SECTION 404(b)(1) EVALUATION REPORT

SHORELINE RESTORATION AND INFRASTRUCTURE PROTECTION PROGRAM (SRIPP)
NASA WALLOPS FLIGHT FACILITY
WALLOPS ISLAND, VIRGINIA

1.0 INTRODUCTION

The following evaluation is provided in accordance with Section 404(b)(1) of the Clean Water Act and the Section 404(b)(1) Guidelines provided in 40 CFR 230. The impact evaluation is summarized from the Draft Programmatic Environmental Impact Statement (DPEIS) for the SRIPP. References to sections of the DPEIS where more information may be obtained are given throughout this analysis.

2.0 PROJECT DESCRIPTION

2.1 Location

Wallops Flight Facility (WFF) is located in the northeastern portion of Accomack County, VA, on the Delmarva Peninsula, and is comprised of the Main Base, Wallops Mainland, and Wallops Island (Figure 1, DPEIS). Wallops Island is bounded by the Chincoteague Inlet to the north, the Assawoman Inlet to the south (which is presently filled in), the Atlantic Ocean to the east, and the estuaries to the west.

2.2 General Description

Currently, there is no beach along approximately 4.3 km (2.7 mi) of the Wallops Island shoreline. Along this stretch, an existing rock seawall fronts the Atlantic Ocean. A beach is present south of the seawall and along the extreme northern portion of the seawall (Figure 3, DPEIS).

The project would be comprised of an initial construction phase with follow-on renourishment cycles. The initial construction phase would include two distinct elements:

1. Extending Wallops Island’s existing rock seawall a maximum of 1,400 meters (4,600 feet) south of its southernmost point; and
2. Placing sand dredged from Unnamed Shoal A, located offshore in Federal waters, along the Wallops Island shoreline. The initial fill would result in approximately 2,446,000 m^3 (3,199,000 yd^3) of sand being placed along nearly 6.8 km (4.2 miles) shoreline.

Subsequent beach renourishment cycles would vary throughout the life of the project. The renourishment cycle is anticipated to require approximately 616,000 m^3 (806,000 yd^3) of sand every 5 years.

The initial fill plus the estimated fill volume over nine renourishment events would result in approximately 7,992,000 m^3 (10,453,000 yd^3) of sand being placed on the shoreline.

Seawall Extension

The southerly extension of the existing seawall would be implemented first and would consist of the placement of approximately 1,400 meters (4,600 feet) of 4.5- to 6.4-metric-tonne (5- to 7-ton) rocks parallel to the shoreline. The seawall extension would be constructed in the approximate location of the geotextile tubes. It would be placed in the beach (some rock slightly below the beach surface, the majority of rock sitting on top of the beach surface), and would be approximately 5 meters (14 feet) above the normal high tide water level, depending on the extent of existing shoreline retreat.

Beach Fill

In the initial nourishment, NASA would place an estimated 2,446,000 m^3 (3,199,000 yd^3) of fill in a south to north direction that would extend for approximately 6.0 km (3.7 mi) north of WFF's southern property boundary at Assawoman Island. The new beach would provide a surface to dissipate wave energy and contribute additional sediment to the nearshore system.

Sand for initial nourishment would be dredged from Unnamed Shoal A and placed onto the beach, as described in Section 2.6.2 of the EIS. For renourishment fill volumes, it is anticipated that approximately half of the fill volume could be excavated from the north Wallops Island borrow site, and the remaining half could be dredged from either Unnamed Shoal A or B.

The initial beach fill would extend 21 meters (70 feet) from the present shoreline in a 1.8-meter-high (6-foot-high) berm, and then would slope underwater for an additional 52 meters (170 feet) seaward; the total distance of the fill profile from the current shoreline would be 73 meters (240 feet). The fill would occur along 6.8 km (4.2 miles) of beach between the northern end of the rock seawall and the southern end of the existing geotextile tubes. The beach fill profile will also include a 4.3 meter (14 ft) high dune at the seawall.

Subsequent beach renourishment cycles would vary throughout the life of the project. Storm frequency and severity would dictate the magnitude and rate of recurrence of beach renourishment. The exact locations and magnitude of renourishment cycles may fluctuate because of the dynamic nature of the ocean environment; therefore, additional NEPA documentation for future renourishment actions may be required and would be prepared, as appropriate. The renourishment cycle is anticipated to require approximately 616,000 m^3 (806,000 yd^3) of sand every 5 years. The initial fill plus the total fill volume over nine renourishment events would result in approximately 7,992,000 m^3 (10,453,000 yd^3) of sand being placed on the shoreline. The topography and bathymetry of the beach would be monitored on a regular basis to determine sand movement patterns and plan when renourishment is needed.

The absence of sand retention structures would result in a larger amount of sand being available for erosion and longshore transport. Over the 50-year project life, the frequency of beach nourishment would be determined by a monitoring program that will be established that will monitor the beach profile and shoreline and volumetric changes.

2.3 Authority and Purpose

The purpose of the project is to reduce the potential for damage to, or loss of, existing NASA, U.S. Navy, and MARS assets on Wallops Island from wave impacts associated with storm events. The project is needed to ensure the continued ability of NASA, the U.S. Navy, and MARS to serve the nation's rapidly growing civil, defense, academic, and commercial aerospace requirements. The SRIPP would help reduce the risk to infrastructure on Wallops Island from storm-induced damages by restoring the beach profile in front of the present shoreline.

Wallops Island has experienced shoreline changes throughout the six decades that NASA has occupied the site. The existing seawall is being undermined because there is little or no protective sand beach remaining and storm waves break directly on the rocks. Currently, the south end of the island is unprotected except for a low revetment around the MARS launch pad and temporary geotextile tubes that extend from the southern end of the existing seawall south to camera stand Z-100.

The potential risks to infrastructure from wave impacts are two-fold: first is the interruption of NASA, U.S. Navy, and MARS missions supported from Wallops Island facilities due to temporary loss of facility functions; and second is the potential for complete loss of these unique facilities. If no protective measures are taken, the assets on Wallops Island will be increasingly at risk from even moderate storm events. Additionally, WFF and MARS are located within the only research range in the U.S. that is wholly controlled by NASA, and as a result, WFF is the only research range in the world that is solely under NASA control and focused on NASA's schedule, budget, and mission objectives. Under Title II of the Omnibus Appropriations Act of 2009 (Public Law 111-8), the U.S. Congress stated that "WFF is an important national asset that can be better utilized by focusing on emerging technologies that meet national needs and NASA priorities."

Currently, assets on Wallops Island are valued at over $1 billion. The NASA facilities at greatest risk are the UAS Runway and the Launch Control Center (building W-20), both located within 30 meters (100 feet) of the shoreline, and all three sounding rocket launch pads, which are approximately 75 meters (250 feet) from the shoreline. U.S. Navy assets at greatest risk include the AEGIS and Ship Self Defense System Facilities. MARS Launch Pads 0-A and 0-B are located within 75 meters (250 feet) of the shoreline, and are also at a high level of risk.

2.4 Alternatives Considered

Chapter 2 of the DPEIS contains a detailed description and analysis of the alternatives considered. The Proposed Action is to implement a 50-year program to allow NASA and its partners to continue to safely utilize Wallops Island and complete their missions with a reduced threat of storm-related loss of facilities. NASA considered the following range of alternatives to meet the purpose and need:

- Relocating At-Risk Infrastructure
- Seawall Extension Only
- Sand Dunes With Various Cores
- Beach Fill Only
- Beach Fill and Seawall Extension
- Beach Fill, Seawall Extension and Sand Retention Structures
- No Action

NASA screened the alternatives based on five criteria: (1) disruption to WFF Operations, (2) level of storm damage reduction, (3) initial cost, (4) maintenance costs, and impact on adjacent barrier islands.

Based on the results of the screening, NASA evaluated 3 Alternatives in detail in the DPEIS:

- Alternative One (Preferred Alternative) - Beach Fill and Seawall Extension
- Alternative Two - Beach Fill, Seawall Extension, and Groin
- Alternative Three - Beach Fill, Seawall Extension, and Breakwater

Avoidance and Minimization of Impacts

NASA's Preferred Alternative is the least environmentally damaging of the practicable alternatives that meet the project purpose and need. As described in Chapter 2 and Appendix A of the DPEIS, beachfill is a critical component of any solution to reduce potential storm-related damage to NASA's infrastructure. As a result, the impacts as a result of dredging the beachfill material and placing it along the shoreline are unavoidable.

NASA's Preferred Alternative would require more initial fill material than the other two alternatives analyzed in the DPEIS; approximately 217,000 m^3 (283,000 yd^3) more than Alternative 2 (beachfill and groin) and approximately 276,000 m^3 (360,000 yd^3) more than Alternative 3 (beachfill and breakwater). Without the construction of a sand retention structure such as a groin or breakwater, the proposed project avoids potential adverse impacts to sediment transport along Assawoman Island located directly to the south of Wallops. In addition, the 70-ft wide beach berm was determined by the USACE to be the minimal amount necessary to provide adequate protection to the vital infrastructure on Wallops (Appendix A in DPEIS). Thereby, minimizing the amount of material to be dredged and then placed along the shoreline. These measures are described in further detail in Chapters 2, 4, and 5 of the DPEIS.

NASA evaluated several potential sources for the beachfill material. Criteria for selection of a borrow site included:

- Suitable grain size that is coarser than the approximate 0.20 mm grain size of the present beach
- Adequate quantity for initial nourishment and nine renourishment cycles over the 50-year life span of the SRIPP
- Distance from Wallops Island shoreline (implications regarding transportation and SRIPP lifecycle costs)

As described in Section 2.5, sources considered included; the nearshore seafloor east of Wallops Island, dredged material from navigation projects, and offshore borrow sites or shoals located in Federal waters.

Nearshore and dredged material from navigation projects were eliminated because the grain-size of the material was finer than was considered optimal for the beachfill. Three offshore shoals were evaluated; Blackfish Bank, Unnamed Shoal A, and Unnamed Shoal B (Figure 12, DPEIS).

Blackfish Bank was eliminated as a potential site due to potential adverse environmental impacts. These included potential impacts due to lowering the shoal profile and increasing wave energy to Assateague Island and thereby increasing shoreline erosion. In addition, potential adverse impacts are avoided to commercial and recreational fishermen who utilize the shoal. The shoal was eliminated even though it is closer to the project site and the dredged material would be less expensive to transport.

Based on the results of wave modeling, a camera survey of the benthic habitats, and a remote underwater archeological survey of Unnamed Shoals A and B, it was determined that either shoal could be used as a potential source of sand for the project with similar environmental impacts. Shoal A was selected as the source of initial beachfill material due its closer proximity to the placement site. A uniform depth of sediment would be dredged from the shoal, a deep pit or pits would not be created.

2.5 Description of Dredged or Fill Material

2.5.1 General Characteristics of Material. The borrow areas are a source of high quality medium to coarse sand. They are comprised of large, exposed deposits of medium sand that varies in thickness and is estimated to have a median grain size of 0.29 mm.

2.5.2 Quantity of Material. For the initial construction, approximately 2,446,000 m^3 (3,199,000 yd^3) of beach quality sand would be placed on the shoreline. Due to assumed losses (conservatively estimated at 25 percent) during dredging and placement, approximately 3,057,500 m^3 (3,998,750 yd^3) of sand would be dredged from an approximate 5.2 km^2 (2 mi^2) area of Unnamed Shoal A. Each renourishment cycle would require approximately 770,000 m^3 (1,007,500 yd^3) of material be dredged.

2.5.3 Source of Material. The source of the borrow material for the initial beach fill is Unnamed Shoal A located in Federal water approximately 11 km (7 mi) offshore and approximately 18 km (11 mi) from the northern tip of Wallops Island. Renourishment material may be collected from Unnamed Shoal A, B, or northern Wallops Island.

2.6 Description of the Discharge Site

2.6.1 Location. The discharge site is located along the Atlantic-facing shoreline of Wallops Island, Virginia. The specific sand placement area extends along 6.8 km (4.2 miles) of the shoreline between the northern end of the rock seawall and the southern end of the existing geotextile tubes. Refer to Figure 14 in DPEIS.

2.6.2 Size. The initial beach fill would extend 21 meters (70 feet) from the present shoreline in a 1.8-meter-high (6-foot-high) berm, and then would slope underwater for an additional 52 meters (170 feet) seaward. The total distance of the fill profile from the current shoreline would be 73 meters (240 feet). The initial construction would discharge approximately (3,199,000 yd^3) of beachfill into waters of the United States.

2.6.3 Type of Discharge Site. Shoreline fronting the Atlantic Ocean.

2.6.4 Type(s) of Habitat. The type of habitat present at the proposed discharge locations are marine sandy beach intertidal and subtidal nearshore habitats and marine open water.

2.6.5 Timing and Duration of Discharge. Initial fill placement would be expected to occur in 2011 and would require several months to complete. Dependent on the results of the monitoring program, renourishment would be expected to occur approximately every five years.

2.6.6 Description of Disposal Methods. A hopper dredge would be used to excavate the sandy material from the borrow areas. The material would be transported using a barge with a pump-out and pipeline delivery system to the beachfill placement site. Subsequently, final grading would be accomplished using standard construction equipment such as bulldozers.

3.0 FACTUAL DETERMINATIONS

3.1 Physical Substrate Determinations

3.1.1 Substrate Elevation and Slope. Water depth is approximately 21 m (70 ft) between Blackfish Bank and Unnamed Shoal A. Unnamed Shoal A is located in depths of 12 to 7.5 m (40 ft to 25 ft). Between Unnamed Shoals A and B, the depth ranges from 23 to 12 m (75 to 40 ft). Unnamed Shoal B is located in depths between 15 m (50 ft) to 9 m (29 ft).

3.1.2 Sediment Type. The principal sediment types associated with Unnamed Shoal A and B are generally in the category of medium-grained sand. Substrate at the shoal is “clean sand” a mean grain size of approximately 0.29 mm, with little silt or clay content. Mean grain size at the placement site is approximately 0.20 mm.

3.1.3 Dredged/Fill Material Movement. The net longshore sediment transport is to the north along Wallops Island. The average erosion rate for the shoreline is approximately 10 feet per year. In addition, the planned construction would establish an initial construction template, which is higher than the final intended design template or profile. It is expected that compaction and erosion would be the primary processes resulting in the change to the design template. Also, the loss or winnowing of fine-grain material into the water column would occur during the initial settlement. These materials may become redeposited within nearshore subtidal waters.

After beachfill material is placed, the rate of erosion on the southern end of Wallops Island and the northern end of Assawoman Island would be reduced due to addition of sand to the sediment transport system. In addition, after the initial fill is placed, some material will move south while the transport system adjusts to introduction of material. As discussed in Section 4.2.2.1 of the DPEIS, there is annual variability in the sediment transport and shoreline changes in the area as well as a degree of uncertainty in the USACE modeling. The modeling predicts a net longshore transport to the north along Wallops Island.

Over the lifetime of the SRIPP, the seawall extension and beach fill would have long-term direct beneficial impacts on geology and the Wallops Island shoreline by mitigating the current rate of shoreline retreat. Continued beach nourishment would add to this benefit by providing ongoing mitigation of shoreline retreat.

3.1.4 Physical Effects on Benthos. The proposed construction and discharges would result in initial burial of the existing beach and nearshore benthic communities when this material is discharged during berm construction. The proposed beachfill is expected to be composed of material that is similar to existing substrate, which is expected to become recolonized by the same type of benthic assemblage. The benthic community at the placement site is expected to recover within several months after construction. Dredging the offshore shoal would result in the direct removal of the benthic community along with the sediment from the seafloor. The benthic community is expected to recolonize the area relatively rapidly after dredging, however recovery of the community composition, biomass, and abundance to predredging conditions may take several years.

3.1.5 Other Effects. No other effects are anticipated.

3.1.6 Actions Taken to Minimize Impacts. Actions taken to minimize impacts include selection of fill material that is similar in nature to the pre-existing substrate, and the avoidance of the creation of deep pits from dredging the borrow site. Short term impacts would include increased, localized turbidity associated with dredging and disposal operations; however these impacts are expected to be minimal. Standard construction practices to minimize turbidity and erosion would be employed during dredging and placement operations.

3.2 Water Circulation, Fluctuation, and Salinity Determinations

3.2.1 Water. Dredging in the borrow site would result in some short-term negative effects, including localized increases in turbidity and slight decreases in dissolved oxygen (DO). Since the dominant substrate at the borrow site is medium-grain sand, it is expected to settle rapidly, causing less turbidity and less oxygen demand than finer-grained (organic) sediments. Dredging within the shoal would have no significant impact on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients, or eutrophication characteristics of the adjacent areas.

3.2.2 Current patterns and circulation. Potential impacts to the physical environment from offshore dredging include changes to hydrodynamic and sediment transport processes, as well as the formation of short-lived turbidity plumes. Near-bed currents on the shoals demonstrate seasonal and event-scale variability. As waves move shoreward from deeper water and propagate over the bathymetric changes resulting from dredging material from the shoal, the height, direction, and other characteristics of the waves change. These transformations, called wave shoaling, refraction, reflection, and diffraction, can significantly increase or decrease the transport of sand along the nearby shoreline, resulting in localized erosion and accretion. Appendix A and Section 4.2.5 of the DPEIS describe the insignificant potential impacts to physical oceanographic processes at nearby Assateague Island. In addition, although local current velocities immediately downstream of dredged areas may temporarily increase (in the direction of strong along shelf flows), the magnitude of change and the size of the footprint are expected to be relatively small. Alterations of near-bed currents may result in local and short-lived changes in sediment movement in the immediate vicinity of the borrow areas, but are expected to return to pre-dredging conditions following infilling.

3.2.3 Normal water level fluctuations – Tidal levels would not be affected.

3.2.4 Salinity gradients – The project would have no impact on salinity.

3.2.5 Actions that will be taken to minimize impacts – A uniform depth of sediment would be dredged from the shoal, a deep pit or pits would not be created. No other actions that would minimize impacts on water circulation/fluctuation and salinity are deemed necessary.

3.3 Suspended Particulate/Turbidity Determinations

3.3.1 Expected changes in suspended particulates and turbidity levels in the vicinity of the disposal site - There will be increased, localized turbidity associated with the beachfill operations. The use of medium-sized sand should allow for a short suspension time and containment of sediment during and after construction. The beachfill consists of beach quality sand of similar grain size and composition as the existing beach sand on Wallops Island therefore, turbidity impacts will be short-term and spatially-limited to the vicinity of the dredge outfall pipe.

3.3.2 Effects (degree and duration) on Chemical and Physical Properties of the Water Column.

a. Light penetration. Short-term, limited reductions would be expected at the dredge site and at the placement site as material is pumped onto the beach.

b. Dissolved oxygen. There is a potential for a decrease in dissolved oxygen levels but the anticipated low levels of organics in the borrow material should not generate a high, if any, oxygen demand.

c. Toxic metals and organics. Because the borrow material is medium-grained sand and originates from an offshore area where no known sources of significant contamination exist, the material is expected to be free of any significant contamination.

d. Pathogens. The source of the beachfill material is an offshore sand shoal and not located near any pollution source. Therefore, no pathogens are expected to be present in the dredged material.

e. Aesthetics. No long-term aesthetic changes will result from the project.

f. Others as appropriate. None identified.

3.3.3 Effects on Biota

a. Primary production, photosynthesis - Minor, short-term effects related to elevated turbidity levels at the dredging and placement sites.

b. Suspension/filter feeders - Minor, short-term effects related to suspended particulates outside the immediate deposition zone. Sessile organisms and organisms with limited mobility would be subject to burial if within the deposition area, especially those currently residing on the portions of the existing rock seawall that is directly exposed to the ocean.

c. Sight feeders. Minor, short-term effects to fish related to turbidity from dredging at the shoal and from placement of material at the shoreline. In addition, shorebirds tend to be attracted to disposal sites and placement activities due to the presence of food items in the dredged material. The impact of these operations at the open-water on sight feeders is expected to be a beneficial, short-term impact.

3.3.4 Actions taken to minimize impacts. Actions include the selection of clean sand with a small fine grain component and a low organic content. No special measures are anticipated to be required to minimize impacts on biota. Standard construction practices would also be employed to minimize turbidity and erosion.

3.3.5 Contaminant Determinations. The discharge material is not expected to introduce, relocate, or increase contaminant levels at either the borrow or placement sites. This is assumed based on the characteristics of the sediment, the proximity of the borrow site to sources of contamination, the area's hydrodynamic regime, and existing water quality.

3.4 Aquatic Ecosystem and Organism Determinations

3.4.1 Effects on Plankton. The effects on plankton would be minor and localized due to their wide distribution throughout the project area. Plankton would be entrained in the suction dredge. In addition, plankton would be adversely affected by light level reduction due to turbidity at the borrow and placement sites. Because the water column is well mixed and the organic content of the shoal sediment is low, significant dissolved oxygen level reductions are not anticipated.

3.4.2 Effects on Benthos. Initially, a complete removal of the benthic community within the borrow area and burial of benthos within the discharge (beachfill) location. The losses of benthic organisms are somewhat offset by the expected rapid opportunistic recolonization from adjacent areas that would occur following cessation of construction activities. Recolonization is expected to occur rapidly in the discharge (beachfill placement) area through horizontal and in some cases vertical migrations of benthos. Recolonization within the borrow area is expected to occur soon after dredging operation ceases via pelagic larval recruitment and horizontal migrations from undisturbed adjacent areas. Recovery of the benthic community to predredge conditions in terms of community composition, biomass, and abundance may take up to a few years.

3.4.3 Effects on Nekton. Nekton would be negatively affected by entrainment in the suction dredge. The offshore shoals are not known to be areas of high nekton concentrations. Nekton are expected to be return to the borrow site immediately following dredging.

3.4.4 Effects on Aquatic Food Web. The aquatic food web is anticipated to be temporarily impacted to a minor degree by dredging activities. Destruction of benthos will temporarily detrimentally impact the aquatic food web for a period of months to years until benthos recolonize the borrow site. Following recovery of food resources, no long-term impact to the aquatic food web is expected. No significant effects.

3.4.5 Effects on Special Aquatic Sites. No special aquatic sites such as sanctuaries, wetlands, submerged aquatic vegetation, mud flats, coral reefs and riffle and pool complexes are present within the project area. Refuges in the area are addressed in Section 3.5.3 below.

3.4.6 Threatened and Endangered Species. NASA has prepared a Biological Assessment (Appendix I DPEIS) and is consulting with the USFWS and NMFS on potential impacts to threatened and endangered species from the project. In the long term, the expansion of the beach would likely provide additional suitable habitat for shorebirds such as the Red Knot and Piping Plover. The piping plover utilizes sandy beach habitat within the northern portion of WFF outside the proposed sand placement area. Monitoring to determine the extent of Piping Plover nesting activity prior to initial construction and periodic nourishment would be conducted to insure that the nesting locations would be avoided during construction until the chicks fledge the nest. The Red Knot uses existing beaches on Wallops Island as a stopover during migration, but does not nest there. Seabeach amaranth has not been documented on Wallops Island but there is potential suitable habitat.

Several species of threatened and endangered sea turtles may be migrating through the sand borrow areas depending on the time of year. Sea turtles have been known to become entrained and subsequently destroyed by suction hopper dredges.

3.4.7 Other Wildlife. No significant effects.

3.4.8 Actions to minimize impacts. To prevent entrainment of sea turtles in the dredge, each dredge will be equipped with a turtle excluder device operated in manner approved by NMFS for this purpose.

As described in Chapter 5 (Mitigation and Monitoring) of the DPEIS, NASA will conduct surveys and monitoring of the project area during sand placement activities, in addition to providing a NMFS-approved observer on board the dredger(s) during dredging operations.

3.5 Proposed Disposal Site Determinations

3.5.1 Mixing Zone Determination. Coarse grained-sand will rapidly settle to the bottom both at the dredging site(s) and at the placement site. Depth considerations are minimal since the receiving area is a beach; current velocities will remain essentially unchanged.

3.5.2 Determination of compliance with applicable water quality standards. Dredging activities will be conducted in accordance with practices utilized in adjacent state waters. Transport of dredged material will comply with Virginia water quality standards. Virginia state water quality certification will be obtained and all conditions of that certification will be followed.

3.5.3 Potential Effects on Human Use Characteristics –

a. Municipal and private water supply. Not applicable.

b. Recreational and commercial fisheries. Minor short-term negative impact to commercial and recreational fisheries are anticipated during dredging and following loss of benthos. Benthic fauna on shoals are expected to recolonize the dredged area within several months with full recovery to predredge conditions that may take up to several years following dredging. No long-term impacts to fisheries are expected.

c. Water related recreation. No significant effects.

d. Aesthetics. Aesthetics will be modified temporarily by the physical presence of the dredge during borrow activities and there will be a short term negative effect on the beach's appearance while the placement of the material on the beach takes place due to the presence of the pipe and related equipment. No significant long-term effects.

e. Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves. Assawoman Island is located directly to the south of Wallops Island. It is managed as part of the Chincoteague National Wildlife Refuge (CNWR) by the U.S. Fish and Wildlife Service (USFWS). The CNWR is located on the southern end of Assateague Island and to the northeast of Wallops Island. In addition, the undeveloped barrier islands that extend down the coast to the mouth of Chesapeake Bay are part of the Nature Conservancy's Virginia Coastal Reserve.

As described in Chapter 4 and Appendix A of the DPEIS, the project will not adversely impact Assawoman Island or the islands to the south nor Assateague Island. The addition of sand of the longshore transport system will likely result in the accretion of sand along the northern portion of Assawoman Island.

3.6 <u>Determination of Cumulative Effects on the Aquatic Ecosystem</u>. All data and information presented suggests the dredged material placement area would have no significant cumulative adverse effects on the aquatic ecosystem.

3.7 <u>Determination of Secondary Effects on the Aquatic Ecosystem</u>. Secondary impacts such as turbidity on aquatic organisms or temporary loss of food sources through the burial or removal of the benthos are considered to be of short duration.

4.0 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

4.1 <u>Adaptation of the Section 404(b)(1) Guidelines to this Evaluation</u>. No significant adaptation of the Section 404(b)(1) Guidelines were made relative to this evaluation.

4.2 <u>Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site, Which Would Have Less Adverse Impact on the Aquatic Ecosystem</u>. Shoreline restoration and extension of the existing seawall at Wallops Island was chosen as the preferred alternative because of the demonstrated need to provide storm damage reduction for NASA's assets. All practicable alternatives considered and evaluated included a beach fill component as a critical part of a multi-tier storm reduction strategy.

4.3 <u>Compliance with Applicable State Water Quality Standards</u>. The proposed action would not violate any applicable state water quality standards. Water quality certification will be received prior to construction. As required by the Coastal Zone Management Act, Coastal Zone Management Program of Virginia, the proposed project has been evaluated for consistency with the coastal development policies.

4.4 <u>Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act</u>. The proposed action would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4.5 <u>Compliance with Endangered Species Act</u>. The project will not significantly detrimentally impact any endangered species or its critical habitat, and is therefore in compliance with the Endangered Species Act of 1973. To avoid detrimental impacts the needs of endangered species, mitigation measures will be utilized dredging to minimize the risk of entraining and destroying sea turtles. These measures include outfitting dredges with sea-turtle deflectors, conducting dredging operations in a manner to minimize risk of sea turtle entrainment, crew training, and the use of NMFS-approved observers, when applicable. In addition, NASA will conduct monitoring of the beach during sand placement activities as described in Chapter 5 (Mitigation and Monitoring) of the DPEIS.

4.6 <u>Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972</u>. No

Marine Sanctuaries, as designated in the Marine Protection, Research, and Sanctuaries Act of 1972, are located within the study area.

4.7 Evaluation of Extent of Degradation of the Waters of the United States. The proposed dredging will result in adverse impacts to benthic invertebrates at the site, although not to regional populations. The proposed project would not have significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish and shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and wildlife will not be significantly adversely affected. No significant adverse impacts on aquatic ecosystem diversity, productivity and stability, and recreation, aesthetics and economic values will occur as a result of the project.

4.8 Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. Appropriate steps will be taken to minimize potential adverse impacts of placing the fill material in the aquatic system. Proposed dredging guidelines and constraints were developed to minimize long-term adverse aquatic impacts, and best management practices will be utilized during dredging to minimize adverse environmental impacts.

4.9 Conclusion. On the basis of the guidelines, the proposed discharge sites for the dredged material is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.