sub>e, which is 66 percent less than Alternative 1. Alternative 3 would emit 252,296 metric tons of CO<sub>2</sub>e, 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:1 $\mu$ Pa-m). The SELcum is dB re: 1 $\mu$ Pa squared seconds (dB re 1  $\mu$ Pa<sup>2</sup>-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 polychaetes 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

Wallop's 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 Wallop's Island across the Chincoteague Inlet, and Assawoman Island located adjacent to Wallop's Island's southern border. Assawoman Island to the south of Wallop's 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 Wallop's 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 Wallop's 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 Wallop's 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 Wallop's 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 melanotos*) 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 Wallop's 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 Wallop's 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 undulatus*), 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 (*Placopecten 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
<b>Mid-Atlantic and New England EFH Species</b>		
Atlantic butterfish ( <i>Peprilus triacanthus</i> )	A, J, E	Sandy, muddy substrates
Atlantic herring ( <i>Clupea harengus</i> )	A, J	Pelagic waters, bottom habitats
Atlantic surfclam ( <i>Spisula solidissima</i> )	A, J	Medium to fine-grained sand 30–80 feet deep
Black sea bass ( <i>Centropristes striata</i> )	A, J, L	Structured habitats (natural and manmade) such as shipwrecks, submerged aquatic vegetation, etc.
Bluefish ( <i>Pomatomus saltatrix</i> )	A, J, L, E	Estuarine and nearshore waters

Species name	Life Stage	Habitat
Clearnose skate ( <i>Raja eglanteria</i> )	A, J	Soft bottoms along the continental shelf
Longfin inshore squid ( <i>Doryteuthis pealeii</i> )	E	Continental shelf waters; muddy and sandy bottoms
Monkfish ( <i>Lophius americanus</i> )	E, L	Sand, mud, and shell habitats
Red hake ( <i>Urophycis chuss</i> )	A, E, L, J	Sandy sediments for juveniles; muddy substrates for adults
Scup ( <i>Stenotomus chrysops</i> )	A, J	Smooth and rocky bottoms; around piers, rocks, and other underwater infrastructure
Spiny dogfish ( <i>Squalus acanthias</i> )	Sub-adult female; sub-adult male; adult male	Bottom dwellers; inshore and estuaries
Summer flounder ( <i>Paralichthys dentatus</i> )	A, J	Sandy habitats, estuaries
Windowpane flounder ( <i>Scophthalmus aquosus</i> )	A, J, E, L	Estuaries and nearshore waters
Winter skate ( <i>Leucoraja ocellata</i> )	A, J	Sandy and gravelly bottoms
Witch flounder ( <i>Glyptocephalus cynoglossus</i> )	E	Sea surface temperatures below 55°F, over deep waters with high salinity
<b>Highly Migratory Species EFH Species</b>		
Albacore tuna ( <i>Thunnus alalunga</i> )	J	Subtropical or tropical waters; often found near surface or around floating objects
Atlantic angel shark ( <i>Squatina dumerili</i> )	ALL	Bottom habitats in coastal waters
Atlantic sharpnose shark (Atlantic stock) ( <i>Rhizoprionodon terraenovae</i> )	A	Estuaries, sandy beaches, deep offshore waters
Blacktip shark (Atlantic stock) ( <i>Carcharhinus limbatus</i> )	A, J	Coastal waters worldwide
Common thresher shark ( <i>Alopias vulpinus</i> )	ALL	Along continental shelf, temperate and tropical waters
Dusky shark ( <i>Charcharhinus obscurus</i> )	N	Shallow inshore waters to beyond the continental shelf; feeds near bottom
Sand tiger shark ( <i>Carcharias taurus</i> )	A, J, N	Shallow bays, reefs and wrecks
Sandbar shark ( <i>Charcharhinus plumbeus</i> )	A, J, N	Bottom dwellers; deep ocean banks and sandbars
Skipjack Tuna ( <i>Katsuwonus pelamis</i> )	A	Open ocean, at depths during the day
Smooth Dogfish ( <i>Mustelus canis</i> )	ALL	Coastal and estuarine waters along continental shelf
Tiger shark ( <i>Galeocerdo cuvieri</i> )	A, J	Coastal and pelagic waters of continental shelf
Yellowfin tuna ( <i>Thunnus albacares</i> )	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 dentatus*) (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*	<i>Megaptera novaeangliae</i>	Along the coasts of all oceans
Fin Whale*	<i>Balaenoptera physalus</i>	Temperate and cool offshore waters, all oceans worldwide
North Atlantic Right Whale*	<i>Eubalaena glacialis</i>	Atlantic coastal waters on the continental shelf
Sperm Whale*	<i>Physeter macrocephalus</i>	Deep open water, or around islands or coastal areas
Sei Whale*	<i>Balaenoptera borealis</i>	Deep offshore subtropical, temperate, and subpolar waters
Blue Whale*	<i>Balaenoptera musculus</i>	All oceans but the Arctic; polar waters for feeding in summer and equatorial waters in winter
Florida Manatee*	<i>Trichechus manatus latirostrus</i>	Coastal waters, rivers, and springs
Dwarf Sperm Whale	<i>Kogia simus</i>	Tropical and temperate waters
True’s Beaked Whale	<i>Mesoplodon mirus</i>	Deep, warm, temperate waters
Cuvier’s-Beaked Whale	<i>Ziphius cavirostris</i>	Typically deeper waters, but sometimes close to shore
Melon-Headed Whale	<i>Peponocephala crassidens</i>	Deep tropical and subtropical waters

Species Common Name	Scientific Name	Habitat
Short-Finned Pilot Whale	<i>Globicephala macrorhynchus</i>	Tropical and temperate waters
Long-Finned Pilot Whale	<i>Globicephala melas</i>	Deep offshore environments
Bottlenose Dolphin	<i>Tursiops truncatus</i>	Harbors, bays, gulfs, estuaries, nearshore and offshore waters
Atlantic Spotted Dolphin	<i>Stenella frontalis</i>	Warm temperate waters, nearshore and offshore
Common Dolphin	<i>Delphinus spp.</i>	Warm temperate waters, nearshore and offshore
Risso's Dolphin	<i>Grampus griseus</i>	Deep, tropical and temperate waters
Spinner Dolphin	<i>Stenella longirostris</i>	Tropical and subtropical coastal waters
Seals	<i>Pinniped spp.</i>	Coastal waters, islands, shores, or ice floats
Harbor Seal	<i>Phoca vitulina</i>	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 SEL <sub>cum</sub> )	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<sub>cum</sub> = cumulative sound exposure level (decibel referenced to 1 microPascal squared per second [dB re 1  $\mu$ Pa<sup>2</sup>  $\mu$ Pa<sup>2</sup>•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 melanotos*), 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 (*Eupatorium anomalum*), 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 fledge. 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 $\mu\text{Pa}^2\cdot\text{s}$	Distance (feet)
Permanent Threshold Shift	220 dB SEL <sub>cum</sub>	2
Temporary Threshold Shift	200 dB SEL <sub>cum</sub>	42
Behavioral Change	175 dB RMS	6.6

*Legend:*  $\mu\text{Pa}$  = microPascal;  $\mu\text{Pa}^2\cdot\text{s}$  = microPascal squared per second; dB = decibel; re = referenced to; RMS = root mean square; SPL = sound pressure level; SEL<sub>cum</sub> = 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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## 5.0 REFERENCES

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Calvin Washington	Accomack County Board of Supervisors

Name	Organization
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Appendix A: Air Quality Calculations

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**TAB A.**

**Emissions Summary for Alternative 1**

**This summary assumes breakwater and seawall stone delivery via rail**

Alternative 1 includes beach renourishment, construction of 12 breakwaters, and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e
Beach Renourishment	Onsite	35.41	110.24	675.33	0.75	17.78	17.24	76,973
	Offsite	0.26	0.82	5.05	0.01	0.13	0.13	558
Breakwater Construction	Onsite	2.04	6.52	27.79	0.03	1.31	1.27	10,427
	Offsite	107.99	592.33	2,667.82	2.08	72.28	66.23	207,049
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Offsite	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal Onsite		37.52	117.13	704.42	0.79	19.16	18.57	88,526
Onsite exceed 250-ton comparative threshold?		No	No	Yes	No	No	No	NA
Subtotal Offsite		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

**Emissions Summary for Alternative 2**

**This summary assumes seawall stone delivery via rail**

Alternative 2 includes beach renourishment and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e
Beach Renourishment	Onsite	35.41	110.24	675.33	0.75	17.78	17.24	76,973
	Offsite	0.26	0.82	5.05	0.01	0.13	0.13	558
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Offsite	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal Onsite		35.49	110.61	676.63	0.76	17.85	17.30	78,099
Onsite exceed 250-ton comparative threshold?		No	No	Yes	No	No	No	NA
Subtotal Offsite		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

**Emissions Summary for Alternative 3**

**This summary assumes breakwater and seawall stone delivery via rail**

Alternative 3 includes construction of 12 breakwaters and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e
Breakwater Construction	Onsite	2.04	6.52	27.79	0.03	1.31	1.27	10,427
	Offsite	107.99	592.33	2,667.82	2.08	72.28	66.23	207,049
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126
	Offsite	17.59	96.48	435.50	0.34	11.41	10.74	33,693
Subtotal Onsite		2.11	6.90	29.09	0.04	1.38	1.34	11,553
Onsite exceed 250-ton comparative threshold?		No	No	No	No	No	No	NA
Subtotal Offsite		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

**HAP emissions for Alternative 1**

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

**HAP emissions for Alternative 2**

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

**HAP emissions for Alternative 3**

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

**TAB B.****Emissions Summary for Alternative 1****This summary assumes breakwater and seawall stone delivery via barge**

Alternative 1 includes beach renourishment, construction of 12 breakwaters, and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Total HAPs
Beach Renourishment	Onsite	35.41	110.24	675.33	0.75	17.78	17.24	76,973	1.70
	Offsite	0.26	0.82	5.05	0.01	0.13	0.13	558	0.01
Breakwater Construction	Onsite	0.65	2.54	11.35	0.02	0.41	0.40	3,838	0.09
	Offsite	27.32	84.91	521.46	0.58	13.68	13.27	57,713	1.30
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126	0.02
	Offsite	1.59	4.96	30.43	0.03	0.80	0.77	3,368	0.08
Total		65.31	203.84	1,244.92	1.39	32.87	31.88	143,577	3.19

**Emissions Summary for Alternative 2****This summary assumes seawall stone delivery via barge**

Alternative 2 includes beach renourishment and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Total HAPs
Beach Renourishment	Onsite	35.41	110.24	675.33	0.75	17.78	17.24	76,973	1.70
	Offsite	0.26	0.82	5.05	0.01	0.13	0.13	558	0.01
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126	0.02
	Offsite	1.59	4.96	30.43	0.03	0.80	0.77	3,368	0.08
Total		37.34	116.39	712.11	0.80	18.78	18.21	82,026	1.81

**Emissions Summary for Alternative 3****This summary assumes breakwater and seawall stone delivery via barge**

Alternative 3 includes construction of 12 breakwaters and seawall extension

Activity	Location	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Total HAPs
Breakwater Construction	Onsite	0.65	2.54	11.35	0.02	0.41	0.40	3,838	0.09
	Offsite	27.32	84.91	521.46	0.58	13.68	13.27	57,713	1.30
Seawall Extension	Onsite	0.07	0.38	1.30	0.00	0.07	0.07	1,126	0.02
	Offsite	1.59	4.96	30.43	0.03	0.80	0.77	3,368	0.08
Total		29.63	92.78	564.54	0.63	14.96	14.51	66,046	1.48

TAB C.

## Emission Calculations for Beach Renourishment

3,000,000 CY of sand + 100% for loss 3,000,000 6,000,000 Total CY  
90 days

Material	Source Location	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Mobilization - supplies via truck	Newport News	114	5.1	90	456	20,520
Tug & barge - mob supplies	Norfolk	100	40	10	400	2,000

Dump/Supply Trucks	VOC lb/mile	CO lb/mile	NOx lb/mile	SO2 lb/mile	PM10 lb/mile	PM2.5 lb/mile	N2O lb/mile	CH4 lb/mile	CO2 lb/mile	Formaldehyde lb/mile	Benzene lb/mile
	VOCs Ton	CO Ton	NOx Ton	SO2 Ton	PM <sub>10</sub> Ton	PM <sub>2.5</sub> Ton	N2O Ton	CH4 Ton	CO2 Ton	Formaldehyde Ton	Benzene Ton
Dump/Supply Trucks	1.87E-03	9.87E-03	1.62E-02	1.28E-05	2.18E-03	1.00E-03	1.82E-05	9.62E-05	3.75	0.00	0.00
CO2e in metric tons/year										35	

Deliveries	Engine HP	# Engines	Load Factor	VOC	CO	NOx	SO2	PM10	PM2.5	N2O	CH4	CO2	BSFC	Formaldehyde	Benzene	
				g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	g/hp-hr	lb/hp-hr	g/hp-hr	g/hp-hr	
Tugboat - propulsion	2000	2	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.304	0.01	0.00	
				VOC Ton	CO Ton	NOx Ton	SO2 Ton	PM <sub>10</sub> Ton	PM <sub>2.5</sub> Ton	N2O Ton	CH4 Ton	CO <sub>2</sub> Ton		Formaldehyde Ton	Benzene Ton	
				0.26	0.82	5.05	0.01	0.13	0.13	0.03	0.00	607.68		0.01	0.00	
CO2e in metric tons/year										558						

Equipment Usage	Hours
Derrick barge	886
Work barge	886
Work Tug	18,598
Bulldozer	35,424
Trailing Suction Dredge-propulsion	35,424
Trailing Suction Dredge - pumps	24,797

Equipment and hours are from the 2019 SERP EA. Hours are factored due to increased material usage in this project.

Hours factor: this project will dredge 6,000,000 CY of sand, the 2019 EA calculations were based on 1,625,000 CY of sand.

6,000,000 / 1,625,000 = 3.69

#### Equipment Emissions

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	N2O g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	BSFC lb/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
Derrick barge	886	2,500	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
Work barge	886	1,000	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
Work Tug	18,598	500	0.5	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
Trailing Suction Dredge-propulsion	35,424	4,000	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
Trailing Suction Dredge - pumps	24,797	2,500	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	N2O lb	CH4 lb	CO2 lb		Formaldehyde lb	Benzene lb
Derrick barge				732	2,274	13,965	15	366	355	82	7	1,681,762			
Work barge				293	910	5,586	6	147	142	33	3	672,705			
Work Tug				2,260	7,023	43,128	48	1,132	1,098	254	20	5,193,677			
Trailing Suction Dredge-propulsion				46,827	145,534	893,775	989	23,452	22,749	5,264	425	107,632,776			
Trailing Suction Dredge - pumps				20,487	63,671	391,027	433	10,260	9,952	2,303	186	47,089,339			
				<b>Tons/year:</b>	<b>35.3</b>	<b>109.7</b>	<b>673.7</b>	<b>0.7</b>	<b>17.7</b>	<b>17.1</b>	<b>4.0</b>	<b>0.3</b>	<b>81,135.1</b>		
												<b>CO2e in metric tons/year</b>	<b>74,567</b>		

Vessel emission factors from page 3-22 of Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition

Engines Less than 30 Liters Per Cylinder, USEPA 2008.

All vessels are presumed to use 2 propulsion engines, table lists total HP.

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr	
Bulldozer	35,424	215	0.58	0.02	0.09	0.29	0.00	0.02	0.02	0.00	536.77	0.00	0.00	
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CH4 lb	CO2 lb	Formaldehyde lb	Benzene lb	
				Bulldozer	190	860	2,854	14	161	156	15	5,227,457	8	43
				<b>Tons/year:</b>	<b>0.1</b>	<b>0.4</b>	<b>1.4</b>	<b>0.0</b>	<b>0.1</b>	<b>0.1</b>	<b>0.01</b>	<b>2,613.7</b>	<b>0.00</b>	<b>0.02</b>
											<b>CO2e in metric tons/year</b>	<b>2,371</b>		

#### Total Onsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	35.41	110.24	675.33	0.75	17.78	17.24	76,973	1.51	0.19

#### Total Offsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	0.26	0.82	5.05	0.01	0.13	0.13	558	0.01	0.00

#### Total Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	35.68	111.06	680.38	0.76	17.91	17.37	77,531	1.52	0.19

**TAB D.****Emission Calculations for Breakwater Construction using Temporary Bulkhead**

This is the highest emissions case among the three options for building breakwaters.

Assume all stones come via train, and are moved from the railhead to the beach by truck.

Bulkhead construction

Pile driving - vibratory hammer

construction of bulkhead - will be filled with sand, which will be spread on the beach after the bulkhead is removed.

pile removal - vibratory hammer

Equipment

crawler crane

hydraulic excavator

vibratory hammer

dozer

130	ft long	Type 2 stone (core stone)	300	average lb
12	ft wide at top		2.3	ft long
14	ft depth		0.78	ft wide
65	ft width at base (assumed all breakwaters are the maximum size)		1.45	ft thickness type 2
21.5	ft width of long sides		0.10	CY volume of 1 Type 2 stone
70,070	CY volume of one breakwater (minus ends)		3114	lb/cy
5,460	CY volume of one breakwater end		5300	average lb
80,990	CY Total volume of one breakwater		2.65	tons
12	total		165	Stone Density
1	month construction period per breakwater		4455	lb/cy

Rocks brought by rail from quarry

10,000	tons ave train capacity	CY per stone	1.190
66,667	Type 2 stone capacity for 1 train		
3,774	Type 1 armor stone capacity for 1 train		

76,399 CY of Type 2 stone required for breakwater

Stone percentages from June 2019 Final Environmental Assessment for the Wallops facility, Appendix E

792,974 Total Type 2 stones for 1 breakwater

12 barges to bring this number of Type 2 stone

118,946 Total weight of Type 2 stones for 1 breakwater (tons)

Stone percentages from June 2019 Final Environmental Assessment for the Wallops facility, Appendix E

4,591 CY volume of Type 1 stone in 1 breakwater

1 barges to bring this number of Type 1 stone

3,859 Total Type 1 stones for 1 breakwater

10,227 Total weight of Type 1 stones for 1 breakwater (tons)

129,173 Total weight of all stones for 1 breakwater (tons)

Truck capacity 12 cy

Number of truck trips 6,749

One way truck distance 10 miles

Sand required to fill the temporary bulkhead:

Length	130 feet
Width	30 feet
Depth	14 feet      Assumed linear depth progression from 0 at beach to 14 feet at breakwater (same height as breakwater)
Volume of temporary bulkhead	27,300 cubic feet 1,011 cubic yards of sand required to fill bulkhead

### Rail delivery from quarry to LeCato railhead

Material	Source Location	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Stone	Quarry	250	14	13	185	6,459

### Per breakwater

0.002 gal/ton-miles of freight transported from EPA 2021 SmartWay Rail Carrier Partner Tool: Technical Documentation.

## Truck hauling from LeCato railhead to beach

Material	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Stone	10	0.57	6,749	3,857	134,983

Highway Side streets Idle	VOC g/VMT	CO g/VMT	NOx g/VMT	SO2 g/VMT	PM10 g/VMT	PM2.5 g/VMT	N2O g/VMT	CH4 g/VMT	CO2 g/VMT	Benzene	Formaldehyde
	0.31	1.74	3.19	0.00	1.37	0.33	0.00	0.01	972.79	0.00	0.02
	0.61	3.40	5.80	0.00	4.37	0.89	0.01	0.03	1445.15	0.00	0.05
	5.23	21.99	34.17	0.02	2.54	2.34	0.08	0.27	5727.82	0.04	0.41
	VOC	CO	NOx	SO2	PM10	PM2.5	N2O	CH4	CO2	Benzene	Formaldehyde
	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
Annual Emissions	0.07	0.39	0.68	0.00	0.43	0.09	0.00	0.00	182.32	0.00	0.01
	CO2e in metric tons/year								166		

Equipment Usage	Hours
Crawler Crane	1,920
Vibratory Hammer	1,920
Dozer	1,920
Excavator	1,920

Assuming 60 days construction per breakwater, 2 8 hour shifts, and 2 units of each equipment

#### Equipment Emissions

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
Crawler Crane	1,920	150	1	0.04	0.18	0.86	0.00	0.04	0.04	0.00	531	0.002	0.010
Vibratory Hammer	1,920	300	1	0.21	0.56	2.62	0.00	0.12	0.11	0.01	530	0.009	0.055
Dozer	1,920	275	0.58	0.02	0.09	0.29	0.00	0.02	0.02	0.00	537	0.001	0.004
Excavator	1,920	450	0.53	0.03	0.20	0.55	0.00	0.03	0.03	0.00	537	0.001	0.008
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CH4 lb	CO2 lb	Formaldehyde lb	Benzene lb
Crawler Crane				26	111	548	1	26	25	2	337,103	1	6
				268	711	3,331	2	148	144	16	673,592	11	70
				13	60	198	1	11	11	1	362,400	1	3
				32	205	554	1	33	32	3	541,859	1	8
				Tons/year:	0.2	0.5	2.3	0.0	0.1	0.1	0.0	957.5	0.007
										CO2e in metric tons/year	869		

#### Total Onsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One Breakwater	0.17	0.54	2.32	0.00	0.11	0.11	869	0.01	0.04
12 Breakwaters	2.04	6.52	27.79	0.03	1.31	1.27	10,427	0.08	0.52

#### Total Offsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One Breakwater	9.00	49.36	222.32	0.17	6.02	5.52	17,254	0.01	0.00
12 Breakwaters	107.99	592.33	2667.82	2.08	72.28	66.23	207,049	0.07	0.01

#### Total Emissions (tons per year)

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One Breakwater	9.17	49.90	224.63	0.18	6.13	5.62	18,123	0.01	0.04
12 Breakwaters	110.02	598.85	2,695.61	2.11	73.59	67.50	217,476	0.15	0.53

TABLE.

Length	3170 feet
Stone weight	5-7 tons
Average Stone weight	6 tons
Height of wall	17.31 14 feet above MHWL (1.31), plus 2 feet excavation
Top width	14 feet
Bottom width	65.93 feet
Area	691.79415 square feet
Volume	2,192,987 cubic feet
	81,222 cubic yards
Stone density	165 lb/cf
	4455 lb/cy
	2.23 ton/cy
Stone volume	2.69 cy/stone
Number of stones required	30,154
Total weight of stones	180,921.47 tons
10,000 tons avg train capacity with one engine	
18 Number of trains to deliver all stones	
Truck capacity	12 cy
Number of truck trips	6,768
One way truck distance	10 miles

### Rail delivery from quarry to LeCato railhead

Material	Source Location	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total miles traveled
Stone	Quarry	250	14	18	258	9,046

0.002 gal/ton-miles of freight transported from EPA 2021 SmartWay Rail Carrier Partner Tool: Technical Documentation.

### Truck hauling from LeCato railhead to beach

Material	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Stone	10	0.57	6,768	3,868	135,370

Highway Side streets Idle	VOC g/VMT	CO g/VMT	NOx g/VMT	SO2 g/VMT	PM10 g/VMT	PM2.5 g/VMT	N2O g/VMT	CH4 g/VMT	CO2 g/VMT	Benzene g/VMT	Formaldehyde g/VMT
	0.31	1.74	3.19	0.00	1.37	0.33	0.00	0.01	972.79	0.00	0.02
	0.61	3.40	5.80	0.00	4.37	0.89	0.01	0.03	1445.15	0.00	0.05
	5.23	21.99	34.17	0.02	2.54	2.34	0.08	0.27	5727.82	0.04	0.41
	VOC	CO	NOx	SO2	PM10	PM2.5	N2O	CH4	CO2	Benzene	Formaldehyde
	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton	Ton
Annual Emissions	0.07	0.41	0.71	0.00	0.43	0.09	0.00	0.00	187.73	0.00	0.01
									CO2e in metric tons/year	171	

Equipment Usage	Hours
Crawler Crane	3,840
Dozer	3,840
Excavator	3,840

Assuming 120 days construction, 2 8 hour shifts, and 2 units of each equipment

## Equipment Emissions

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
Crawler Crane	3,840	150	1	0.0414138	0.1753584	0.8636454	0.0014719	0.040731732	0.0395098	3.58E-03	530.93	0.002	0.010
Dozer	3,840	275	0.58	0.0195561	0.0883136	0.2930742	0.0014402	0.016561595	0.0160647	1.58E-03	536.77	0.001	0.004
Excavator	3,840	450	0.53	0.0319626	0.2032897	0.5487676	0.0014798	0.032563556	0.0315866	2.82E-03	536.74	0.001	0.008
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CH4 lb	CO2 lb	Formaldehyde lb	Benzene lb
Crawler Crane				53	223	1,097	2	52	50	5	674,206	2	12
				26	119	396	2	22	22	2	724,800	1	6
				65	410	1,108	3	66	64	6	1,083,718	3	16
				Tons/year:	0.1	0.4	1.3	0.0	0.1	0.1	0.0	1,241.4	0.00
CO2e in metric tons/year											1,126		

**Total Onsite Emissions**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	0.07	0.38	1.30	0.00	0.07	0.07	1,126	0.00	0.02

**Total Offsite Emissions**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	17.59	96.48	435.50	0.34	11.41	10.74	33,693	0.01	0.00

**Total Emissions (tons per year)**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Seawall Extension	17.66	96.85	436.80	0.34	11.48	10.81	34,819	0.01	0.02

## TAB F.

## Emission Calculations for Breakwater Construction

130 ft long	Type 2 stone (core stone)	300 average lb
12 ft wide at top		2.3 ft long
14 ft depth		0.78 ft wide
65 ft width at base (assumed all breakwaters are the maximum size)		1.45 ft thickness type 2
21.5 ft width of long sides		0.10 CY volume of 1 Type 2 stone
70,070 CY volume of one breakwater (minus ends)		
5,460 CY volume of one breakwater end		
80,990 CY Total volume of one breakwater	Type 1 stone (breakwater armor stone)	5300 average lb
12 total		tons
1 month construction period		165 lb/cf
Rocks brought by water from Norfolk	Stone Density	4455 lb/cy
1,500 tons ave barge capacity		CY per stone
10,000 Type 2 stone capacity for 1 barge		1.190
566 Type 1 armor stone capacity for 1 barge		
Deposited using barge excavator		
76,399 CY of Type 2 stone required for breakwater	Stone percentages from June 2019 Final Environmental Assessment for the Wallops facility, Appendix E	
792,974 Total Type 2 stones for 1 breakwater		
79 barges to bring this number of Type 2 stone	Stone percentages from June 2019 Final Environmental Assessment for the Wallops facility, Appendix E	
4,591 CY volume of Type 1 stone in 1 breakwater		
7 barges to bring this number of Type 1 stone		
3,859 Total Type 1 stones for 1 breakwater		

Material	Source Location	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Tug & barge - riprap	Norfolk	100	40	86	3,445	17,223

Per breakwater

Deliveries	Engine HP	# Engines	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	N2O g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	BSFC lb/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
<b>Tugboat - propulsion</b>	2000	2	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.350	0.01	0.00
				<b>VOC Ton</b>	<b>CO Ton</b>	<b>NOx Ton</b>	<b>SO2 Ton</b>	<b>PM10 Ton</b>	<b>PM2.5 Ton</b>	<b>N2O Ton</b>	<b>CH4 Ton</b>	<b>CO2 Ton</b>		<b>Formaldehyde Ton</b>	<b>Benzene Ton</b>
				<b>Tugboat Emissions</b>	2.28	7.08	43.46	0.05	1.14	1.11	0.26	0.02	5,233		
													CO2e in metric tons/year	4,809	

Equipment Usage	Hours
Work Tug	1,920
Excavator	1,920

assumed 2 units of each equipment, working 16 hours per day for 60 days

#### Equipment Emissions

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	N2O g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr	
Work Tug	1,920	150	0.50	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	506.69	0.01	0.00	
Excavator	1,920	450	0.53	0.03	0.20	0.55	0.00	0.03	0.03	0.00	0.00	536.74	0.00	0.01	
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	N2O lb	CH4 lb	CO2 lb	Formaldehyde lb	Benzene lb	
				Work Tug	74	218	1,337	1	35	34	8	1	161,063	4	0
				Excavator	34	205	554	1	33	32	0	3	541,859	1	8
				Tons/year:	0.1	0.2	0.9	0.0	0.0	0.0	0.0	0.0	351.5	0.00	0.00
													CO2e in metric tons/year	320	

All vessels are presumed to use 2 propulsion engines, table lists total HP.

#### Total Onsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One Breakwater	0.05	0.21	0.95	0.00	0.03	0.03	320	0.00	0.00
12 Breakwaters	0.65	2.54	11.35	0.02	0.41	0.40	3,838	0.03	0.05

#### Total Offsite Emissions

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One Breakwater	2.28	7.08	43.46	0.05	1.14	1.11	4,809	0.10	0.01
12 Breakwaters	27.32	84.91	521.46	0.58	13.68	13.27	57,713	1.17	0.13

#### Total Emissions (tons per year)

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
One breakwater	2.33	7.29	44.40	0.05	1.17	1.14	5,129	0.10	0.02
12 breakwaters	27.97	87.45	532.81	0.60	14.09	13.67	61,551	1.20	0.18

**TAB G.**

Length	3170 feet
Stone weight	5-7 tons
Average Stone weight	6 tons
Height of wall	17.31 14 feet above MHWL (1.31), plus 2 feet excavation
Top width	14 feet
Bottom width	65.93 feet
Area	691.79415 square feet
Volume	2,192,987 cubic feet
	81,222 cubic yards
Stone density	165 lb/cf
	4455 lb/cy
	2.23 ton/cy
Stone volume	2.69 cy/stone
Number of stones required	30,154
Total weight of stones	180,921.47
1,500 tons avg barge capacity	
121 Number of barges to deliver all stones	
Truck capacity	12 cy
number of stones per truck	4
Number of truck trips	7,538

tracked excavator  
bulldozer

**Material deliveries via barge**

Material	Source Location	One way distance (mi)	Total Round Trip Time (hrs)	Total # of trips	Computed Total time (hrs)	Total mi traveled
Stone	Norfolk	100	20	121	2,412	24,123

Deliveries	Engine HP	# Engines	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	N2O g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	BSFC lb/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
Tugboat - propulsion	2000	2	0.68	0.22	0.69	4.21	0.00	0.11	0.11	0.02	0.00	507	0.350	0.01	0.00
				VOC Ton	CO Ton	NOx Ton	SO2 Ton	PM10 Ton	PM2.5 Ton	N2O Ton	CH4 Ton	CO2 Ton		Formaldehyde Ton	Benzene Ton
				1.59	4.96	30.43	0.03	0.80	0.77	0.18	0.01	3,665		0.07	0.01
												CO2e in metric tons/year		3,368	

Equipment Usage	Hours
Crawler Crane	3,840
Dozer	3,840
Excavator	3,840

Assuming 120 days construction, 2 8 hour shifts, and 2 units of each equipment

**Equipment Emissions**

Off-road Equipment	Hours of Operation	Engine HP	Load Factor	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	SO2 g/hp-hr	PM10 g/hp-hr	PM2.5 g/hp-hr	CH4 g/hp-hr	CO2 g/hp-hr	Formaldehyde g/hp-hr	Benzene g/hp-hr
Crawler Crane	3,840	150	1	0.041414	0.175358	0.863645	0.001472	0.040731732	0.03951	3.58E-03	530.93	0.00	0.01
Dozer	3,840	275	0.58	0.019556	0.088314	0.293074	0.00144	0.016561595	0.016065	1.58E-03	536.77	0.00	0.00
Excavator	3,840	450	0.53	0.031963	0.20329	0.548768	0.00148	0.032563556	0.031587	2.82E-03	536.74	0.00	0.01
				VOC lb	CO lb	NOx lb	SO2 lb	PM10 lb	PM2.5 lb	CH4 lb	CO2 lb	Formaldehyde lb	Benzene lb
Crawler Crane				53	223	1,097	2	52	50	5	674,206	2	12
Dozer				26	119	396	2	22	22	2	724,800	1	6
Excavator				65	410	1,108	3	66	64	6	1,083,718	3	16
Tons/year:				0.1	0.4	1.3	0.0	0.1	0.1	0.0	1,241.4	0.00	0.02
CO2e in metric tons/year										1,126			

**Total Onsite Emissions**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	0.07	0.38	1.30	0.00	0.07	0.07	1,126	0.00	0.02

**Total Offsite Emissions**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Tons per Year	1.59	4.96	30.43	0.03	0.80	0.77	3,368	0.07	0.01

**Total Emissions (tons per year)**

	VOC	CO	NOx	SO2	PM10	PM2.5	CO2e	Formaldehyde	Benzene
Seawall Extension	1.67	5.33	31.73	0.04	0.87	0.84	4,494	0.07	0.03

**TAB H.**

average passenger vehicle

400 grams of CO2 per mile  
0.88 lb of CO2 per mileSource: <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#driving>

	CO2e	
	Tons/yr	
Alt 1	329,827	748,542,112 miles 64,529 cars driving 11,600 miles in a single year (annual mileage source: Virginia DMV) 9,218 cars driving 11,600 miles per year (annual mileage source: Virginia DMV) for seven years
Alt 2	112,351	254,980,116 miles 21,981 cars driving 11,600 miles per year (annual mileage source: Virginia DMV)
Alt 3	252,296	572,584,755 miles 49,361 cars driving 11,600 miles per year (annual mileage source: Virginia DMV)

**TAB I.**  
**EQUIPMENT DATA AND EMISSION FACTORS**

Construction	HP	Emissions Factors										
		Load Factor	VOC	CO	NOx	SO <sub>2</sub>	PM10	PM2.5	CO <sub>2</sub>	CH4	Formaldehyde	Benzene
Dozer	275	0.58	0.02	0.09	0.29	1.44E-03	0.02	0.02	536.77	1.58E-03	0.001	0.00
Excavator	450	0.53	0.03	0.20	0.55	1.48E-03	0.03	0.03	536.74	2.82E-03	0.001	0.01
MOBILE CRANE	150	1	0.04	0.18	0.86	1.47E-03	0.04	0.04	530.93	3.58E-03	0.002	0.01
Pile Driver/Extractor	300	1	0.21	0.56	2.62	1.70E-03	0.12	0.11	530.44	0.01	0.009	0.05

Note: The MOVES model does not include emission factors for N2O for nonroad equipment. N2O for nonroad equipment is estimated using ratio N2O/CH4 ratio of 0.26/0.57 from EPA (2016), Table B-8.

Construction Trucks	Emissions Factors										
	VOC	CO	NOx	SO <sub>2</sub>	PM10	PM2.5	CO <sub>2</sub>	CH4	N2O	Formaldehyde	Benzene
Onsite trucks - Idle	5.23	21.99	34.17	0.02	2.54	2.34	5,727.82	0.27	0.08	3.88E-02	4.06E-01
Onsite trucks - 10 MPH	0.85	4.48	7.34	0.01	0.99	0.46	1,701.05	0.04	0.01	4.52E-03	4.74E-02

Boat Equipment	Engine kW	Emissions Factors												
		Load Factor	VOC	CO	NOx	SO <sub>2</sub>	PM10	PM2.5	CO <sub>2</sub>	CH4	N <sub>2</sub> O	BSFC	Formaldehyde	Benzene
Work tug - propulsion	112	0.5	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014
Ocean Tug- propulsion	1118	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014
Derrick Barge	2500	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014
Work Barge	1000	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014
Trailing Suction Dredge - Propulsion	4000	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014
Trailing Suction Dredge - Pumps	2500	0.68	0.30	0.92	5.64	6.25E-03	0.15	0.14	679	2.68E-03	0.03	213	0.013	0.0014

Hazardous Air Pollutant (HAP) Speciation Profiles/Emission Factors from USEPA Port Emissions Inventory Guidance (2020), Appendix D.

Benzene = 0.004739 X VOC

Formaldehyde = 0.042696 X VOC

For Harbocraft:

SO<sub>2</sub> Emission factor calculated based on equation 4.5 in EPA (2020), Port Emission Guidance

CO<sub>2</sub> Emission factor calculated based on equation 4.4 in EPA (2020)

CH<sub>4</sub> Emission factor calculated based on 4.5.4 in EPA (2020)

N<sub>2</sub>O Emission factor calculated based on equation 4.3 in EPA (2020)

For ocean going vessels:

CO<sub>2</sub> Emission factor calculated based on equation 3.4 in EPA (2020)

PM<sub>2.5</sub> calculated as 92% of PM10 as per 3.5.3 in EPA (2020)

#### Rail Movement of Materials

Locomotives - EPA Tier 1 engines assumed

	g/gal								
	VOC	CO	Nox	SO <sub>2</sub>	PM10	PM2.5	CO <sub>2</sub>	CH4	N <sub>2</sub> O
Large Line Haul, Tier 1+	4.85	26.62	120.5	0.0939	3.042	2.951	10,150	0.8	0.26

diesel fuel density assumed at 3200 g/gal.

Sulfur content assumed at 15 ppm

Carbon content assumed at 87 % by mass

Emission data from EPA, 2020 National Emissions Inventory: 453.59 g/lb

Locomotive Component, Table 5. ERG 2022.

No EFs for formaldehyde or benzene

0.002 gal/ton-miles of freight transported from EPA 2021 SmartWay Rail Carrier Partner Tool: Technical Documentation

#### Truck/Transit Emission Factors

Road Type	Vehicle Type	Speed (MPH)	Emission Factor Units	Maximum Emission Factor											
				VOC	CO	NOx	SO <sub>2</sub>	PM10	PM2.5	CO <sub>2</sub>	CH4	N <sub>2</sub> O	Total GHGs (CO <sub>2</sub> e)	Benzene	Formaldehyde
Highway	SUSH Truck	35	g/VMT	3.07E-01	1.74E+00	3.19E+00	3.31E-03	1.37E+00	3.33E-01	9.73E+02	1.46E-02	2.36E-03	9.74E+02	2.30E-03	2.41E-02
Sidestreets	SUSH Truck	15	g/VMT	6.07E-01	3.40E+00	5.80E+00	4.92E-03	4.37E+00	8.88E-01	1.45E+03	3.12E-02	5.52E-03	1.45E+03	4.52E-03	4.74E-02
Idle	SUSH Truck	0	g/hr	5.23E+00	2.20E+01	3.42E+01	1.95E-02	2.54E+00	2.34E+00	5.73E+03	2.70E-01	8.27E-02	5.76E+03	3.88E-02	4.06E-01

SUSH = Single Unit Short Haul

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Appendix B: EFH and Special Status Species Consultations

NOAA Fisheries Essential Fish Habitat Consultation

**NOAA Fisheries Greater Atlantic Regional Fisheries Office  
Essential Fish Habitat (EFH) Assessment & Fish and Wildlife  
Coordination Act (FWCA) Consultation Worksheet**

**August 2021 rev.**

## **Authorities**

The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with NOAA Fisheries on any action or proposed action authorized, funded, or undertaken by such agency that may adversely affect essential fish habitat (EFH) identified under the MSA. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in the consultation process.

The Fish and Wildlife Coordination Act (FWCA) requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. The FWCA also requires that federal agencies consider the effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. Under the FWCA, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not federally managed and do not have designated EFH.

It is important to note that these consultations take place between NOAA Fisheries and federal action agencies. **As a result, EFH assessments, including this worksheet, must be provided to us by the federal agency, not by permit applicants or consultants.**

## **Use of the Worksheet**

This worksheet can serve as an EFH assessment for **Abbreviated EFH Consultations**, and as a means to provide information on potential effects to other NOAA trust resources considered under the FWCA. An abbreviated consultation allows us to determine quickly whether, and to what degree, a federal action may adversely affect EFH. Abbreviated consultation procedures can be used when federal actions do not have the potential to cause substantial adverse effects on EFH and when adverse effects could be alleviated through minor modifications.

The intent of the EFH worksheet is to provide a guide for determining the information needed to fully assess the effects of a proposed action on EFH. In addition, the worksheet may be used as a tool to assist you in developing a more comprehensive EFH assessment for larger projects that may have more substantial adverse effects to EFH. However, for large, complex projects that have the potential for significant adverse effects, an **Expanded EFH Consultation** may be warranted and the use of this worksheet alone is not appropriate as your EFH assessment.

An **adverse effect** is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Consultation under the MSA is not required if there is no adverse effect on EFH or if no EFH has been designated in the project area. However, because the definition of “adverse effect” is very broad, most in-water work will result in some level of adverse effect requiring consultation with us, even if the impact is temporary or the overall result of the project is habitat restoration or enhancement. It is important to remember that an adverse effect determination is a trigger to consult with us. It does not mean that a project cannot proceed as proposed, or that project modifications are necessary. An adverse effect determination under the EFH provisions of the MSA simply means that the effects of the proposed action on EFH must be evaluated to determine if there are ways to avoid, minimize, or offset adverse effects. Additional details on EFH consultations, tools, and resources, including [frequently asked questions](#) can be found on our [website](#).

## Instructions

This worksheet should be used as your EFH assessment for **Abbreviated EFH Consultations** or as a guide to develop your EFH assessment. It is not appropriate to use this worksheet as your EFH assessment for large, complex projects, or those requiring an Expanded EFH Consultation.

When completed fully and with sufficient information to clearly describe the activities proposed, habitats affected, and project impacts, as well as the measures taken to avoid, minimize or offset any unavoidable adverse effects, this worksheet provides us with required components of an EFH assessment including:

1. A description of the proposed action.
2. An analysis of the potential adverse effects on EFH and the federally managed species.
3. The federal agency’s conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable.

When completing this worksheet and submitting information to us, it is important to ensure that sufficient information is provided to clearly describe the proposed project and the activities proposed. At a minimum, this should include the public notice (if applicable) or project application and project plans showing:

- location map of the project site with area of impact.
- existing and proposed conditions.
- all in-water work and the location of all proposed structures and/or fill.
- all waters of the U.S. on the project site with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked.
- Habitat Areas of Particular Concern (HAPCs).
- sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom or natural rocky habitat areas, and shellfish beds.
- site photographs, if available.

Your analysis of effects **should focus on impacts that reduce the quality and/or quantity of the habitat or result in conversion to a different habitat type** for all life stages of species with designated EFH within the action area. Simply stating that fish will move away or that the project

will only affect a small percentage of the overall population is not a sufficient analysis of the effects of an action on EFH. Also, since the intent of the EFH consultation is to evaluate the direct, indirect, individual and cumulative effects of a particular federal action on EFH and to identify options to avoid, minimize or offset the adverse effects of that action, is it not appropriate to conclude that an impact is minimal just because the area affected is a small percentage of the total area of EFH designated. The focus of the consultation is to reduce impacts resulting from the activities evaluated in the assessment. Similarly, a large area of distribution or range of the fish species is also not appropriate rationale for concluding the impacts of a particular project are minimal.

Use the information on the our [EFH consultation website](#) and [NOAA's EFH Mapper](#) to complete this worksheet. The mapper is a useful tool for viewing the spatial distribution of designated EFH and HAPCs. Because summer flounder HAPC (defined as: “ all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH”) does not have region-wide mapping, local sources and on-site surveys may be needed to identify submerged aquatic vegetation beds within the project area. The full designations for each species may be viewed as PDF links provided for each species within the Mapper, or via our website links to the [New England Fishery Management Councils Omnibus Habitat Amendment 2](#) (Omnibus EFH Amendment), the [Mid-Atlantic Fishery Management Councils FMPs](#) (MAMFC - Fish Habitat), or the [Highly Migratory Species](#) website. Additional information on species specific life histories can be found in the EFH source documents accessible through the [Habitat and Ecosystem Services Division website](#). This information can be useful in evaluating the effects of a proposed action. Habitat and Ecosystem Services Division (HESD) staff have also developed a technical memorandum *Impacts to Marine Fisheries Habitat from Non-fishing Activities in the Northeastern United States*, [NOAA Technical Memorandum NMFS-NE-209](#) to assist in evaluating the effects of non-fishing activities on EFH. If you have questions, please contact the [HESD staff member](#) in your area to assist you.

Federal agencies or their non-federal designated lead agency should email the completed worksheet and necessary attachments to the HESD New England (ME, NH, MA, CT, RI) or Mid- Atlantic (NY, NJ, PA, DE, MD, VA) Branch Chief and the regional biologist listed on the [Contact Regional Office Staff section](#) on our [EFH consultation website](#) and listed below.

We will provide our EFH conservation recommendations under the MSA, and recommendations under the FWCA, as appropriate, within 30 days of receipt of a **complete** EFH assessment for an abbreviated consultation. Please ensure that the EFH worksheet is completed in full and includes detail to minimize delays in completing the consultation. If we are unable to assess potential impacts based on the information provided, we may request additional information necessary to assess the effects of the proposed action on our trust resources before we can begin a consultation. If the worksheet is not completely filled out, it may be returned to you for completion. **The EFH consultation and our response clock does not begin until we have sufficient information upon which to consult.**

If this worksheet is not used, you should include all the information required to complete this worksheet in your EFH assessment. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. You may need to prepare a more detailed EFH assessment for more substantial or complex projects to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. The format of the EFH worksheet may not be sufficient to incorporate the extent of detail required for large-scale projects, and a separate EFH assessment may be required.

Regardless of the format, you should include an analysis as outlined in this worksheet for an expanded EFH assessment, along with any additional necessary information including:

- the results of on-site inspections to evaluate habitat and site-specific effects.
- the views of recognized experts on habitat or the species that may be affected.
- a review of pertinent literature and related information.
- an analysis of alternatives that could avoid or minimize adverse effects on EFH.

For these larger scale projects, interagency coordination meetings should be scheduled to discuss the contents of the EFH consultation and the site-specific information that may be needed in order to initiate the consultation.

Please contact our Greater Atlantic Regional Fisheries Office, [Protected Resources Division](#) regarding potential impacts to marine mammals or threatened and endangered species and the appropriate consultation procedures.

## **HESD Contacts\***

### **New England - ME, NH, MA, RI, CT**

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### **Mid-Atlantic - NY, NJ, PA, MD, VA**

Karen Greene, Branch Chief

Jessie Murray - NY, Northern NJ (Monmouth Co. and north)

Keith Hanson - NJ (Ocean Co. and south), DE and PA,  
Mid-Atlantic wind

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### **Ecosystem Management (Wind/Aquaculture)**

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**\*Please check for the most current staffing list on our [contact us page](#) prior to submitting your assessment.**

# EFH Assessment Worksheet rev. August 2021

Please read and follow all of the directions provided when filling out this form.

## 1. General Project Information

Date Submitted:

Project/Application Number:

Project Name:

Project Sponsor/Applicant:

Federal Action Agency (or state agency if the federal agency has provided written notice delegating the authority<sup>1</sup>):

Fast-41:      Yes      No

Action Agency Contact Name:

Contact Phone:      Contact Email:

Address, City/Town, State:

## 2. Project Description

<sup>2</sup>Latitude:      Longitude:

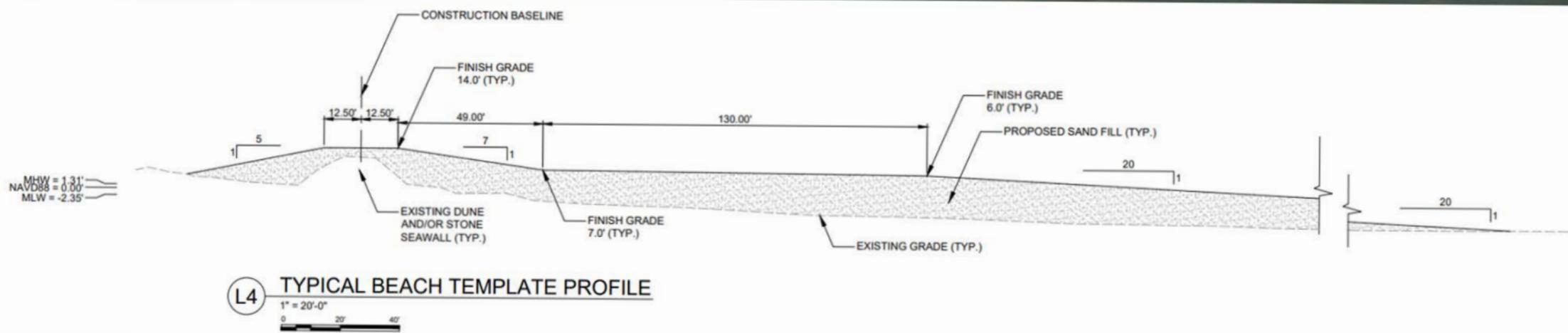
Body of Water (e.g., HUC 6 name):

Project Purpose:

Project Description:

Anticipated Duration of In-Water Work including planned Start/End Dates and any seasonal restrictions proposed to be included in the schedule:

<sup>1</sup> A federal agency may designate a non-Federal representative to conduct an EFH consultation by giving written notice of such designation to NMFS. If a non-federal representative is used, the Federal action agency remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act. <sup>2</sup> Provide the decimal, or the degrees, minutes, seconds values for latitude and longitude using the World Geodetic System 1984 (WGS84) and negative degree values where applicable.



## Project Area Description

The project area consists of three primary areas, the beach, offshore sand area, and offshore breakwater area.

For the impacted beach area, 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. 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.

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. 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 or beach 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.

For the offshore sand area, sand would be taken from Unnamed Shoal A. Unnamed Shoal A is around 1,800 acres (over 2.5 square miles) and 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. 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 and it is anticipated that 3 million cubic yards would be moved per renourishment event. The dredging and beach fill portion of the project would take approximately 3 months. In the table above, "no" was checked for the "restored to pre-existing conditions" column because, as explained in the footnote, we expect the dredging of Unnamed Shoal A would be done in a way to not substantially change shoal topography and conditions to be restored naturally over time.

Breakwaters would also be implemented approximately 200 feet offshore. Each individual breakwater would convert approximately 0.275 acre 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.

### **3. Site Description**

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH? Yes No

Is the project in designated HAPC? Yes No

Does the project contain any Special Aquatic Sites<sup>4</sup>? Yes No

Is this coordination under FWCA only? Yes No

Total area of impact to EFH (indicate sq ft or acres):

Total area of impact to HAPC (indicate sq ft or acres):

Current range of water depths at MLW    Salinity range (PPT):    Water temperature range (°F):

<sup>3</sup>Use the tables in Sections 5 and 6 to list species within designated EFH or the type of designated HAPC present. See the worksheet instructions to find out where EFH and HAPC designations can be found. <sup>4</sup> Special aquatic sites (SAS) are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. They include sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes (40 CFR Subpart E). If the project area contains SAS (i.e. sanctuaries and refuges, wetlands, mudflats, vegetated shallows/SAV, coral reefs, and/or riffle and pool complexes, describe the SAS, species or habitat present, and area of impact.

### **4. Habitat Types**

In the table below, select the location and type(s) for each habitat your project overlaps. For each habitat type selected, indicate the total area of expected impacts, then what portion of the total is expected to be temporary (less than 12 months) and what portion is expected to be permanent (habitat conversion), and if the portion of temporary impacts will be actively restored to pre- construction conditions by the project proponent or not. A project may overlap with multiple habitat types.

Habitat Location	Habitat Type	Total impacts (lf/ft <sup>2</sup> /ft <sup>3</sup> )	Temporary impacts (lf/ft <sup>2</sup> /ft <sup>3</sup> )	Permanent impacts (lf/ft <sup>2</sup> /ft <sup>3</sup> )	Restored to pre-existing conditions?

\*Restored to pre-existing conditions means that as part of the project, the temporary impacts will be actively restored, such as restoring the project elevations to pre-existing conditions and replanting. It does not include natural restoration or compensatory mitigation.

### **Submerged Aquatic Vegetation (SAV) Present?:**

Yes: \_\_\_\_\_ No: \_\_\_\_\_

If the project area contains SAV, or has historically contained SAV, list SAV species and provide survey results including plans showing its location, years present and densities if available. Refer to Section 12 below to determine if local SAV mapping resources are available for your project area.

## Sediment Characteristics:

The level of detail required is dependent on your project – e.g., a grain size analysis may be necessary for dredging. In addition, if the project area contains rocky/hard bottom habitat<sup>6</sup> (pebble, cobble, boulder, bedrock outcrop/ledge) identified as Rocky (coral/rock), Substrate (cobble/gravel), or Substrate (rock) above, describe the composition of the habitat using the following table.

Substrate Type* (grain size)	Present at Site? (Y/N)	Approximate Percentage of Total Substrate on Site
Silt/Mud (<0.063mm)		
Sand (0.063-2mm)		
Rocky: Pebble/Gravel /Cobble(2-256mm)**		
Rocky: Boulder (256-4096mm)**		
Rocky: Coral		
Bedrock**		

<sup>6</sup>The type(s) of rocky habitat will help you determine if the area is cod HAPC.

\* Grain sizes are based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders.

\*\* Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.

If no grain size analysis has been conducted, please provide a general description of the composition of the sediment. If available please attach images of the substrate.

**Diadromous Fish (migratory or spawning habitat- identify species under Section 10 below):**

Yes: \_\_\_\_\_ No: \_\_\_\_\_

## 5. EFH and HAPC Designations

Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries. Use the [EFH mapper](#) to determine if EFH may be present in the project area and enter all species and life stages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present at your project site. If the habitat characteristics described in the text descriptions do not exist at your site, you may be able to exclude some species or life stages from additional consideration. For example, the water depths at your site are shallower than those described in the text description for a particular species or life stage. We recommend this for larger projects to help you determine what your impacts are.

EFH and HAPC Designations Table - Continued

Species Present	EFH is designated/mapped for:				What is the source of the EFH information included?
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
dusky shark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EFH Mapper c
long-finned squid	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EFH Mapper c
monkfish	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EFH Mapper c
red hake	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
sand tiger shark	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
sandbar shark	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
scup	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
skipjack tuna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
smoothhound shark (Atlantic stock)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
spiny dogfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
summer flounder	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c

EFH and HAPC Designations Table - Continued

Species Present	EFH is designated/mapped for:				What is the source of the EFH information included?
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
tiger shark	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
windowpane flounder	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
winter skate	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EFH Mapper c
witch flounder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	EFH Mapper c
yellowfin tuna	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	EFH Mapper
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## 6. Habitat Areas of Particular Concern (HAPCs)

HAPCs are subsets of EFH that are important for long-term productivity of federally managed species. HAPCs merit special consideration based their ecological function (current or historic), sensitivity to human-induced degradation, stresses from development, and/or rarity of the habitat. While many HAPC designations have geographic boundaries, there are also habitat specific HAPC designations for certain species, see note below. Use the [EFH mapper](#) to identify HAPCs within your project area. Select all that apply.

Summer flounder: SAV <sup>7</sup>	Alvin & Atlantis Canyons
Sandbar shark	Baltimore Canyon
Sand Tiger Shark (Delaware Bay)	Bear Seamount
Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	Heezen Canyon
Inshore 20m Juvenile Cod <sup>8</sup>	Hudson Canyon
Great South Channel Juvenile Cod	Hydrographer Canyon
Northern Edge Juvenile Cod	Jeffreys & Stellwagen
Lydonia Canyon	Lydonia, Gilbert & Oceanographer Canyons
Norfolk Canyon (Mid-Atlantic)	Norfolk Canyon (New England)
Oceanographer Canyon	Retriever Seamount
Veatch Canyon (Mid-Atlantic)	Toms, Middle Toms & Hendrickson Canyons
Veatch Canyon (New England)	Washington Canyon
Cashes Ledge	Wilmington Canyon
Atlantic Salmon	

<sup>7</sup> Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

<sup>8</sup> The purpose of this HAPC is to recognize the importance of inshore areas to juvenile Atlantic cod. The coastal areas of the Gulf of Maine and Southern New England contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. Although this habitat type is not rare in the coastal Gulf of Maine, it provides two key ecological functions for juvenile cod: protection from predation, and readily available prey. See [EFH mapper](#) for links to text descriptions for HAPCs.

The Virginia Marine Resources Commission's *Chesapeake Bay Interactive Map* does not show any SAV documented between 2020 and 2024 present within the Project Area (Virginia Marine Resources Commission, n.d.). In addition, the Virginia Institute of Marine Science's *Interactive SAV Map* does not document presence of SAV within the Project Area (Virginia Institute of Marine Science, n.d.). Therefore, there is no Summer flounder HAPC within the Project Area. Images of the Project Area from the interactive maps are shown below.

## Map Layers

### Shellfish Grounds

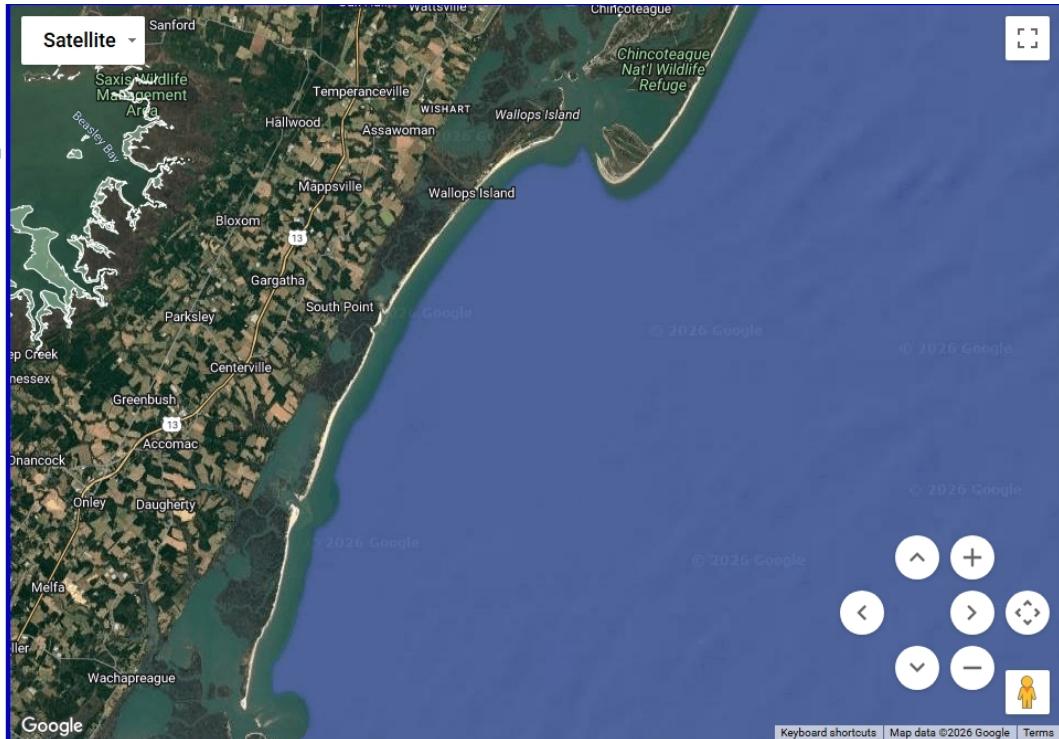
- Private Oyster Ground Leases
- Oyster Ground Applications
- Shellfish Condemnation Zones By VDH
- Open Harvest Areas 4 VAC 20-720
- VDH Growing Areas
- Public Grounds
- Public Clamming Grounds
- Oyster Sanctuaries
- State Marsh and Meadow Lands
- Submerged Aquatic Vegetation Sanctuaries
- Submerged Aquatic Vegetation 2020-2024
- PRFC Potomac River Mgmt Areas

### Commercial Fishing

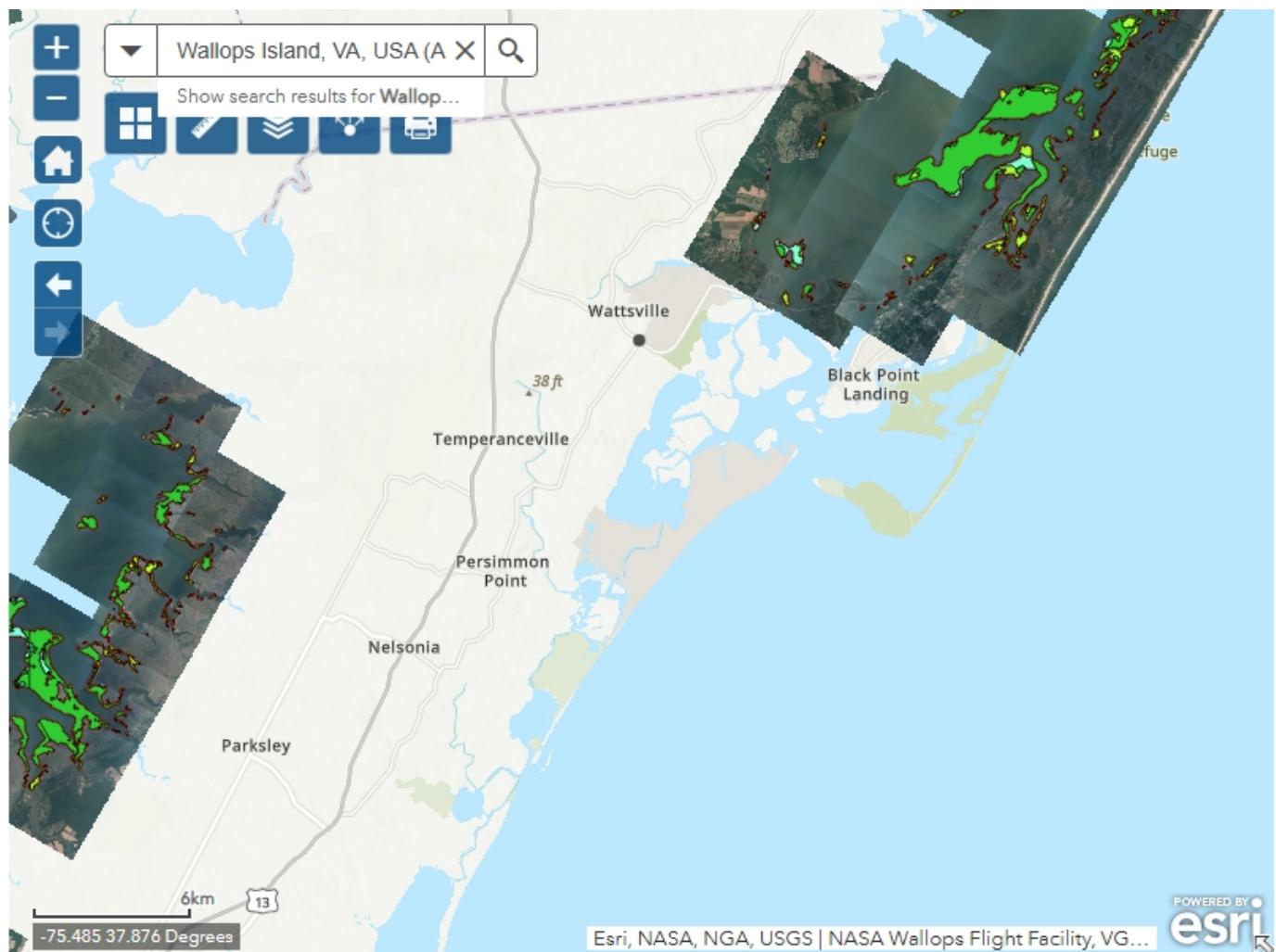
- Mandatory Harvest Reporting Areas
- Pound Nets
- Staked Gill Nets
- Fyke Nets

### Habitat Permits

- Habitat Permit Applications in 2024
- Habitat Permit Applications in 2025
- Habitat Permit Applications in 2026



Virginia Marine Resources Commission. (n.d.). Chesapeake Bay Map. Retrieved January 16, 2026, from [https://webapps.mrc.virginia.gov/public/maps/chesapeakebay\\_map.php](https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php)



Virginia Institute of Marine Science. (n.d.). Interactive SAV map. Virginia Institute of Marine Science. Retrieved January 16, 2026, from <https://www.vims.edu/research/units/programs/sav/access/maps/>

## 7. Activity Details

Select all that apply	Project Type/Category
	Agriculture
	Aquaculture - <u>List species here:</u>
	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
	Beach renourishment
	Dredging/excavation
	Energy development/use e.g., hydropower, oil and gas, pipeline, transmission line, tidal or wave power, wind
	Fill
	Forestry
	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port, railroad)
	Intake/outfall
	Military (e.g., acoustic testing, training exercises)
	Mining (e.g., sand, gravel)
	Overboard dredged material placement
	Piers, ramps, floats, and other structures
	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, mitigation bank/ILF creation)
	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
	Water quality (e.g., storm water drainage, NPDES, TMDL, wastewater, sediment remediation)
	Other:

## 8. Effects Evaluation

Select all that apply	Potential Stressors Caused by the Activity		Select all that apply and if temporary <sup>9</sup> or permanent	Habitat alterations caused by the activity
	Temp	Perm		
				Underwater noise
				Water quality/turbidity/contaminant release
				Vessel traffic/barge grounding
				Impingement/entrainment
				Prevent fish passage/spawning
				Benthic community disturbance
				Impacts to prey species
				Water depth change
				Tidal flow change
				Fill
				Habitat type conversion
				Other:
				Other:

<sup>9</sup>Temporary in this instance means during construction. <sup>10</sup> Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

### Details - project impacts and mitigation

Briefly describe how the project would impact each of the habitat types selected above and the amount (i.e., acreage or sf) of each habitat impacted. Include temporary and permanent impact descriptions and direct and indirect impacts. For example, dredging has a direct impact on bottom sediments and associated benthic communities. The turbidity generated can result in a temporary impact to water quality which may have an indirect effect on some species and habitats such as winter flounder eggs, SAV or rocky habitats. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

What specific measures will be used to avoid and minimize impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided or minimized, why not?

Is compensatory mitigation proposed?      Yes      No

If compensatory mitigation is not proposed, why not? If yes, describe plans for compensatory mitigation (e.g. permittee responsible, mitigation bank, in-lieu fee) and how this will offset impacts to EFH and other aquatic resources. Include a proposed compensatory mitigation and monitoring plan as applicable.

The 2019 Wallops Flight Facility Update and Consolidation of Existing Biological Opinions, Accomack County, VA. Project # 2015-F-3317 requires measures to minimize effects on protected species within the Project Area.

## **10. Federal Agency Determination**

<b>Federal Action Agency's EFH determination (select one)</b>	
	There is no adverse effect <sup>7</sup> on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA only request.
	The adverse effect <sup>7</sup> on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
	The adverse effect <sup>7</sup> on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA documents, if applicable.

<sup>7</sup> An adverse effect is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

## **11. Fish and Wildlife Coordination Act**

Under the FWCA, federal agencies are required to consult with us if actions that the authorize, fund, or undertake will result in modifications to a natural stream or body of water. Federal agencies are required to consider the effects these modifications may have on fish and wildlife resources, as well as provide for the improvement of those resources. Under this authority, we consider the effects of actions on NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats, that are not managed under a federal fisheries management plan. Some examples of other NOAA-trust resources are listed below. Some of these species, including diadromous fishes, serve as prey for a number of federally-managed species and are therefore considered a component of EFH pursuant to the MSA. We will be considering the effects of your project on these species and their habitats as part of the EFH/FWCA consultation process and may make recommendations to avoid, minimize or offset and adverse effects concurrently with our EFH conservation recommendations.

Please contact our Greater Atlantic Regional Fisheries Office, [Protected Resources Division](#) regarding potential impacts to marine mammals or species listed under the Endangered Species Act and the appropriate consultation procedures.

## Fish and Wildlife Coordination Act Resources

<b>Species known to occur at site (list others that may apply)</b>	<b>Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.</b>
alewife	
American eel	
American shad	
Atlantic menhaden	
blue crab	
blue mussel	
blueback herring	
Eastern oyster	
horseshoe crab	
quahog	
soft-shell clams	
striped bass	
<b>other species:</b>	
<b>other species:</b>	
<b>other species:</b>	

## **12. Useful Links**

[National Wetland Inventory Maps](#)

[EPA's National Estuary Program \(NEP\)](#)

[Northeast Regional Ocean Council \(NROC\) Data Portal](#)

[Mid-Atlantic Regional Council on the Ocean \(MARCO\) Data Portal](#)

### **Resources by State**

#### **Maine**

[Maine Office of GIS Data Catalog](#)

[Town shellfish information including shellfish conservation area maps](#)

[State of Maine Shellfish Sanitation and Management](#)

[Eelgrass maps](#)

[Casco Bay Estuary Partnership](#)

[Maine GIS Stream Habitat Viewer](#)

#### **New Hampshire**

[NH Statewide GIS Clearinghouse, NH GRANIT](#)

[NH Coastal Viewer](#)

[State of NH Shellfish Program](#)

#### **Massachusetts**

[MA DMF Shellfish Sanitation and Management Program](#)

[MassGIS Data \(Including Eelgrass Maps\)](#)

[MA DMF Recommended TOY Restrictions Document Massachusetts](#)

[Bays National Estuary Program](#)

[Buzzards Bay National Estuary Program](#)

[Massachusetts Division of Marine Fisheries](#)

[Massachusetts Office of Coastal Zone Management](#)

#### **Rhode Island**

[RI Shellfish and Aquaculture](#)

[RI Shellfish Management Plan](#)

[RI Eelgrass Maps](#)

[Narragansett Bay Estuary Program](#)

[Rhode Island Division of Marine Fisheries](#)

[Rhode Island Coastal Resources Management Council](#)

## **Connecticut**

[CT Bureau of Aquaculture](#)

[Natural Shellfish Beds in CT](#)

[Eelgrass Maps](#)

[Long Island Sound Study](#)

[CT GIS Resources](#)

[CT DEEP Office of Long Island Sound Programs and Fisheries](#)

[CT River Watershed Council](#)

## **New York**

[Eelgrass Report](#)

[Peconic Estuary Program](#)

[NY/NJ Harbor Estuary Program](#)

[New York GIS Clearinghouse](#)

## **New Jersey**

[Submerged Aquatic Vegetation Mapping](#)

[Barnegat Bay Partnership](#)

[NJ GeoWeb](#)

[NJ DEP Shellfish Maps](#)

## **Pennsylvania**

[Delaware River Management Plan](#)

[PA DEP Coastal Resources Management Program](#)

[PA DEP GIS Mapping Tools](#)

## **Delaware**

[Partnership for the Delaware Estuary](#)

[Center for Delaware Inland Bays](#)

[Delaware FirstMap](#)

## **Maryland**

[Submerged Aquatic Vegetation Mapping](#)

[MERLIN \(Maryland's Environmental Resources and Land Information Network\)](#)

[Maryland Coastal Atlas](#)

[Maryland Coastal Bays Program](#)

## **Virginia**

[VMRC Habitat Management Division](#)

[Submerged Aquatic Vegetation mapping](#)

NOAA Fisheries ESA Section 7 Consultation



**Goddard Space Flight Center**

Wallops Flight Facility

Wallops Island, VA 23337

Reply to Attn of: 250.W

January 20, 2026

Julie Crocker  
Acting Assistant Regional Administrator  
Protected Resources Division  
National Marine Fisheries Service  
55 Great Republic Drive  
Gloucester, MA 01930-2276

Dear Ms. Crocker:

This correspondence serves as the National Aeronautics and Space Administration's (NASA's) notification to the National Oceanographic and Atmospheric Administration (NOAA) Fisheries of its proposed Shoreline Protection Program at Wallops Flight Facility (WFF), Wallops Island, Virginia. This project tiers to the 50-year Shoreline Restoration and Infrastructure Protection Program (SRIPP). The goal of the SRIPP is to reduce direct damage to Wallops Island's infrastructure, allowing WFF to continue its mission of supporting aerospace programs.

To date, there have been three renourishments and shoreline protection projects. The initial cycle of renourishment was completed in August 2012. The second cycle, which repaired the effects of Hurricane Sandy, was completed in September 2014. The third, which incorporated breakwater construction, was completed in 2021. The current Proposed Action is to perform additional beach renourishment, breakwater construction, and to repair and extend the existing sea wall. These activities are needed to maintain the beach berm and dune system, which is vital to protecting critical NASA, United States (U.S.) Navy, Department of Air Force, and Virginia Space Authority assets. The purpose of this correspondence is to request NOAA Fisheries concurrence that consultation does not need to be reinitiated based on the similarity of potential effects to those previously assessed in the SRIPP (as amended).

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (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 Act of 1899, the USACE has jurisdiction over the placement of structures and work conducted in navigable waters of the U.S. and would issue a permit to enable the proposed project. Additionally, the USACE Norfolk District is overseeing project design, construction, and monitoring on NASA's behalf. The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) has jurisdiction over mineral resources on the Federal Outer Continental Shelf and would enter into a negotiated agreement with NASA and USACE pursuant to section 8(k)(2)(d) of the Outer Continental Shelf Lands Act. Therefore, both BOEM and USACE are serving as cooperating agencies on this project.

To this end, NASA has assumed the role of Lead Federal Agency for Endangered Species Act (ESA) Section 7 compliance and both BOEM and USACE are participating in NASA's ESA

consultation. The effects of their actions are considered in all project documents, including this correspondence.

## 1.0 Background

### 1.1 Shoreline Restoration and Infrastructure Protection Program

On December 13, 2010, NASA issued a Record of Decision (ROD) for the WFF SRIPP Programmatic Environmental Impact Statement (2010 Final SRIPP PEIS [NASA, 2010a]), which analyzed structural and non-structural options, varying beach berm widths, and multiple sources of fill material that could be used to restore and protect the Wallops Island shoreline over 50 years. During this time, an estimated nine beach renourishment cycles at approximately 5-year intervals were anticipated. In its ROD, NASA selected beach fill (from Unnamed Shoal A, Unnamed Shoal B, or north Wallops Island beach) and seawall extension and adopted a suite of mitigation and monitoring protocols to reduce potential environmental impacts and track project performance.

The initial phase entailed placement of approximately 3.2 million cubic yards of sand dredged from Unnamed Shoal A along the Wallops Island shoreline and a 1,430-foot southerly extension of the rock seawall with future extensions to a maximum length of 4,600 feet.

NASA consulted with NOAA Fisheries, which issued a Biological Opinion (BO) (July 22, 2010) that concluded the proposed action:

- *Would have no effect to hawksbill sea turtles based on the very low probability of presence within the Action Area;*
- *May affect, but is not likely to adversely affect humpback whale, fin whale, North Atlantic right whale, leatherback sea turtle, and Atlantic green sea turtle; and*
- *May affect but would not jeopardize the continued existence of loggerhead sea turtle (Northwest Atlantic Ocean Distinct Population Segment) and Kemp's ridley sea turtle.*

The SRIPP BO included an Incidental Take Statement (ITS), exempting the take of nine sea turtles (eight loggerhead sea turtles and one Kemp's ridley sea turtle) over the 50-year life of the project (based on one turtle injury or mortality for every 1.6 million cubic yards of material removed from offshore borrow areas). While no takes were documented in the daily biological observer dredge reports during the initial dredging operations, NASA assumes 2 loggerhead sea turtles may have been taken based on a total 3.2 million cubic yards dredged.

### 1.2 Post-Hurricane Sandy Shoreline Repair

A second renourishment and repair to a section of the seawall were required after Hurricane Sandy made landfall in October 2012. NASA prepared the Post-Hurricane Sandy Shoreline Repair Final Environmental Assessment (EA), signed a Finding of No Significant Impact (FONSI) on June 6, 2013 (NASA, 2013), and consulted with NOAA Fisheries which issued a BO (August 3, 2012). In addition to the previous determinations, it added that the proposed action:

- *May adversely affect but is not likely to jeopardize the continued existence of the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, or South Atlantic DPSs of Atlantic sturgeon.*

In addition to the ITS for sea turtles issued in the 2010 BO, it provided for the exempted incidental take of no more than one Atlantic sturgeon for approximately every 9.4 million cubic yards of material removed from the borrow areas, or a total of two Atlantic sturgeon.

Repairs to the seawall and second beach renourishment of 650,000 cubic yards of sand were completed in September 2014. During this renourishment, unexploded ordnance was discovered in a hopper intake basket. Subsequently, munitions and explosives of concern (MEC) screening was added to the dredge to protect personnel and equipment. Since MEC screening was not included in the earlier consultations and would preclude the identification of remains by on-board observers, NASA requested the SRIPP BO be amended to account for this addition. On September 26, 2014, NOAA Fisheries issued an amendment to the SRIPP BO which added the requirement for an on-vessel lookout bridge watch when MEC screening is used, provided an ITS for Atlantic sturgeon, and concluded that incidental take of sea turtles would be unchanged by the addition of MEC screening. While no takes were documented in the daily biological observer dredge reports during the Post-Hurricane Sandy dredging operations, based on a total of 650,000 cubic yards dredged, NASA would assume a fractional take of 0.4 loggerhead sea turtles and 0.07 Atlantic sturgeon. Therefore, between the combined SRIPP and Post-Hurricane Sandy dredging events of 3,850,000 cubic yards, NASA assumes a total take of 2.4 sea turtles (2.165 loggerheads and 0.24 kemp's ridley) and 0.4 Atlantic sturgeon.

### **1.3 Shoreline Enhancement and Restoration Project**

Subsequent storms in 2015, 2016, and 2018 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 evaluate the effectiveness of constructing breakwater(s) along the shoreline to reduce the intensity of wave action and the rate of sediment transport, since previous renourishments provided only temporary protection. The USACE modeled how alternative placement, size, and number of breakwaters affected shoreline stabilization and sediment transport. Results indicated the placement of detached parallel breakwaters approximately 200 feet offshore would be most effective (USACE, 2018b).

NASA proposed to continue the SRIPP by implementing the Shoreline Enhancement and Restoration Project (SERP). It prepared the SERP EA and signed a FONSI on July 16, 2019 (NASA, 2019). Repairs included beach renourishment using approximately 1.1 million cubic yards of sand sourced from the north Wallops Island beach and construction of five breakwaters using barges. These were constructed in two sets—two breakwaters constructed in front of the Horizontal Integration Facility and three breakwaters constructed south of these, in front of Launch Pad 0-B.

NASA provided the SERP Biological Evaluation (BE), which included the recently-listed giant manta ray. In a letter dated November 20, 2018, NOAA Fisheries determined that it was not necessary to reinitiate the consultation on the SRIPP BO (as amended).

In October 2020, NASA proposed modifications to the breakwater construction methods. Three tropical storms/hurricanes had caused construction delays and posed hazards to personnel and equipment. Because of this, NASA proposed to build the three southern breakwaters via temporary bulkheads constructed perpendicular to the shoreline. NASA requested concurrence that the change to construction methodology would result in no additional effects to protected species. On October 2, 2020, NOAA Fisheries provided its concurrence via email and stated that reinitiation of consultation was not required.

## 2.0 Proposed Action

The beach and dune system established to protect NASA's Wallops Island launch range infrastructure has continued to erode through storm wind and wave damage. The effects of storms are most apparent in the southern half of the Wallops Island beach, where the majority of the critical launch assets are located.

The current Proposed Action is to perform additional beach renourishment, breakwater construction, and/or seawall repair and extension taking into consideration new information. NASA's proposed action would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The Proposed Action could involve a combination of the following, implemented in phases over the next 7 years (**Figure 1**):

- sand renourishment within an approximately 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; and
- repairs and extension of the existing seawall.



**Figure 1 Project Area and Components**

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.

## **2.1 Dredging**

Over the next 7 years, the beach along the Wallops Island shoreline infrastructure protection area would be renourished using up to 3 million cubic yards of sand sourced from Unnamed Shoal A. 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, resulting in an estimated 4.5 million cubic yards dredged in order to renourish the beach with 3 million cubic yards of sand. The dredging and beach fill portion of the project would take approximately 3 months.

The renourishment processes (i.e., beach fill mobilization, dredging, and sand placement) would be consistent with the analyses described previously. 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, pump-out 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.

Offshore, the dredging process would be cyclical in nature, with the vessel transiting to the borrow site, lowering its drag arms (equipped with munitions and explosives of concern [MEC] screens and sea turtle deflectors), filling its hopper, and transporting the material to a pump-out station (the floating end of a submerged pipeline) that would be placed at a water depth of approximately 30 feet, approximately 2 miles offshore. The pathway from Unnamed Shoal A to the pump-out buoy avoids Chincoteague Shoal and Blackfish Bank. 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. The sand/water slurry would be pumped to the beach through several miles of submerged steel pipeline 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. Nearshore, it is expected that the contractor would employ one or more anchored pump-out stations

## **2.2 Beach Renourishment**

Consistent with previous beach renourishment projects, onshore sections of discharge lines would be placed using a front-end loader or crane. As the sand slurry is discharged onto the shoreline, bulldozers would grade the material to the desired design template. 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 progresses.

## **2.3 Breakwater Construction**

Also over the next 7 years, up to 12 breakwaters would be constructed approximately 200 feet offshore between the two existing sets of breakwaters. Breakwaters would vary in height and width depending on the elevation of the sea bottom. Each breakwater would cover 11,000–12,000 square feet of bottom, for a total of up to approximately 144,000 square feet. Breakwaters could be placed in sets or individually. Breakwaters would be similar to those previously constructed with a layer of Type I Armor Stone, a center core of Virginia Department of Transportation (VDOT) 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 while minimizing impacts to sediment transport and hydrodynamics in the project vicinity. Construction of each breakwater is estimated to take approximately 2 to 3 months. Breakwater construction could occur using several methods: via barge, temporary bulkheads, or temporary trestle system.

### ***2.3.1 Building Breakwaters by Barge***

The rock and other materials for constructing each breakwater would be transported to the breakwater construction area by barge or to the WFF 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.

### ***2.3.2 Building Breakwaters Using Temporary Bulkheads***

Materials and equipment would be transported to the WFF area by rail and offloaded to trucks or by truck to and from the island via existing roads to either an impervious surface or previously disturbed upland staging area. During construction, staging could move to the construction zone on the beach. Temporary bulkhead structures would be constructed using steel sheet piles. 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).

### ***2.3.3 Building Breakwaters Using Temporary Trestle System***

Materials and equipment would be transported to the WFF area by rail and offloaded to trucks or by truck to and from the island via existing roads to either an impervious surface or previously disturbed upland staging area. During construction, staging could move to the construction zone on the beach. A series of steel pilings would be installed and beams placed across the top of the piles to form temporary trestles. The system would be 30 to 40 feet wide with crane mats used as decking.

## **2.4 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. While the wall has prevented overwash and storm damage, erosion of the shoreline seaward of the wall has continued, resulting in an increased risk of damage to the seawall. 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. Consistent with previous SRIPP consultations, this portion of the project would occur on land where species under NOAA Fisheries jurisdiction would not be present. No direct or indirect effects are expected and this project component will not be discussed further.

## **2.5 Mitigations and Monitoring**

Dredging would be conducted in a manner consistent with the 2010 SRIPP BO (as amended). Specifically, NASA would at a minimum incorporate the following mitigation measures.

- Dredge offshore sand from Unnamed Shoal A sub-area A-1.
- 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.
- When utilizing MEC screening, NASA shall ensure that a lookout/bridge watch, knowledgeable in listed species identification, will be present on board the hopper dredge at all times to inspect the draghead each time it is removed from the water.
- If a listed whale is spotted within 1 kilometer (0.62 mile) of the dredge, stop dredging until the whale is farther than 1 kilometer from the dredge.
- All dredge operators will monitor the right whale sighting reports (i.e., sighting advisory system, dynamic management areas, seasonal management areas) to remain informed on the whereabouts of right whales within the vicinity of the action area.
- All dredge operators will conform to the regulations prohibiting the approach of right whales closer than 500 yards. Any vessel finding itself within the 500-yard buffer zone around a right whale must depart the area immediately at a safe, slow speed, unless one of the exceptions applies (see 50 Code of Federal Regulations 224.103 (c)).
- 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 sea turtles, in accordance with established and approved monitoring protocols.
- In accordance with WFF's Protected Species Monitoring Plan, if sea turtle nests are identified, the nests will be clearly marked using signage and rope barriers encircling each site. A qualified biological monitor will conduct daily nest inspections. All on-site personnel will be informed of the nesting status, and all project activities within 1,000 feet of a nest will be suspended or relocated until hatching is complete.
- Prior to initiation of on-site work, NASA will notify all prospective employees, operators, and contractors about the presence and biology of the plover, knot, and loggerhead; special provisions necessary to protect these species; activities that may affect these species; and ways to avoid and minimize these effects. NASA has developed a fact sheet containing this information
- 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 to monitor effectiveness.

## **3.0 Description of the Action Area**

The action area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 Code of Federal

Regulations section 402.02). The action area includes the Wallops Island offshore borrow sites, the waters between and immediately adjacent to these areas where project vessels would travel and dredged material would be transported, as well as an area extending 4,000 feet in all directions from the area to be dredged to account for the sediment plume generated during dredging activities. The action area also includes the portion of Wallops Island and the portion of Wallops Island shoreline and nearshore waters that would be affected by the extended seawall and beach fill (i.e., 3.7 miles of shoreline) as well as the portion of Atlantic Ocean from the edge of Wallops Island shoreline and adjacent to the outboard side of the proposed breakwater structures. As dredging operations would also produce underwater noise levels that range between 120–160 decibels relative to 1 micropascal (dB re 1 $\mu$ Pa), the action area would also include the area around the dredge where effects of increased underwater noise levels would be experienced. Based on the analysis of dredge noise and transmission loss calculations, effects of dredge noise would be experienced within approximately 2,625 feet from the dredge during loading and pumping.

#### 4.0 Status of Species within the Action Area

**Table 1** lists the species that would be potentially affected by the project activities.

**Table 1 Listed Species Which May Exist within the Action Area**

Common Name	ESA Status	Previous Determination
Humpback whale <i>Megaptera novaeangliae</i>	Endangered	MA/NLAA
Fin whale <i>Balaenoptera physalus</i>	Endangered	MA/NLAA
North Atlantic right whale <i>Eubalaena glacialis</i>	Endangered	MA/NLAA
Hawksbill sea turtle <i>Eretmochelys imbricata</i>	Endangered	NE
Loggerhead sea turtle <sup>1</sup> <i>Caretta caretta</i>	Threatened	MA/NJ
Kemp's ridley sea turtle <i>Lepidochelys kempii</i>	Endangered	MA/NJ
Leatherback sea turtle <i>Dermochelys coriacea</i>	Endangered	MA/NLAA
Green sea turtle <i>Chelonia mydas</i>	Threatened	MA/NLAA
Atlantic sturgeon <sup>2</sup> <i>Acipenser oxyrinchus oxyrinchus</i>	Endangered	MA/NJ
Giant Manta Ray <i>Manta birostris</i>	Threatened	MA/NLAA

Key: ESA = Endangered Species Act; MA = may affect; NE = no effect; NJ = no jeopardy; NLAA = not likely to adversely affect

Notes: <sup>1</sup> Northwest Atlantic Ocean Distinct Population Segment

<sup>2</sup>Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments

Consistent with previous shoreline restoration and stabilization projects, a determination of no effect is made the hawksbill sea turtle. Because the low likelihood of its presence in the project area and interaction with project components, it is not carried forward for detailed analysis.

The SRIPP BO (as amended) considered the effects of offshore dredging and beach renourishment on these listed species and included an ITS for those species that may be adversely affected, but not jeopardized, by the SRIPP. Specifically, the ITS exempts the take of nine sea turtles (eight loggerhead sea turtles and one Kemp's Ridley sea turtle) and two subadult

Atlantic sturgeon during these operations over the 50-year life of the SRIPP. These numbers were based on the volume of sand that would be removed from the borrow area during that project lifespan: one sea turtle injured or killed for every 1.6 million cubic yards and one Atlantic sturgeon injured or killed for every 9.4 million cubic yards.

#### **4.1 Marine Mammals**

The 2010 Final SRIPP PEIS described the marine mammals that may occur seasonally within the project area offshore of Wallops Island. Consistent with previous consultations, this includes right whales from November–May; humpback whales from September–April; and fin whales from October–January. It also noted that it is possible for individual transient whales to be present in the action area outside of these times as this area is used by whales moving between calving/mating grounds and foraging grounds.

#### **4.2 Sea Turtles**

In accordance with the Protected Species Monitoring Plan, NASA monitors 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. From 1979 to 2008, a total of five loggerhead sea turtle nests occurred on Wallops Island, one in each year. Nesting occurred again in 2010, 2012, and 2013, and there were four, two, and two nests, respectively, for a total of eight nests with five false crawls. No loggerhead sea turtle nesting activity has occurred on Wallops Island since 2013. DNA analysis determined that all four nests in 2010 were dug by a single female loggerhead sea turtle (NASA, 2010b; USFWS, 2016). Historically, only loggerhead sea turtles have been found on Wallops Island (NASA, 2023).

The area offshore of Wallops Island is considered to be marginal as sea turtle habitat, and observations of sea turtles in these waters are infrequent. 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.

#### **4.3 Atlantic Sturgeon**

The Atlantic sturgeon is a subspecies of sturgeon distributed along the eastern coast of North America from Hamilton Inlet, Labrador, Canada to Cape Canaveral, Florida, United States. Populations of Atlantic sturgeon are categorized into the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments (DPSs). Individuals from all the listed DPSs may occur in the action area.

A study by BOEM passively monitored telemetered fish in the Sandbridge Shoal Marine Minerals Lease Area off the southeast coast of Virginia, south of Unnamed 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).

#### **4.4 Giant Manta Ray**

The giant manta ray was listed as threatened in January 2018. Giant manta rays are slow-growing, migratory animals with small, highly fragmented populations that are sparsely

distributed across the world. It is the world's largest ray with a wingspan of up to 29 feet and can weigh up to 5,300 pounds. It is found worldwide in tropical, subtropical, and temperate bodies of water and is commonly found offshore, in oceanic waters, and near productive coastlines. It has been found in waters as cool as 66 degrees Fahrenheit and has been observed in estuarine waters near oceanic inlets (NOAA, 2021). Giant manta rays primarily feed on planktonic and nektonic species throughout the water column, not benthic, organisms. During feeding, giant manta rays may be found aggregating in shallow waters at depths less than 33 feet; however, tagging studies have also shown that the species conducts dives of up to 650 to 1,500 feet and is capable of diving to depths exceeding 3,200 feet. This diving behavior may be influenced by season and shifts in prey location associated with the thermocline (NOAA, 2021). There is the potential for giant manta rays to be within the offshore borrow area during the summer months

## 5.0 Effects of the Action on Listed Species

Because the effects of the proposed activities have been evaluated in detail previously, the following sections provide a summary of effects. The activities proposed at this time have been assessed previously in the SRIPP BO (as amended) and in subsequent coordination as follows.

- Dredging sand from Unnamed Offshore Shoal A, moving it as a slurry via pipeline to the Wallops Island beach, and using heavy equipment on the beach to grade the sand into a desired design template were evaluated in 2010, 2012, and 2014 and effects determinations were provided in the SRIPP BO (as amended).
- Construction of offshore breakwaters was evaluated in a 2018 Biological Assessment. In a letter dated November 20, 2018, NOAA Fisheries determined that it was not necessary to reinitiate the consultation on the SRIPP BO.
- In 2020, NASA requested NOAA Fisheries concurrence that constructing breakwaters via temporary bulkheads perpendicular to the shoreline would result in no additional effects to protected species. On October 2, 2020, NOAA Fisheries provided its concurrence via email and stated that reinitiation of consultation was not required.

## 5.1 Dredging

Consistent with the SRIPP BO, potential effects of dredging include entrainment of sea turtles and Atlantic sturgeon (other species would not be susceptible and/or would not be expected to be present); alteration of sea turtle and Atlantic sturgeon foraging habitat; Atlantic sturgeon, giant manta rays, and sea turtle interaction with suspended sediment; injury to Atlantic sturgeon, giant manta rays, sea turtles, or whales from underwater noise generated during dredging operations; and collisions between whales, Atlantic sturgeon, giant manta rays, or sea turtles and project vessels.

### 5.1.1 *Entrainment*

During sand harvest, it is possible that turtles, particularly loggerhead and Kemp's ridley sea turtles, would become entrained in the dredge as described in previous consultation documents. Entrainment of green sea turtles is extremely unlikely because of their low numbers in the action area. Green sea turtles forage in seagrass beds, which do not exist in the borrow area, and leatherback sea turtles forage on jellyfish in the water column, thus these species are not likely to interact with the draghead. Loggerheads are the most numerous sea turtles in the area and tend to forage on the bottom, therefore are most likely to become entrained. However, the probability of interaction is very low because turtle numbers in the area are low. It is anticipated that over the life of the project, up to nine sea turtles could be killed, with no more than one being a Kemp's

ridley and the remainder being loggerheads.

Similarly, it is possible that subadult sturgeon would become entrained in the dredge as described in previous consultation documents (adults are too large to become entrained in draghead openings). No change to methodology is proposed that would affect this and the possibility persists. Entrainment of large mobile animals, such as sturgeon, is relatively rare, particularly in the open ocean where individuals' movements would not be restricted (as may be the case in a river channels). Additionally, Atlantic sturgeon density in the action area is expected to be low and migrating individuals would occur higher in the water column away from the draghead. Therefore, NOAA Fisheries estimated that the likelihood of interaction of an Atlantic sturgeon with a dredge operating under the SRIPP may lead to up to two subadult Atlantic sturgeon being killed.

### ***5.1.2 Foraging Habitat Alteration***

Removal of sediments from Unnamed Shoal A would affect infauna, as well as species which prey upon them. Green sea turtles forage in seagrass beds, which do not exist in the borrow area, and leatherback sea turtles forage on jellyfish in the water column, thus no effects from foraging habitat alteration are anticipated. The borrow area is not known to be an area where Kemp's ridley or loggerhead sea turtles or Atlantic sturgeon congregate; dredging could affect turtle and sturgeon prey items. Given the small area affected by the proposed activities relative to abundant adjacent habitats and the ability of turtles to exploit food sources over a large area, these effects would be minor and discountable.

### ***5.1.3 Suspended Sediment Effects***

Dredging operations cause sediment to be suspended in the water column as dragheads are pulled through the sediment, turbulence is generated by the vessel, and from overflow of turbid water during hopper filling. Suspended solid concentrations would be lower than levels considered toxic to fish. The most likely effect of suspended sediments would be to alter behaviors of whales, sea turtles, Atlantic sturgeon, or giant manta rays as these highly mobile species alter movement to avoid sediment plumes. Such movements are likely to be insignificant.

### ***5.1.4 Underwater Noise***

Dredging operations would result in noise from vessel activities. Marine animals may have behavioral and physiological reactions to underwater noise but responses would typically be brief. An increase in background vessel noise levels has the potential to expose Atlantic sturgeon, giant manta rays, sea turtles, or whales to sound and general disturbance, potentially resulting in short-term behavioral reactions such as avoidance response and masking. These species are more likely to react to nearby vessel noise (i.e., within tens of meters) than to noise from a distant vessel. Maximum noise levels from the vessel would be well below those that would cause injury to Atlantic sturgeon, giant manta rays, sea turtles, or whales, and effects on behaviors would be discountable. Existing mitigations including maintaining buffers and turning off pumps when whales are sited would reduce the likelihood that whales are exposed to excessive underwater noise. Limiting vessel speeds would make it possible for individuals to avoid vessel activity.

### ***5.1.5 Vessel Collision***

Though vessel collision could occur, strike is more likely to occur in areas with high levels of vessel traffic and/or high species density. Existing mitigations including maintaining buffers, posting lookouts, and limiting vessel speeds would lower the possibility of collisions with project

vessels. This, coupled with the ability of species to detect and avoid vessels, reduces the likelihood of vessel collisions with whales, Atlantic sturgeon, giant manta rays, or sea turtles to discountable levels.

## **5.2 Beach Renourishment**

Potential effects of beach renourishment include alteration of sea turtle and Atlantic sturgeon foraging habitat, sea turtle nesting habitat, and interaction with suspended sediment.

### ***5.2.1 Foraging Habitat Alteration***

Green and leatherback sea turtles are unlikely to forage in nearshore area of Wallops island as appropriate habitat and prey items do not occur here. Loggerhead and Kemp's ridley sea turtles could use nearshore areas for feeding as could Atlantic sturgeon. Benthic prey items in the renourishment area would be buried during beach renourishment resulting in the temporary loss of foraging habitat. Given the small area affected by the proposed activities relative to abundant adjacent habitats and the ability of turtles to exploit food sources over a large area, these effects would be minor and discountable. It is expected that recolonization of the nearshore benthos will occur within 2-6 months after each renourishment cycle is complete. Additionally, the placement of sand seaward of the existing seawall, where currently limited or no beach area exists, would have beneficial effects on benthic organisms by restoring and creating new beach habitat and providing additional sources of prey along the Wallops Island shoreline.

### ***5.2.2 Turtle Nesting Habitat Alteration***

Impacts to nesting sea turtles could include avoided nesting attempts due to construction activity (noise, artificial lighting) on the beach, disorientation of hatchlings (due to project-related light sources), obstruction to hatchlings during their emergence and subsequent trip to the ocean, or loss of beach habitat. However, sea turtle nesting occurred on the new Wallops Island dune during the initial beach fill, indicating that it is very possible that the renourished elevated beach would provide additional sea turtle nesting habitat, a net benefit to the species.

### ***5.2.3 Suspended Sediment Effects***

As described above for dredging, sand placement on the Wallops Island beach would cause sediment to be suspended in the water column. Suspended solid concentrations would be lower than levels considered toxic to fish. The most likely effect of suspended sediments would be to alter behaviors of whales, sea turtles, or fish as these highly mobile species alter movement to avoid sediment plumes. Such movements are likely to be insignificant.

## **5.3 Breakwater Construction**

Potential effects of breakwater construction include sea turtle, giant manta ray, and Atlantic sturgeon interaction with suspended sediment; injury from noise generated during operations; alteration of sea turtle and Atlantic sturgeon foraging habitat; and alteration of sea turtle nesting habitat. Whales and manta rays are not expected to be present in the areas close to shore where breakwater construction is proposed. These species are highly mobile and could avoid the area. Therefore, no deleterious effects would be expected.

### ***5.3.1 Suspended Sediment Effects***

As described above for dredging and beach renourishment, breakwater construction could result in a temporary increase in suspended sediments, which could affect turtles and Atlantic sturgeon close to shore. Impacts would be similar to those described above.

### 5.3.2 Underwater Noise

Breakwater construction-related stressors include disturbance from vessel noise (if breakwaters are constructed from offshore) or non-impulsive pile driving (if breakwaters are constructed from shore via temporary bulkheads or trestles). A number of factors may influence an animal's response to noise, including its previous experience, its auditory sensitivity, its biological and social status (including age and sex), and its behavioral state and activity at the time of exposure. NOAA Fisheries reviewed studies of hearing sensitivity of marine mammals and developed thresholds for use as guidance when assessing the effects of anthropogenic sound on marine mammals based on measured or estimated hearing ranges (NMFS, 2024); however, listed whales are not expected to be present near the shore where such activities may occur.

Thresholds have also been developed for sea turtles based on auditory sensitivity in marine mammals. Construction of breakwaters could cause disturbance to sea turtles area avoidance. Noise from the installation of steel sheet piling using a vibratory hammer, if that method were used to install breakwaters (which is estimated to be as high as 163 decibels) may affect sea turtles. **Table 2** illustrates the sound thresholds for causing effects to sea turtles (Navy, 2017, 2018) and distances from the noise source (steel sheet pile being driven by a vibratory hammer) for those effects to occur. Outside these distances, effects would not occur. Additionally, noise dampening would be expected as sound waves encounter shallow bottom sediments and would be masked by the sound of crashing surf. Given that breakwater construction activities would occur fairly close to shore, noise levels would fall below those that could cause permanent or temporary threshold shifts (hearing impacts) or behavior changes, it is unlikely that sea turtles would experience effects from underwater noise.

**Table 2 Auditory Injury and Behavioral Thresholds for Sea Turtles Exposed to Non-Impulsive Sounds**

Effect	Weighted SPL Threshold re $\mu\text{Pa}2\cdot\text{s}$	Distance (feet)
Permanent Threshold Shift	220 dB SEL <sub>cum</sub>	2
Temporary Threshold Shift	200 dB SEL <sub>cum</sub>	42
Behavioral Change	175 dB RMS	6.6

Key:  $\mu\text{Pa}$  = microPascal;  $\mu\text{Pa}2\cdot\text{s}$  = microPascal squared per second; dB = decibel; re = referenced to; RMS = root mean square; SPL = sound pressure level; SEL<sub>cum</sub> = cumulative sound exposure level over 24 hours, weighted for turtle hearing group based on formula in Navy 2017

Current acoustic thresholds define behavioral disturbance to fish from all source types at 150 dB RMS. If a sturgeon were present in the study area and exposed to noise sufficient to create a behavioral response, it would modify its behavior and move away from the affected area prior to incurring injury. Although ESA-listed fish species could be affected by noise and disturbance, the probability would be decreased due to the low potential for occurrence in the study area. While Atlantic sturgeon may not always necessarily change their trajectory due to noise from vessels or pile driving, this species is highly mobile and an individual within the vicinity would be expected to alter its movement and avoid the area. Underwater noise from breakwater construction will be temporary and localized, and is unlikely to affect Atlantic sturgeon movements or ability to access habitat. Additionally, Atlantic sturgeon density in the action area is expected to be low, and any individuals transiting the study area would be able to avoid vessels and pile activity.

### **5.3.3 Foraging Habitat Alteration**

Loggerhead and Kemp's ridley sea turtles could use nearshore areas for feeding as could Atlantic sturgeon. Benthic prey items in the renourishment area would be buried during beach renourishment resulting in the temporary loss of foraging habitat. Given the small area affected by the proposed activities relative to abundant adjacent habitats and the ability to exploit food sources over a large area, these effects would be minor and discountable. It is expected that recolonization of the nearshore benthos would occur within 2 to 6 months after each renourishment cycle is complete. Additionally, the placement of sand seaward of the existing seawall, where currently limited or no beach area exists, would have beneficial effects on benthic organisms by restoring and creating new beach habitat and providing additional sources of prey along the Wallops Island shoreline.

### **5.3.4 Turtle Nesting Habitat Alteration**

Impacts to nesting sea turtles could include avoided nesting attempts due to construction activity (noise, artificial lighting) on the beach, disorientation of hatchlings (due to project-related light sources), obstruction to hatchlings during their emergence and subsequent trip to the ocean, or loss of beach habitat. However, sea turtle nesting occurred on the Wallops Island dune during the initial beach fill, indicating that it is very possible that the renourished elevated beach would provide additional sea turtle nesting habitat, a net benefit to the species.

Beach stabilization measures such as renourishment and hard structures provide not only increased beach width for shore protection but also may provide increased “real estate” of sea turtle nesting habitat that would otherwise be unavailable due to erosion (USACE, 2022). However, hard structures can affect adjacent beaches by modifying coastal sediment transport processes (USACE, 2022). Coastal modifications (e.g., beach armoring, beach sand placement, sand fencing) and associated pressures (e.g., artificial lighting, human disturbance, noise, beach compaction) may change beach morphology, nesting area availability and the incubating environment of marine turtle eggs (Nelson Sella and Fuentes, 2019). Because marine turtles rely on sandy coasts for reproductive purposes, impacts can affect individual species directly or can act indirectly on their habitat so that it becomes unsuitable for resting or reproduction (Nelson Sella and Fuentes, 2019).

Beach stabilization measures can affect sea turtles by preventing access to suitable nesting sites, impeding and/or trapping nesting females, abandoning nesting attempts, preventing proper nest construction, and overall loss of nesting habitat due to long term beach erosion (USACE, 2022). A 2025 study found that despite a general increase in sea turtle nest numbers, a marked decrease was observed in the study area landward of the breakwaters, demonstrating that breakwaters may effectively impact the ingress and egress of nesting sea turtles, as well as the egress of hatchlings (Casale et al., 2025). This indicates that breakwaters represent a barrier for nesting females that may nest elsewhere, either in the same or in a different coastal tract. This would result in a decrease in nest density landward of the breakwaters and an increase in other areas free of breakwaters. This pattern would be expected even if breakwaters do not act as physical barriers but instead alter beach characteristics in ways that make nesting more difficult (Casale et al., 2025). In the long term, the longshore transport would be altered by the breakwaters and may enhance or denigrate nesting habitat for sea turtles on Wallops Island.

Aside from the physical obstruction of the breakwater blocking access to the beach for the mother and the open ocean for both the mother and emergent hatchlings, the structures can redirect the direction of the turtles and possibly point them towards a light source. However,

light disorientation impacts can be minimized by reducing the wattage of light sources, altering the direction of light sources by shielding or lowering the light elevation, and using lights with spectral properties (longer wavelengths) that are less disruptive to sea turtles (USACE, 2022).

## 6.0 Effects Determination

Based on the discussion above, NASA has made determinations of effects resulting from components of the proposed action on ESA-listed marine species (**Table 3**).

**Table 3 Effects Determinations**

	Dredging	Beach Renourishment	Breakwater Construction
Humpback whale	NLAA	NE	NE
Fin whale	NLAA	NE	NE
North Atlantic right whale	NLAA	NE	NE
Hawksbill sea turtle	NE	NE	NE
Loggerhead sea turtle	MA/NJ	NLAA	NLAA
Kemp's ridley sea turtle	MA/NJ	NLAA	NLAA
Leatherback sea turtle	NLAA	NLAA	NLAA
Green sea turtle	NLAA	NLAA	NLAA
Atlantic sturgeon	MA/NJ	NLAA	NLAA
Giant Manta Ray	NLAA	NLAA	NLAA

Key: MA= may affect; NJ = no jeopardy; NLAA = may affect not likely to adversely affect; NE = no effect

## 7.0 Conclusion

During the preparation of the 2010 SRIPP PEIS, the 2013 Hurricane Sandy EA, and the 2019 SERP EA, NASA consulted with NOAA Fisheries regarding potential effects on listed species and critical habitat NOAA Fisheries offered a revised BO in August of 2012 and confirmed in 2018 and 2020 that reinitiation was not warranted.

In consideration of the scope of the proposed project, listed species known to inhabit the project area, the potential effects on those species, and mitigation measures to be implemented, NASA has made the determinations listed in **Table 3**. Over the next 7 years, this project may involve an estimated total amount of 4.5 million cubic yards of sand harvested with a MEC screen, placement and grading of sand on Wallops Island beach, construction of up to 12 detached breakwaters, as well as repair and extension of the seawall. The proposed action is similar to that considered in previous consultations. In light of the mitigation procedures that would be implemented to avoid affecting threatened and endangered species, NASA concludes that reinitiating formal ESA consultation is not necessary. NASA requests NOAA Fisheries concurrence with this determination.

If you have any questions or require additional information, please contact Ms. Lori Levine at (301) 286-6741 or lori.m.levine@nasa.gov.

Sincerely,

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U.S. Fish and Wildlife Service ESA Section 7 Consultation



**Goddard Space Flight Center**  
Wallops Flight Facility  
Wallops Island, VA 23337

Reply to Attn of: 250.W

January 20, 2026

Troy Anderson  
Virginia Field Office  
U.S. Fish and Wildlife Service  
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Dear Mr. Anderson:

This correspondence serves as the National Aeronautics and Space Administration's (NASA's) notification to the United States (U.S.) Fish and Wildlife Service (USFWS) of its proposed Shoreline Protection Program at Wallops Flight Facility (WFF), Wallops Island, Virginia. This project tiers to the 50-year Shoreline Restoration and Infrastructure Protection Program (SRIPP). The goal of the SRIPP is to reduce direct damage to Wallops Island's infrastructure, allowing WFF to continue its mission of supporting aerospace programs.

To date, there have been three renourishments and shoreline protection projects. The initial cycle of renourishment was completed in August 2012. The second cycle, which repaired the effects of Hurricane Sandy, was completed in September 2014. The third, which incorporated breakwater construction, was completed in 2021. The current Proposed Action is to perform additional beach renourishment, breakwater construction, and to repair and extend the existing sea wall. These activities are needed to maintain the beach berm and dune system, which is vital to protecting critical NASA, U.S. Navy, Department of Air Force, and Virginia Space Authority assets.

The purpose of this correspondence is to request USFWS concurrence that the action currently proposed is substantially similar to those considered previously (in the SRIPP Biological Assessment [BA], 2010 Programmatic Biological Opinion [BO], 2016 BO, and 2019 Programmatic BO, 2021 Project Modification, and 2024 Letter of Concurrence [LoC]) that is, these actions may affect and are likely to adversely affect piping plovers, red knots, and loggerhead sea turtles. Further, because the actions are substantially similar in scope and geography, and have similar effects to the same listed species, NASA requests that they are covered under the 2019 Programmatic BO and 2021 Project Modification. NASA would continue to follow all provisions of the 2019 Programmatic BO and 2021 Project Modification as it relates to avoidance and minimization measures, reporting, and USFWS coordination.

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (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 Act of 1899, the USACE has jurisdiction over the placement of structures and work conducted in navigable waters of the U.S. and would issue a permit to enable the proposed project. Additionally, the USACE

Norfolk District is overseeing project design, construction, and monitoring on NASA's behalf. The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) has jurisdiction over mineral resources on the Federal Outer Continental Shelf and would enter into a negotiated agreement with NASA and USACE pursuant to section 8(k)(2)(d) of the Outer Continental Shelf Lands Act. Therefore, both BOEM and USACE are serving as cooperating agencies on this project.

To this end, NASA has assumed the role of Lead Federal Agency for Endangered Species Act (ESA) Section 7 compliance and both BOEM and USACE are participating in NASA's ESA consultation. The effects of their actions are considered in all project documents, including this correspondence.

## **1.0 Background**

### **1.1 Shoreline Restoration and Infrastructure Protection Program**

On December 13, 2010, NASA issued a Record of Decision (ROD) for the WFF SRIPP Programmatic Environmental Impact Statement (2010 Final SRIPP PEIS), which analyzed structural and non-structural options, varying beach berm widths, and multiple sources of fill material that could be used to restore and protect the Wallops Island shoreline over 50 years. During this time, an estimated nine beach renourishment cycles at approximately 5-year intervals were anticipated. In its ROD, NASA selected beach fill (from Unnamed Shoal A, Unnamed Shoal B, or north Wallops Island beach) and seawall extension and adopted a suite of mitigation and monitoring protocols to reduce potential environmental impacts and track project performance. The initial phase entailed placement of approximately 3.2 million cubic yards of sand dredged from Unnamed Shoal A along the Wallops Island shoreline and a 1,430-foot southerly extension of the rock seawall with future extensions to a maximum length of 4,600 feet.

### **1.2 Post-Hurricane Sandy Shoreline Repair**

A second renourishment and repair to a section of the seawall were required after Hurricane Sandy made landfall in October 2012. NASA prepared the Post-Hurricane Sandy Shoreline Repair Final Environmental Assessment (EA) (NASA, 2013). Repairs to the seawall and second beach renourishment of 650,000 cubic yards of sand were completed in September 2014.

### **1.3 Shoreline Enhancement and Restoration Project**

Subsequent storms in 2015, 2016, and 2018 resulted in a reduction of over a million cubic yards of sand in the southern portion of the island as compared to after the 2014 shoreline repair (USACE, 2018). In 2018, NASA requested the USACE Norfolk District Hydraulics and Hydrology Section evaluate the effectiveness of constructing breakwater(s) along the shoreline to reduce the intensity of wave action and the rate of sediment transport, since previous renourishments provided only temporary protection. NASA proposed to continue the SRIPP by implementing the Shoreline Enhancement and Restoration Project (SERP). Repairs included beach renourishment using approximately 1.1 million cubic yards of sand sourced from the north Wallops Island beach and construction of five breakwaters using barges. These were constructed in two sets—two breakwaters constructed in front of the Horizontal Integration Facility and three breakwaters constructed south of these, in front of Launch Pad 0-B. During construction, three tropical storms/hurricanes caused delays and posed hazards to personnel and equipment. Because of this, NASA proposed to build the

three southern breakwaters via temporary bulkheads constructed perpendicular to the shoreline.

## 2.0 Proposed Action

The beach and dune system established to protect NASA's Wallops Island launch range infrastructure has continued to erode through storm wind and wave damage. The effects of storms are most apparent in the southern half of the Wallops Island beach, where the majority of the critical launch assets are located.

Consistent with the 2019 Programmatic BO (USFWS, 2019), NASA's proposed action would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The Proposed Action could involve a combination of the following, implemented in phases over the next 7 years (**Figure 1**):

- dredging up to 4.5 million cubic yards of sand from Offshore Unnamed Shoal A;
- sand renourishment within an approximately 15,000-foot section of shoreline;
- construction of up to 12 breakwaters in the nearshore area between the existing breakwaters; and
- repairs and extension of the existing seawall.

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. Existing mitigation measures and monitoring requirements would be unchanged.



**Figure 1 Project Area and Components**

## **2.1 Dredging**

Over the next 7 years, the beach along the Wallops Island shoreline infrastructure protection area would be renourished using up to 3 million cubic yards of sand sourced from Unnamed Shoal A. 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 be dredged to meet the targeted fill volume. Sediment losses during dredging and placement are assumed to be up to 50 percent, resulting in an estimated 4.5 million cubic yards dredged in order to renourish the beach with 3 million cubic yards of sand. The dredging together with the beach renourishment portion of the project would take approximately 3 months.

Dredging would be consistent with the previous projects. The dredge contractor would transport equipment and materials to the project site. Offshore equipment would include several miles of discharge pipe, pump-out 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.

The dredging process would be cyclical in nature, with the vessel transiting to the borrow site, lowering its drag arms (equipped with munitions and explosives of concern [MEC] screens and sea turtle deflectors), filling its hopper, and transporting the material to a pump-out station (the floating end of a submerged pipeline) that would be placed at a water depth of approximately 30 feet, approximately 2 miles offshore. The pathway from Unnamed Shoal A to the pump-out station avoids Chincoteague Shoal and Blackfish Bank and is approximately 14 miles. The pump-out station would be moved up to 10 times. Booster pumps may be needed to aid the offloading of sand from the pump-out buoy to the shoreline. The sand/water slurry would be pumped to the beach through several miles of submerged steel pipeline 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. Nearshore, it is expected that the contractor would employ one or more anchored pump-out stations.

## **2.2 Beach Renourishment**

Consistent with previous beach renourishment projects, onshore sections of discharge lines would be placed using a front-end loader or crane. As the sand slurry is discharged onto the shoreline, bulldozers would grade the material to the desired design template. 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. 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 progresses.

## **2.3 Breakwater Construction**

Also over the next 7 years, up to 12 breakwaters would be constructed approximately 200 feet offshore between the two existing sets of breakwaters. Breakwaters would vary in height and width depending on the elevation of the sea bottom. Each breakwater would cover 11,000–12,000 square feet of bottom, for a total of up to approximately 144,000 square feet. Breakwaters could be placed in sets or individually. Breakwaters would be similar to those previously constructed with a layer of Type I Armor Stone, a center core of Virginia

Department of Transportation (VDOT) 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 while minimizing impacts to sediment transport and hydrodynamics in the project vicinity. Construction of each breakwater is estimated to take 2 to 3 months. Breakwater construction could occur using several methods: via barge, temporary bulkheads, or temporary trestle system.

### ***2.3.1 Building Breakwaters by Barge***

The rock and other materials for constructing each breakwater would be transported to the breakwater construction area by barge or to the WFF 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.

### ***2.3.2 Building Breakwaters Using Temporary Bulkheads***

Materials and equipment would be transported to the WFF area by rail and offloaded to trucks or by truck to and from the island via existing roads to either an impervious surface or previously disturbed upland staging area. During construction, staging could move to the construction zone on the beach. Temporary bulkhead structures would be constructed using steel sheet piles. 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).

### ***2.3.3 Building Breakwaters Using Temporary Trestle System***

Materials and equipment would be transported to the WFF area by rail and offloaded to trucks or by truck to and from the island via existing roads to either an impervious surface or previously disturbed upland staging area. During construction, staging could move to the construction zone on the beach. A series of steel pilings would be installed and beams placed across the top of the piles to form temporary trestles. The system would be 30 to 40 feet wide with crane mats used as decking.

## **2.4 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. While the wall has prevented overwash and storm damage, erosion of the shoreline seaward of the wall has continued, resulting in an increased risk of damage to the seawall. 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 could require repairs at any location.

## **2.5 Mitigation**

The 2019 Programmatic 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, 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.

### **3.0 Description of the Action Area**

The action area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 Code of Federal Regulations section 402.02). As with previous shoreline consultations, the action area includes the Wallops Island offshore borrow sites, the waters between and immediately adjacent to these areas where project vessels would travel and dredged material would be transported, the beach and nearshore where sand would be replenished, the offshore area where breakwaters would be constructed, and the shoreline where seawall repairs and extension could take place.

### **4.0 Status of Species within the Action Area**

**Table 1** provides a review of species that would be potentially affected by the project activities that have been assessed previously in shoreline project consultations. **Table 2** is a list of species that have been listed or proposed for listing since the last shoreline consultation as well as their potential to occur in the action area.

**Table 1 Previously Evaluated ESA-Listed Species with Potential to Occur in the Action Area**

Common Name	ESA Status	Previous Determination	Species/Habitat Presence in Action Area
Northern long- eared bat ( <i>Myotis septentrionalis</i> )	E	NLAA	Species was not detected (nor was any species of the genus <i>Myotis</i> ) during 2017–2018 or 2024 bat acoustic and mist netting surveys (Barr, 2018; NASA, 2024b). While there is suitable habitat present in parts of the island, none is present in the action area.
Piping Plover ( <i>Charadrius melanotos</i> )	T	LAA	Within the action area, plovers use wide sandy beaches on Metompkin, Assawoman, Wallops, and Assateague Islands for courtship and nesting.
Roseate tern ( <i>Sterna dougallii dougallii</i> )	E	NLAA	Species has not been identified and is not likely to be present.
Rufa red knot ( <i>Calidris canutus rufa</i> )	T	LAA	The majority of knot foraging habitat on Wallops Island occurs on the north end of the island, well north of the action area.
Green sea turtle ( <i>Chelonia mydas</i> )	T	NLAA	Species has not been identified and is not likely to be present.
Hawksbill sea turtle ( <i>Eretmochelys imbricata</i> )	E	NLAA	Species has not been identified and is not likely to be present.
Kemp's ridley sea turtle ( <i>Lepidochelys kempii</i> )	E	NLAA	Species has not been identified and is not likely to be present.
Leatherback sea turtle ( <i>Dermochelys coriacea</i> )	E	NLAA	Species has not been identified and is not likely to be present.
Loggerhead sea turtle ( <i>Caretta caretta</i> )	T	LAA	Nests on Wallops Island have been documented on the recreational beach and in front of the rock wall, but are not documented every year.
Seabeach amaranth ( <i>Amaranthus pumilus</i> )	T	NLAA	Species has not been identified and is not likely to be present.

Key: E = Endangered; ESA = Endangered Species Act; LAA = likely to adversely affect; NLAA = not likely to adversely affect; T= threatened

**Table 2 ESA Listed Species not Previously Evaluated with Potential to Occur in the Action Area**

Common Name	ESA Status	Species/Habitat Presence in Action Area
Tricolored bat ( <i>Perimyotis subflavus</i> )	PE	Species was detected during 2017–2018 and was not detected in 2024 bat acoustic and netting surveys (Barr, 2018; NASA, 2024b). While there is suitable habitat present in parts of the island, none is present in the action area.
Eastern black rail ( <i>Laterallus jamaicensis jamaicensis</i> )	T	NASA completed two sets of surveys during the breeding season: from June 10 to July 13, 2021 (Ritzert, Stein, and Bartok, 2021) and 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 action area.
Bermuda petrel ( <i>Pterodroma cahow</i> )	E	No Bermuda petrel habitat exists in the action area. The Bermuda petrel is a seabird with a restricted range, primarily nesting on small islands in Bermuda, over 1,000 miles from Wallops Island.
Monarch butterfly ( <i>Danaus plexippus</i> )	PT	No suitable habitat exists in the action area.

Key: E = Endangered; ESA = Endangered Species Act; NASA = National Aeronautics and Space Administration; PE = proposed endangered; T= threatened; USFWS = United States Fish and Wildlife Service

While habitat does exist on Wallops Island for the endangered northern long-eared bat, none exists in the action area. Northern long-eared bat has not been detected during surveys in 2017, 2018, or 2024. Tricolored bat habitat exists on Wallops Island and it was detected in surveys in 2018 (but not in 2024); but there is no habitat in the action area and the species is not likely to be affected by project activities (NASA, 2024a, 2024b).

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 action area, and no wetlands would be affected by the Proposed Action.

Bermuda petrels are unlikely to encounter dredging activities as water depths are shallower than where the species is usually found. This, along with the small size of the area offshore that would be affected by dredging, the duration of activities, the patchy and seasonal distribution of the species over a large area, suggest that dredging has a discountable probability of affecting Bermuda petrels.

The monarch butterfly, which recently was proposed for federal listing as threatened, also has no suitable habitat within the project area since the area is unlikely to provide habitat for milkweeds, their preferred host species.

**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 fledge. Additionally, when prior renourishment occurred during the nesting season, NASA increased monitoring to 7 days a week. **Table 3** illustrates historic nest data.

**Table 3** 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, 2019, 2020, 2021, 2022, 2023, 2024c, 2025

**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 4** illustrates historic rufa red knot counts at Wallops Island. The project area overlaps the current designated critical habitat for the rufa red knot. 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 4 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, 2019, 2020, 2021, 2022, 2023, 2024c, 2025

**Sea Turtles:** In accordance with the Protected Species Monitoring Plan, 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, 2023).

## 5.0 Effects of the Action on Listed Species

Because the effects of the proposed activities have been evaluated in detail previously, the following sections provide a summary of effects. Project elements are substantially similar to those assessed previously in the SRIPP BA, 2010 Programmatic BO, 2016 BO, and 2019 Programmatic BO; and 2021 Project Modification. Therefore, there would be no change to effects determination, take, terms and conditions, and monitoring and reporting requirements for species previously evaluated. None of the species listed since 2019 have the potential to occur in the action area.

### 5.1 Dredging

The effects of dredging on sea turtles offshore is being evaluated in consultation with the National Oceanic and Atmospheric Administration Fisheries. Bermuda petrels are unlikely to encounter dredging activities as water depths are shallower than where the species is usually found. This, along with the small size of the area offshore that would be affected by dredging, the duration of activities, the patchy and seasonal distribution of the species over a large area, suggest that dredging has a discountable probability of affecting Bermuda petrels. Dredging is not expected to affect any other ESA-listed species managed by USFWS.

### 5.2 Beach Renourishment

Beach renourishment would temporarily disturb piping plover and loggerhead sea turtle nesting habitat and red knot migratory habitat, though currently the quality of existing habitat has been diminished by erosion and productivity is historically low. In the long term, the beach nesting habitat would be stabilized by beach renourishment and other stabilization efforts. Benthic prey items in the sand template would be buried during renourishment, resulting in the temporary loss of foraging habitat for piping plovers and rufa red knots.

Given the small area affected by the proposed activities relative to abundant adjacent habitats and the ability of these species to exploit food sources over a large area, these effects would be minor. In the long term, a wider stable beach would be recolonized by benthos from adjacent areas and would provide foraging habitat for these species. Effects would not appreciably diminish the value of the proposed rufa red knot critical habitat over the long term because beach foraging habitat would be stabilized; therefore, the proposed action is not likely to adversely modify proposed critical habitat.

Noise and human presence in the renourishment area could disturb piping plovers, red knots, and loggerhead sea turtles for the duration of activities. Nesting sea turtles could be impacted by nighttime construction activity (particularly artificial lighting) on the beach, unintentional burial of a newly dug nest (if it were undetected), disorientation of hatchlings (due to project-related light sources), or obstruction to hatchlings during their emergence and subsequent trip to the ocean. The replenished beach would prove suitable 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, and continued piping plover nesting, it is possible that the additional elevated beach would provide suitable nesting habitat.

### **5.3 Breakwater Construction**

Noise and human presence during breakwater construction could disturb piping plovers, red knots, and loggerhead sea turtles for the duration of activities. The construction of breakwaters could potentially cause disturbance and area avoidance by sea turtles, depending on the time of year construction was initiated. Impacts to nesting sea turtles could include avoided nesting attempts due to construction activity (noise, artificial lighting) on the beach, disorientation of hatchlings (due to project-related light sources), obstruction to hatchlings during their emergence and subsequent trip to the ocean, or loss of beach habitat. However, sea turtle nesting occurred on the new Wallops Island dune during the initial beach fill, indicating that it is very possible that the renourished elevated beach would provide additional sea turtle nesting habitat, a net benefit to the species. Similarly, a wider stable beach would be colonized by benthos from adjacent areas and would provide foraging habitat for piping plover and rufa red knot in 3 to 6 months (Hill-Spanick et al., 2018; Tauran et al., 2025). In addition, the above-water portion of the breakwaters after construction would provide potential roosting and resting area for birds.

### **5.4 Seawall Repair and Extension**

Noise and human presence associated with seawall work could disturb piping plovers, red knots, and loggerhead sea turtles for the duration of activities. Extension of the seawall could cover existing foraging habitat. Possible effects on nesting turtles would be generally the same as those discussed for beach renourishment and breakwater construction.

## **6.0 Effects Determination**

Based on the discussion above, NASA has made determinations of effects resulting from components of the proposed action on ESA-listed species (**Table 5**).

**Table 5 Effects Determinations**

Species	Dredging	Beach Renourishment	Breakwater Construction	Seawall Repair and Extension
<b>Evaluated in Previous Consultations</b>				
Northern long-eared bat	NE	NLAA	NLAA	NLAA
Piping Plover	NE	LAA	LAA	LAA
Roseate tern	NE	NLAA	NLAA	NLAA
Rufa red knot	NE	LAA	LAA	LAA
Green sea turtle	NLAA	NLAA	NLAA	NLAA
Hawksbill sea turtle	NLAA	NLAA	NLAA	NLAA
Kemp's ridley sea turtle	NLAA	NLAA	NLAA	NLAA
Leatherback sea turtle	NLAA	NLAA	NLAA	NLAA
Loggerhead sea turtle	NLAA	LAA	LAA	LAA
Seabeach amaranth	NE	NLAA	NLAA	NLAA
<b>Listed Since Previous Consultation</b>				
Tricolored bat	NE	NLAA	NLAA	NLAA
Eastern black rail	NE	NE	NE	NE
Bermuda petrel	NLAA	NE	NE	NE
Monarch butterfly	NE	NLAA	NLAA	NLAA

Key: LAA = likely to adversely affect; NE = no effect; NJ = not likely to jeopardize the continued existence; NLAA = not likely to adversely affect

## 7.0 Conclusion

In consideration of the scope of the proposed project, listed species known to inhabit the project area, and the potential effects on those species, NASA concludes that the proposed action is substantially similar in scope, geography and timing as that covered in the 2019 Programmatic BO. Species listed or proposed for listing since the 2019 Programmatic BO would not be affected or are not likely to be affected by the proposed action. Further, NASA concludes that impacts associated with the proposed action are substantially similar as those considered within the SRIPP BA, 2010 Programmatic BO, 2016 BO, 2019 Programmatic BO, and 2021 Project Modification; that is these actions *may affect, likely to adversely affect* piping plovers, red knots, and loggerhead sea turtles. NASA hereby requests USFWS concurrence with this determination and that the proposed action can be covered under the 2019 Programmatic BO and 2021 Project Modification.

If you have any questions or require additional information, please contact Ms. Lori Levine at (301) 286-6741 or [lori.m.levine@nasa.gov](mailto:lori.m.levine@nasa.gov).

Sincerely,

Shari Miller  
Environmental Planning Group Lead  
Medical and Environmental Management Division

cc:

228/W. Harris  
228/J. Saecker  
250/B. Deyo  
250/L. Levine  
USFWS/E. Argo  
BOEM/L. Brandt  
BOEM/J. Bucatari  
USACE/S. Reinheimer  
USACE/S. Williams

## References

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

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Julie Langan  
State Historic Preservation Officer  
Virginia Department of Historic Resources  
2801 Kensington Avenue  
Richmond, VA 23221

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight Center's Wallops Flight Facility Wallops Island, Virginia**

Ms. Langan,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend 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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

NASA has determined that the proposed project is an undertaking as defined in 36 Code of Federal Regulations (CFR) § 800.16(y) and it is a type of activity that has the potential to cause effects on historic properties. NASA has prepared an Environmental Assessment to evaluate the potential environmental effects of both enhancing and protecting the shoreline on

Wallop Island with the proposed Federal action alternatives. The 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 CFR 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1). 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 serving as the lead agency.

The purpose of this letter is to initiate consultation pursuant to the terms of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800. This letter serves to define the Area of Potential Effects (APE) for the undertaking and gauge project effects located within the bounds of the proposed undertaking.

### **Description of Undertaking**

Consistent with the Action Alternatives described in detail in the 2010 Final SRIPP PEIS (NASA 2010), 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 2019), NASA's proposed undertaking would implement measures to protect the beach along the Wallop Island shoreline infrastructure protection area. The undertaking could involve a combination of sand renourishment within an approximate 15,000-foot section of shoreline from the south property line on Wallop Island north to the location of the fire station; breakwater construction nearshore between existing sets of breakwaters; as well as repairs and extension of the existing seawall. Shoreline stabilization activities could 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. Renourishment processes (i.e., beach fill mobilization, dredging and sand placement, and pre- and post- dredging surveys) under the proposed undertaking would be consistent with those described in detail in previous NEPA (NASA 2010; NASA 2013; NASA 2019). For this proposed undertaking, sand material for beach renourishment would come from Outer Continental Shelf (OCS) Unnamed Shoal A. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010, 2013, 2019).

### **No Action Alternative**

Under the No Action Alternative, NASA would not renourish the Wallop 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 Wallop Island from storm events and sea level rise; or repair or extend the existing seawall.

## **Area of Potential Effects (36 CFR § 800.4(a)(1))**

An APE is defined in 36 CFR § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

## **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project’s APE in accordance with the Secretary of the Interior’s Standards and Guidelines for Identification.

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 impacted 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 the 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 2022a).

## **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the steps outlined in Stipulation XII, *Post Review Discoveries*, of the executed 2014 Programmatic Agreement (NASA 2014, 2022).

## Conclusion

NASA has determined that the implementation of the undertaking warrants a finding of **No Historic Properties Affected** per 36 CFR Section 800.4(d)(1). NASA invites you to comment on this undertaking and our determination of effects. In addition to your office, NASA is consulting with Tribal Nations who may have cultural and/or historical interests in the area.

Please respond within thirty (30) days of receipt of this letter to Irene Romero at [irene.j.romero@nasa.gov](mailto:irene.j.romero@nasa.gov). Thank you for your assistance.

Sincerely,

*Irene J. Romero*

Irene Romero  
NASA Goddard Cultural Resources Manager  
8800 Greenbelt Road  
Greenbelt, MD 20771

### Enclosures:

- 1- Map depicting the location of Wallops Flight Facility, Wallops Island, Virginia
- 2- Map showing the Area of Potential Effects
- 3- References Cited

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Wenonah Haire, DMD  
Tribal Historic Preservation Officer  
Catawba Indian Nation  
1536 Tom Steven Road  
Rock Hill, SC 29730

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National  
Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight  
Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Ms. Haire,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

NASA has determined that the proposed project is an undertaking as defined in 36 Code of Federal Regulations (CFR) § 800.16(y) and it is a type of activity that has the potential to cause effects on historic properties. NASA has prepared an Environmental Assessment to evaluate the potential environmental effects of both enhancing and protecting the shoreline on Wallops Island with the proposed Federal action alternatives. The 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 CFR 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1). 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 serving as the lead agency.

The purpose of this letter is to initiate consultation pursuant to the terms of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800. This letter serves to define the Area of Potential Effects (APE) for the undertaking and gauge project effects located within the bounds of the proposed undertaking.

### **Description of Undertaking**

Consistent with the Action Alternatives described in detail in the 2010 Final SRIPP PEIS (NASA 2010), 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 2019), NASA's proposed undertaking would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The undertaking could involve a combination of 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; breakwater construction nearshore between existing sets of breakwaters; as well as repairs and extension of the existing seawall. Shoreline stabilization activities could 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. Renourishment processes (i.e., beach fill mobilization, dredging and sand placement, and pre- and post- dredging surveys) under the proposed undertaking would be consistent with those described in detail in previous NEPA (NASA 2010; NASA 2013; NASA 2019). For this proposed undertaking, sand material for beach renourishment would come from Outer Continental Shelf (OCS) Unnamed Shoal A. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010, 2013, 2019).

### **No Action Alternative**

Under the No Action Alternative, 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 sea level rise; or repair or extend the existing seawall.

### **Area of Potential Effects (36 CFR § 800.4(a)(1))**

An APE is defined in 36 CFR § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various

kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

### **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project's APE in accordance with the Secretary of the Interior's Standards and Guidelines for Identification.

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 impacted 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 the 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 2022a).

In accordance with Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*; EO 12372, *Intergovernmental Review of Federal Programs*; and Section 106 of the National Historic Preservation Act and its implementation regulations found at 36 CFR § 800.2, § 800.3, and § 800.4, NASA respectfully requests your assistance in identifying the following:

- traditional resources or sacred sites that may be located within the current APE;
- historic properties in the APE of which we may not be aware; and/or
- your Tribe's interest in participating in additional consultation.

### **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight

Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the appropriate protocol for inadvertent discoveries.

## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

If you request additional consultation, NASA will work with your office to adopt procedures that will meet your Tribe's needs and requirements for continued consultation.

In order to address your concerns in a timely manner for both the Tribe and the proposed undertaking, please respond to this letter within thirty (30) days of receipt to Irene Romero at [irene.j.romero@nasa.gov](mailto:irene.j.romero@nasa.gov). Thank you for your assistance.

Sincerely,

*Irene J. Romero*

Irene Romero  
NASA Goddard Cultural Resources Manager  
8800 Greenbelt Road  
Greenbelt, MD 20771

## Enclosures:

- 1- Map depicting the location of Wallops Flight Facility, Wallops Island, Virginia
- 2- Map showing the Area of Potential Effects
- 3- References Cited

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Stephen Adkins  
Chief  
Chickahominy Indian Tribe  
8200 Lott Cary Road  
Providence Forge, VA 23140

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Chief Adkins,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

NASA has determined that the proposed project is an undertaking as defined in 36 Code of Federal Regulations (CFR) § 800.16(y) and it is a type of activity that has the potential to cause effects on historic properties. NASA has prepared an Environmental Assessment to evaluate the potential environmental effects of both enhancing and protecting the shoreline on Wallops Island with the proposed Federal action alternatives. The 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 CFR 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1). 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 serving as the lead agency.

The purpose of this letter is to initiate consultation pursuant to the terms of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800. This letter serves to define the Area of Potential Effects (APE) for the undertaking and gauge project effects located within the bounds of the proposed undertaking.

### **Description of Undertaking**

Consistent with the Action Alternatives described in detail in the 2010 Final SRIPP PEIS (NASA 2010), 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 2019), NASA's proposed undertaking would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The undertaking could involve a combination of 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; breakwater construction nearshore between existing sets of breakwaters; as well as repairs and extension of the existing seawall. Shoreline stabilization activities could 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. Renourishment processes (i.e., beach fill mobilization, dredging and sand placement, and pre- and post- dredging surveys) under the proposed undertaking would be consistent with those described in detail in previous NEPA (NASA 2010; NASA 2013; NASA 2019). For this proposed undertaking, sand material for beach renourishment would come from Outer Continental Shelf (OCS) Unnamed Shoal A. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010, 2013, 2019).

### **No Action Alternative**

Under the No Action Alternative, 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 sea level rise; or repair or extend the existing seawall.

### **Area of Potential Effects (36 CFR § 800.4(a)(1))**

An APE is defined in 36 CFR § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various

kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

### **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project's APE in accordance with the Secretary of the Interior's Standards and Guidelines for Identification.

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 impacted 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 the 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 2022a).

In accordance with Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*; EO 12372, *Intergovernmental Review of Federal Programs*; and Section 106 of the National Historic Preservation Act and its implementation regulations found at 36 CFR § 800.2, § 800.3, and § 800.4, NASA respectfully requests your assistance in identifying the following:

- traditional resources or sacred sites that may be located within the current APE;
- historic properties in the APE of which we may not be aware; and/or
- your Tribe's interest in participating in additional consultation.

### **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight

Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the appropriate protocol for inadvertent discoveries.

## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

If you request additional consultation, NASA will work with your office to adopt procedures that will meet your Tribe's needs and requirements for continued consultation.

In order to address your concerns in a timely manner for both the Tribe and the proposed undertaking, please respond to this letter within thirty (30) days of receipt to Irene Romero at [irene.j.romero@nasa.gov](mailto:irene.j.romero@nasa.gov). Thank you for your assistance.

Sincerely,

*Irene J. Romero*

Irene Romero  
NASA Goddard Cultural Resources Manager  
8800 Greenbelt Road  
Greenbelt, MD 20771

## Enclosures:

- 1- Map depicting the location of Wallops Flight Facility, Wallops Island, Virginia
- 2- Map showing the Area of Potential Effects
- 3- References Cited

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Chief Gerald Stewart  
Chickahominy Indians, Eastern Division  
2895 Mt Pleasant Road  
Providence Forge, VA 23140

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National  
Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight  
Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Chief Stewart,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

NASA has determined that the proposed project is an undertaking as defined in 36 Code of Federal Regulations (CFR) § 800.16(y) and it is a type of activity that has the potential to cause effects on historic properties. NASA has prepared an Environmental Assessment to evaluate the potential environmental effects of both enhancing and protecting the shoreline on Wallops Island with the proposed Federal action alternatives. The 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 CFR 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1). 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 serving as the lead agency.

The purpose of this letter is to initiate consultation pursuant to the terms of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800. This letter serves to define the Area of Potential Effects (APE) for the undertaking and gauge project effects located within the bounds of the proposed undertaking.

## Description of Undertaking

Consistent with the Action Alternatives described in detail in the 2010 Final SRIPP PEIS (NASA 2010), 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 2019), NASA's proposed undertaking would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The undertaking could involve a combination of 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; breakwater construction nearshore between existing sets of breakwaters; as well as repairs and extension of the existing seawall. Shoreline stabilization activities could 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. Renourishment processes (i.e., beach fill mobilization, dredging and sand placement, and pre- and post- dredging surveys) under the proposed undertaking would be consistent with those described in detail in previous NEPA (NASA 2010; NASA 2013; NASA 2019). For this proposed undertaking, sand material for beach renourishment would come from Outer Continental Shelf (OCS) Unnamed Shoal A. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010, 2013, 2019).

## No Action Alternative

Under the No Action Alternative, 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 sea level rise; or repair or extend the existing seawall.

## Area of Potential Effects (36 CFR § 800.4(a)(1))

An APE is defined in 36 CFR § 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE

includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

### **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project's APE in accordance with the Secretary of the Interior's Standards and Guidelines for Identification.

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 impacted 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 the 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).

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In accordance with Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*; EO 12372, *Intergovernmental Review of Federal Programs*; and Section 106 of the National Historic Preservation Act and its implementation regulations found at 36 CFR § 800.2, § 800.3, and § 800.4, NASA respectfully requests your assistance in identifying the following:

- traditional resources or sacred sites that may be located within the current APE;
- historic properties in the APE of which we may not be aware; and/or
- your Tribe's interest in participating in additional consultation.

### **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the appropriate protocol for inadvertent discoveries.

## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

If you request additional consultation, NASA will work with your office to adopt procedures that will meet your Tribe's needs and requirements for continued consultation.

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Sincerely,

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Irene Romero  
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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Tribal Chief Lee Lockamy  
Nansemond Indian Tribe  
1001 Pembroke Lane  
Suffolk, VA 23434

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Chief Lockamy,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

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## **No Action Alternative**

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## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

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Irene Romero  
NASA Goddard Cultural Resources Manager  
8800 Greenbelt Road  
Greenbelt, MD 20771

### Enclosures:

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Chief Robert Gray  
Pamunkey Indian Nation  
1054 Pocahontas Trail  
King William, VA 23086

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Chief Gray,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

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## **Area of Potential Effects (36 CFR § 800.4(a)(1))**

An APE is defined in 36 CFR § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE

includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

### **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project's APE in accordance with the Secretary of the Interior's Standards and Guidelines for Identification.

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 impacted 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 the 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 2022a).

In accordance with Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*; EO 12372, *Intergovernmental Review of Federal Programs*; and Section 106 of the National Historic Preservation Act and its implementation regulations found at 36 CFR § 800.2, § 800.3, and § 800.4, NASA respectfully requests your assistance in identifying the following:

- traditional resources or sacred sites that may be located within the current APE;
- historic properties in the APE of which we may not be aware; and/or
- your Tribe's interest in participating in additional consultation.

### **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the appropriate protocol for inadvertent discoveries.

## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

If you request additional consultation, NASA will work with your office to adopt procedures that will meet your Tribe's needs and requirements for continued consultation.

In order to address your concerns in a timely manner for both the Tribe and the proposed undertaking, please respond to this letter within thirty (30) days of receipt to Irene Romero at [irene.j.romero@nasa.gov](mailto:irene.j.romero@nasa.gov). Thank you for your assistance.

Sincerely,

*Irene J. Romero*

Irene Romero  
NASA Goddard Cultural Resources Manager  
8800 Greenbelt Road  
Greenbelt, MD 20771

### Enclosures:

- 1- Map depicting the location of Wallops Flight Facility, Wallops Island, Virginia
- 2- Map showing the Area of Potential Effects
- 3- References Cited

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Paramount Chief Norris Howard, Sr.  
Pocomoke Indian Nation  
3355 Allen Road  
Eden, MD 21822

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National  
Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight  
Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Paramount Chief Howard,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

NASA has determined that the proposed project is an undertaking as defined in 36 Code of Federal Regulations (CFR) § 800.16(y) and it is a type of activity that has the potential to cause effects on historic properties. NASA has prepared an Environmental Assessment to evaluate the potential environmental effects of both enhancing and protecting the shoreline on Wallops Island with the proposed Federal action alternatives. The 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 CFR 1216.3); and NASA Procedural Requirement (NPR) *Implementing the National Environmental Policy Act and Executive Order 12114* (NPR 8580.1). 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 serving as the lead agency.

The purpose of this letter is to initiate consultation pursuant to the terms of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800. This letter serves to define the Area of Potential Effects (APE) for the undertaking and gauge project effects located within the bounds of the proposed undertaking.

## Description of Undertaking

Consistent with the Action Alternatives described in detail in the 2010 Final SRIPP PEIS (NASA 2010), 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 2019), NASA's proposed undertaking would implement measures to protect the beach along the Wallops Island shoreline infrastructure protection area. The undertaking could involve a combination of 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; breakwater construction nearshore between existing sets of breakwaters; as well as repairs and extension of the existing seawall. Shoreline stabilization activities could 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. Renourishment processes (i.e., beach fill mobilization, dredging and sand placement, and pre- and post- dredging surveys) under the proposed undertaking would be consistent with those described in detail in previous NEPA (NASA 2010; NASA 2013; NASA 2019). For this proposed undertaking, sand material for beach renourishment would come from Outer Continental Shelf (OCS) Unnamed Shoal A. All dredging and equipment placement would take place in areas previously surveyed (NASA 2010, 2013, 2019).

## No Action Alternative

Under the No Action Alternative, 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 sea level rise; or repair or extend the existing seawall.

## Area of Potential Effects (36 CFR § 800.4(a)(1))

An APE is defined in 36 CFR § 800.16(d) as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.” The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this undertaking, NASA determined that the APE

includes the sand dredging from Unnamed Shoal A, pumpout buoy area, beach renourishment area, and construction of offshore breakwaters (Enclosure 2).

### **Identification of Historic Properties (36 CFR § 800.4(b))**

Pursuant to the NHPA, Section 106 Implementing Regulations at 36 CFR § 800.4(b), qualified preservation professionals have carried out the identification of historic properties within this project's APE in accordance with the Secretary of the Interior's Standards and Guidelines for Identification.

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 impacted 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 the 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 2022a).

In accordance with Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*; EO 12372, *Intergovernmental Review of Federal Programs*; and Section 106 of the National Historic Preservation Act and its implementation regulations found at 36 CFR § 800.2, § 800.3, and § 800.4, NASA respectfully requests your assistance in identifying the following:

- traditional resources or sacred sites that may be located within the current APE;
- historic properties in the APE of which we may not be aware; and/or
- your Tribe's interest in participating in additional consultation.

### **Results of Identification and Evaluation (36 CFR § 800.4(d))**

There are no known historic properties within the APE at Wallops Island. In the unlikely event of an inadvertent discovery of previously unrecorded or unevaluated cultural resources during ground-disturbing construction, the work would immediately stop, and the Wallops Flight Facility Cultural Resources Manager would be notified. The Wallops Flight Facility Cultural Resources Manager would follow the appropriate protocol for inadvertent discoveries.

## Conclusion

Pursuant to 36 CFR Section 800.4(d)(1), NASA has reached a preliminary determination of no historic properties affected for the proposed undertaking with respect to historic properties in the APE. However, prior to finalizing our effects determination, we would like to solicit input regarding Tribal resources that may be present within the APE.

If you request additional consultation, NASA will work with your office to adopt procedures that will meet your Tribe's needs and requirements for continued consultation.

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Sincerely,

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Greenbelt, MD 20771

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National Aeronautics and  
Space Administration

**NASA Goddard Space Flight Center**  
Greenbelt, MD 20771



January 20, 2026

Chief Anne Richardson  
Rappahannock Tribe of Virginia  
5036 Indian Neck Road  
Stephens Church, VA 23148

**SUBJECT: National Historic Preservation Act Section 106 Consultation for the National Aeronautics and Space Administration Shoreline Protection Program at Goddard Space Flight Center's Wallops Flight Facility Wallops Island, Virginia**

Dear Chief Richardson,

The National Aeronautics and Space Administration (NASA) proposes to implement measures to protect the beach along the Wallops Island shoreline at Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Virginia (Enclosure 1). The purpose is to protect the Wallops Island shoreline through beach renourishment, construction of additional breakwaters, and/or repair and extend existing seawall in order to reduce the potential for damage to, or loss of, NASA, United States (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 sea level rise. 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 the level of functionality it was originally intended through periodic beach renourishment and shoreline protection.

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## Conclusion

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*Irene J. Romero*

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