

**FEDERAL CONSISTENCY DETERMINATION
WALLOPS ISLAND
POST-HURRICANE SANDY BEACH RENOURISHMENT**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
WALLOPS FLIGHT FACILITY
WALLOPS ISLAND, VA 23337**

This document provides the Commonwealth of Virginia with the National Aeronautics and Space Administration's (NASA) Consistency Determination under Coastal Zone Management Act Section 307(c)(1) and Title 15 Code of Federal Regulations (CFR) Part 930, Subpart C, for renourishing the Wallops Island beach at NASA's Goddard Space Flight Center Wallops Flight Facility (WFF). The information in this Consistency Determination is provided pursuant to 15 CFR Section 930.39.

Background

On December 13, 2010, NASA issued a *Record of Decision (ROD)* for its *Final Programmatic Environmental Impact Statement Wallops Flight Facility Shoreline Restoration and Infrastructure Protection Program (Final PEIS)*.¹ In its *ROD*, NASA selected for implementation Alternative 1, Seawall Extension and Beach Fill.

As identified in the *Final PEIS* and *ROD*, the initial phase of the project entailed NASA extending its existing rock seawall approximately 1,415 feet (ft) south and then dredging and placing approximately 3.2 million cubic yards (CY) of sand from an offshore shoal in Federal waters referred to as Unnamed Shoal A.

After issuing its *ROD* and securing necessary permits, NASA and its technical partner, the U.S. Army Corps of Engineers (USACE), Norfolk District, oversaw the construction of the project between April and August 2012. Both during and after completing the initial beach fill cycle, the agencies have sponsored multiple topographic and hydrographic surveys of the project site. The most recent monitoring effort, conducted in November 2012 following Hurricane Sandy, identified the need to renourish the beach.

The survey data indicate the area that sustained the greatest damage is the southern half of the project site; behind which are located some of NASA and the Commonwealth of Virginia's most critical launch assets, including Mid-Atlantic Regional Spaceport Launch Complex 0 and multiple sounding rocket pads (**Figure 1**). Of particular concern is the fact that the seaward half of the dune has been lost in most places and the beach berm has been lowered by at least several feet. Although it can be expected that some of the sand moved offshore will eventually move back into the intertidal zone on the beach, those areas of highest elevation (i.e., dune and berm) would require renourishment to regain their full functionality.

Subsequent to NASA identifying this need, Public Law 113-2, *Disaster Relief Appropriations Act, 2013*, was signed into law on January 29, 2013. Within the bill is a

¹ The *Final PEIS* and its appendices are available online at http://sites.wff.nasa.gov/code250/final_sripp_peis_document.html

provision for NASA to repair those of its facilities that sustained damages during Hurricane Sandy. Accordingly, NASA has prepared this Consistency Determination to assist in the decision-making process.

Description of the Action

Upon receipt of all necessary authorizations, NASA would contract the dredging and placement of up to 800,000 CY of sand from the same borrow area (Unnamed Shoal A, sub-area A-1) that was the source of material for the initial beach fill (**Figure 2**). Given the distance of the borrow area from Wallops Island, it is expected that the contractor would again use one or more trailing suction hopper dredges to obtain the material.

Because of overflow from the hopper dredge at the offshore borrow area during dredging and losses during pump-out and placement, a larger volume of material would need to be dredged to meet the targeted fill volume. Based on information from other shoreline restoration projects, sediment losses during dredging and placement operations may be up to 25 percent. Assuming a conservative 25 percent loss, the dredged volume for the proposed renourishment would be approximately 1,000,000 CY.

Nearshore, it is expected that the contractor would require one or more anchored pumpout stations approximately 2 miles east of Wallops Island in 25-30 ft of water. Up to several miles of submerged steel pipeline would be temporarily placed on the seafloor and would be the conduit by which the sand/water slurry would be pumped from the dredge to the beach. Once discharged onto the beach, mechanized equipment (e.g., bulldozers) would grade the material to the design template.

The linear extent of the proposed beach fill would be approximately 2.3 miles described generally as the shoreline between the Z-100 camera stand on the south up to just beyond the Horizontal Integration Facility located mid-island (**Figure 3**).

Following beach fill, NASA would re-plant the dunes with native vegetation and install sand fencing to trap windblown sand.

It is expected that the dredging and beach fill work would take between 1.5-3 months to complete with actual duration driven by the number of hopper dredges the contractor would allocate to the project. The timing of the work would be dependent upon contractor availability; therefore, for the purposes of this Consistency Determination, it should be assumed that the project could be conducted at any time of year.

Depending upon the amount of funding available for the project, it is also possible that NASA would further extend its rock seawall to the south. However, the additional distance would remain within the maximum 4,600-ft distance described in the *Final PEIS*.

In summary, with the exception of a shortened time between initial fill and the first renourishment cycle, the Proposed Action is substantially equivalent to the renourishment component described in the *Final PEIS*, which estimated that approximately 806,000 CY of material would be needed every 3-7 years.

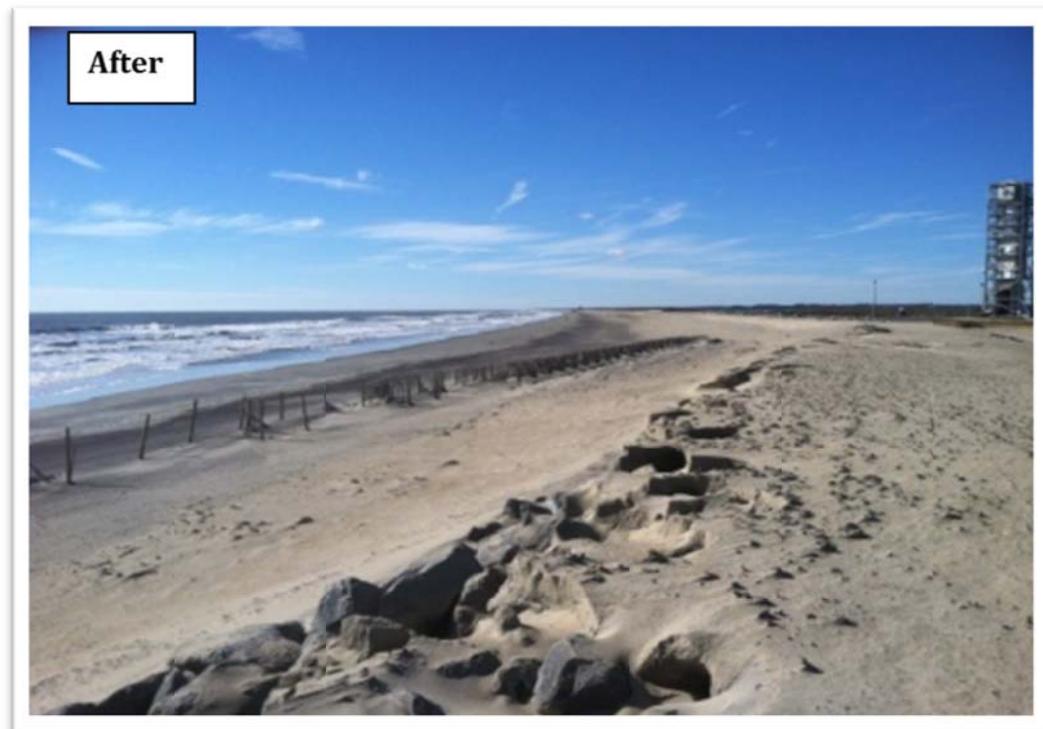


Figure 1: Hurricane Sandy Storm Damage on South Wallops Island, looking south

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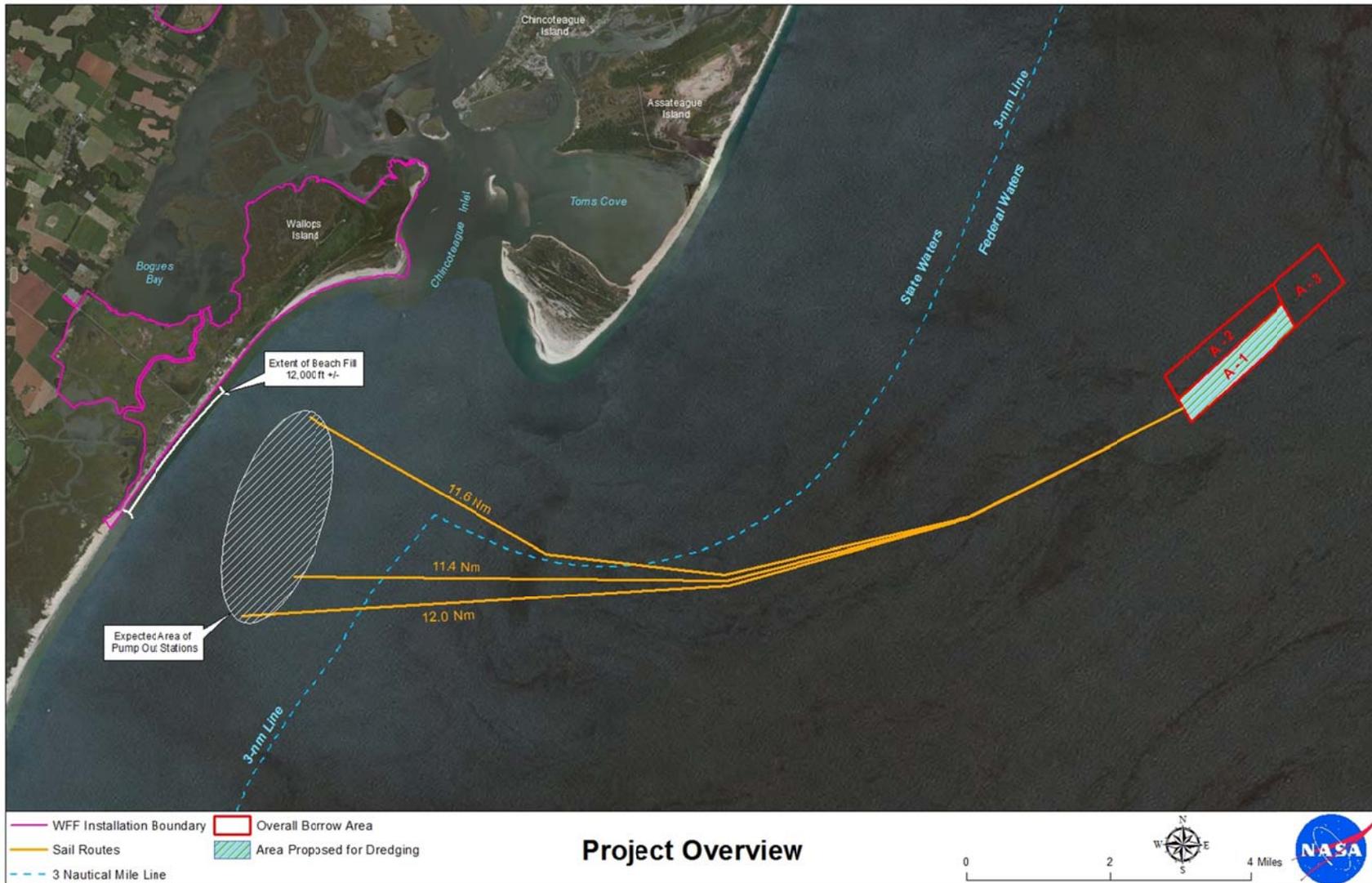


Figure 2: Project Overview

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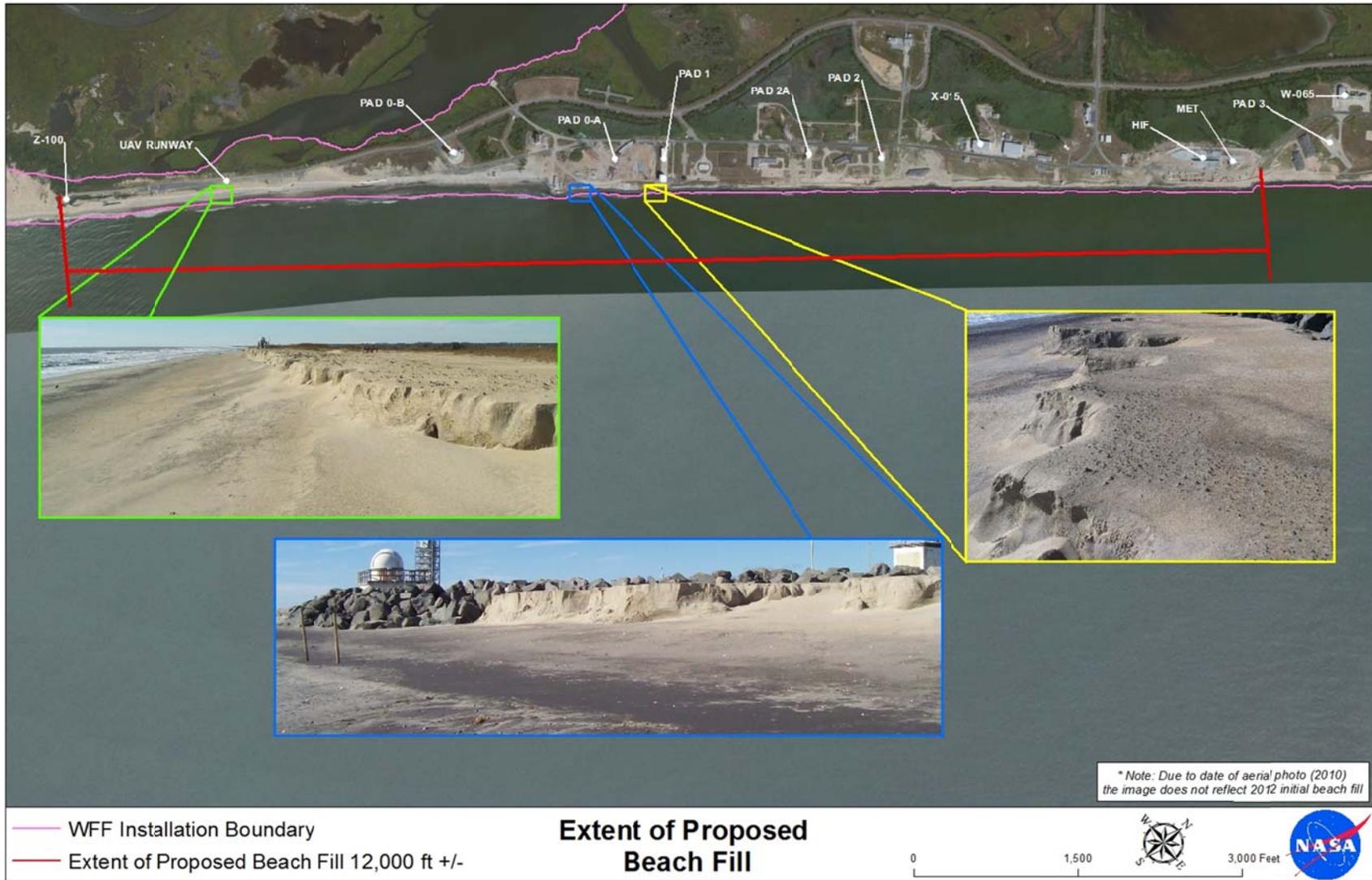


Figure 3: Extent of Proposed Beach Fill

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Changes to Environmental Context Since *Final PEIS*

The 3.7-mile-long initial fill created a dune east of the existing rock seawall at elevation +14 ft with a +6 ft elevation berm transitioning offshore at a 1:20 slope to the depth of closure, estimated to be -13 ft. However, storm conditions encountered during Hurricane Sandy relocated much of the sub-aerial (dry beach) dune and berm east in the cross-shore direction, with the profile of the now subaqueous material more gently sloped than immediately post-fill (**Figure 4**). Therefore, much of the previously supratidal berm is now intertidal.

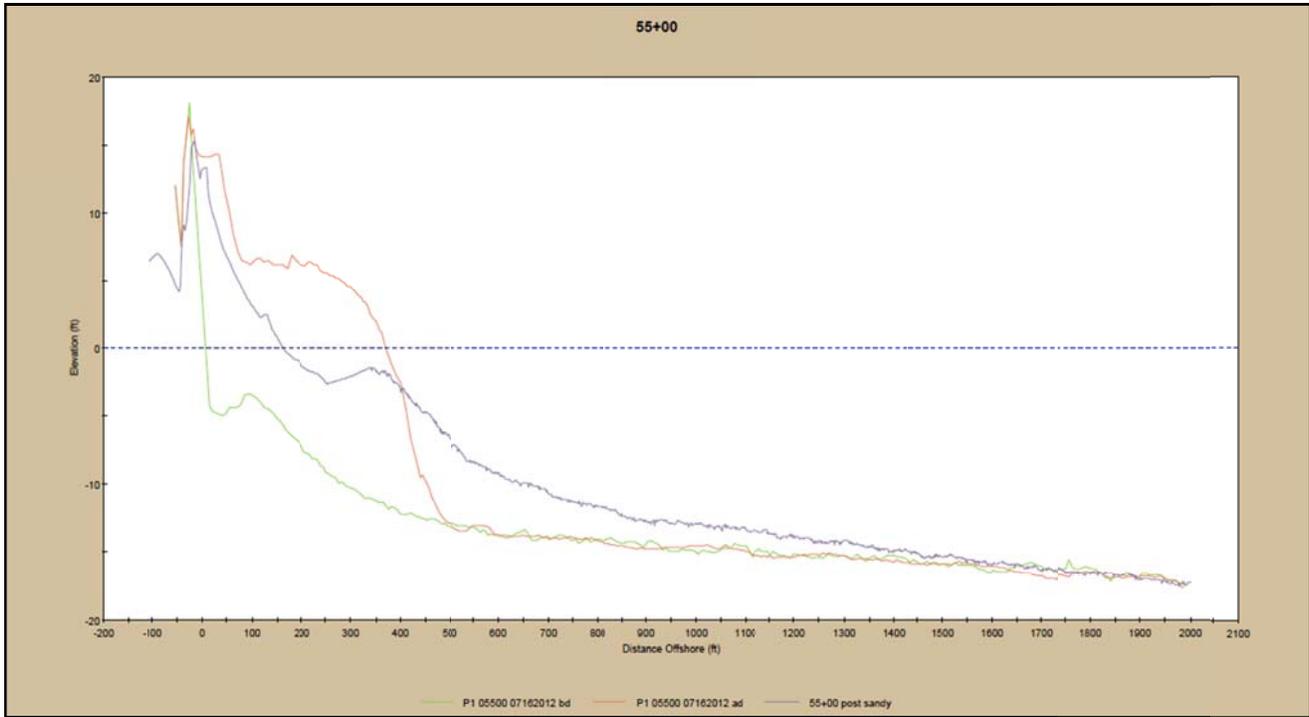


Figure 4: Beach Profile Changes at Wallops Island
Green line is before initial fill; brown line is after initial fill; purple line is post-Sandy
Approximately 28x vertical exaggeration

Removing sand for the initial fill cycle in 2012 resulted in changes to shoal topography, as depicted in **Figures 5 and 6**. In summary, up to half of the shoal's crest was lowered by up to approximately 10 ft. As shown in **Figure 6**, within sub-area A-1, smaller, more steeply sloped areas of micro-topography were created.

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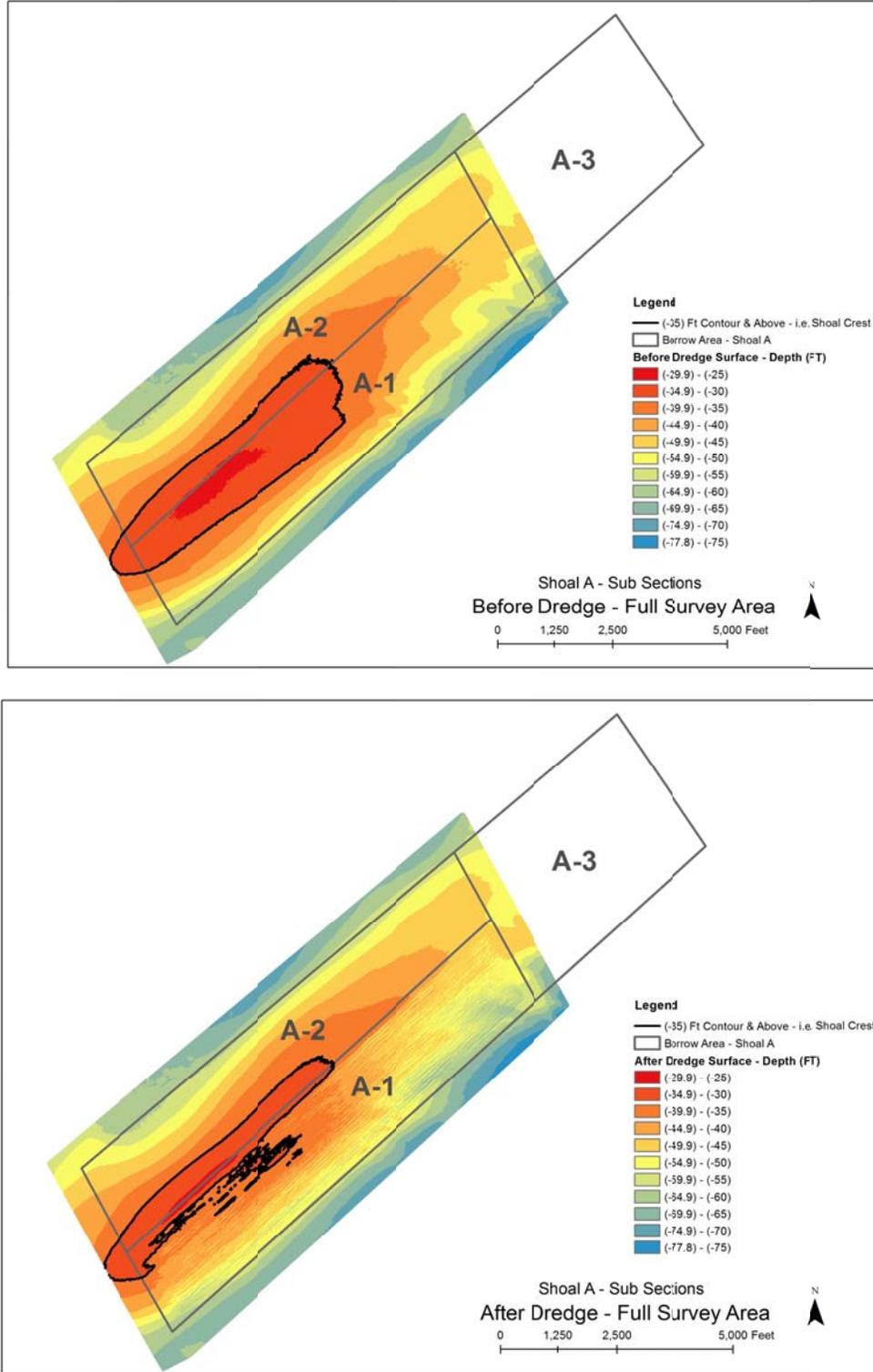
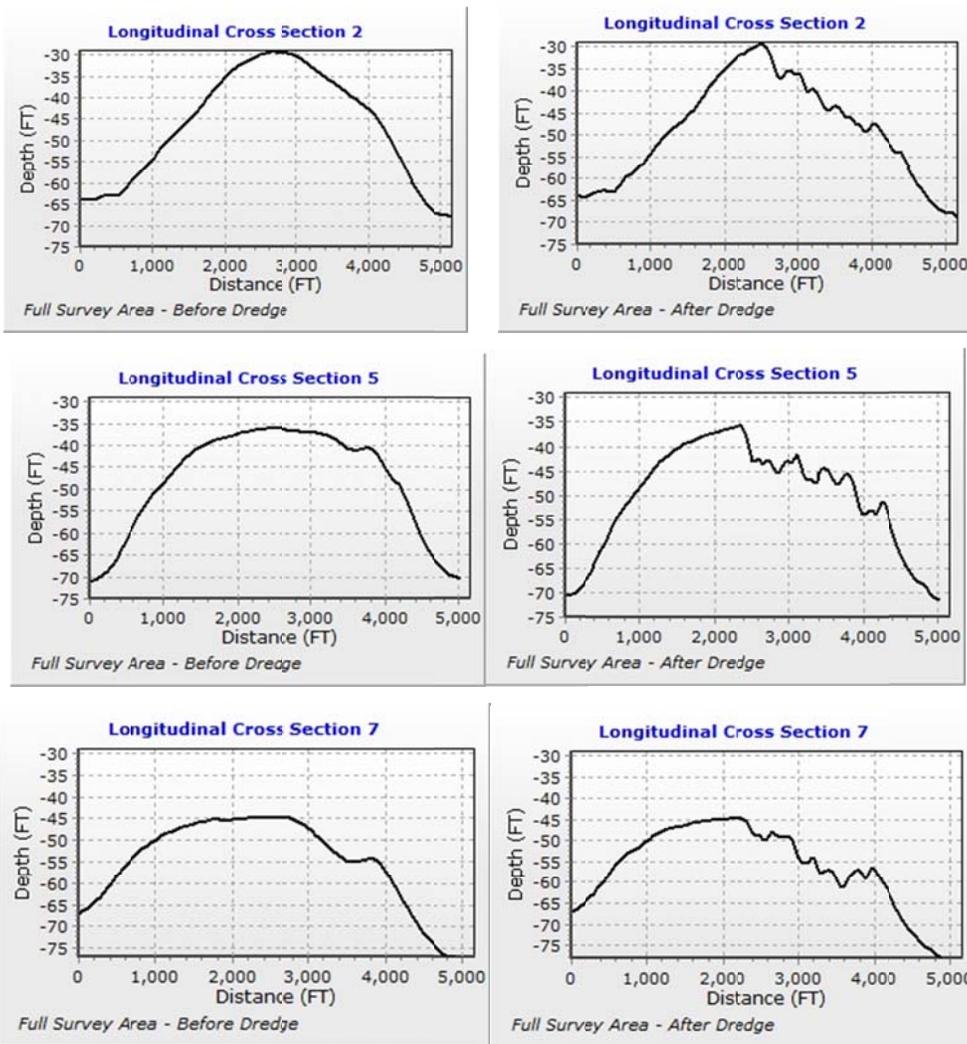
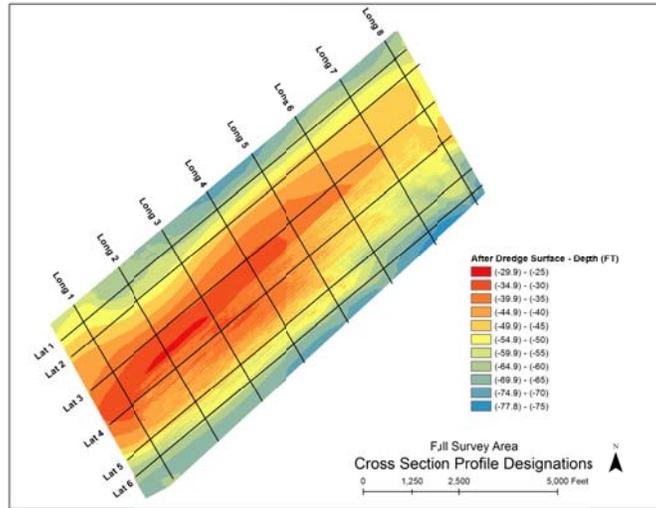


Figure 5: Pre- and Post-Dredge Changes to Borrow Area
Note that dredging was confined to sub-area A-1

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**Figure 6: Selected Cross-sections Depicting Changes to Shoal Pre- and Post-Dredge
 Approximately 61x vertical exaggeration**

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Effects to Resources

NASA has determined that the Proposed Action would affect the land or water uses or natural resources of Virginia in the following manner:

Coastal Geology and Processes

Nearshore

Placement of the proposed additional sediment along the Wallops Island shoreline would benefit the nearshore transport system because more material would be available for transport to either north Wallops Island or south to the adjacent Assawoman Island. It is expected that both areas would expand in size as a result of implementing the Proposed Action. In the cross-shore direction, the presence of the elevated, constructed beach would limit the possibility of overwash events to only major storms, which would restrict Wallops Island from migrating to the west. In the easterly direction, the presence of additional sand within the nearshore system would likely lead to the formation of offshore sand bars and sloughs, which would effectively dissipate wave energy.

Offshore

Consistent with the mitigation measures described in detail in the *Final PEIS*, NASA would ensure to the extent practicable that material removed from the Shoal A borrow area would be done so in a uniform manner across the areal extent of sub-area area A-1. As such, approximately two thirds of the southern half of the shoal's elevation would be lowered by an additional 1.5-3 ft on average, with some areas approaching an additional height reduction of 10 ft. As proposed, the elevation of the northern portion of the shoal (sub-area A-2) would remain the same unless an unexpected condition required its use. The conservative model-based analysis performed for the *Final PEIS* indicated that even when a 2 square-mile area of the shoal was "planed" to an elevation necessary to obtain 10 million CY 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. Therefore, it is not expected that the lowering of the shoal by the proposed depth would cause any measurable reduction in wave-sheltering effects on properties to the west of the borrow area.

Water Quality

Offshore

Dredging operations would cause sediment to be suspended in the water column. Studies of past projects indicate that the extent of the sediment plume is generally limited to between 1,640- 4,000 ft from the dredge and that elevated turbidity levels are generally short-lived, on the order of an hour or less (USACE 1983; Hitchcock et al. 1999; Minerals Management Service [MMS] 1999; Anchor Environmental 2003; Wilber et al. 2006).

The length and shape of the plume depends on the hydrodynamics of the water and the sediment grain size. Given that the dominant substrate at the borrow area is sand, it is expected to settle rapidly and cause less turbidity and oxygen demand than finer-grained sediments. 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 hydrodynamics of the water column are subject to mixing and exchange with oxygen rich surface waters. Any resultant water column turbidity 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 minor impacts on marine waters at the offshore borrow area.

Nearshore

Multiple studies have been conducted on past beach nourishment projects to determine the extent and duration of elevated suspended solids levels downcurrent of a dredge’s discharge pipe. In general, elevated concentrations were limited to an area 1,310-1,640 ft of the discharge pipe in the swash zone (Schubel et al. 1978; Burlas et al. 2001; Wilber et al. 2006).

Given that the beach fill material proposed for the Wallops Island shoreline has a low amount of fine-grained sediment, it is expected that the turbidity plume generated at the placement site would be comparable to those reported in similar projects: concentrated within the swash zone; dissipating between 1,000-2,000 ft alongshore; and short-term, only lasting several hours.

Construction equipment would use petroleum-based fuels and lubricants. Inadvertent spills or leaks of these substances would have the potential to adversely affect water quality. NASA would require its contractors to implement Best Management Practices (BMPs) for vehicle and equipment fueling and maintenance, as well as spill prevention and control measures.

Air Quality

In the *Final PEIS*, NASA estimated the potential criteria pollutant and greenhouse gas emissions from a beach renourishment event that used Shoal A as the source of sand. As summarized in **Table 1**, while fossil fuel-powered construction equipment would generate emissions, it is not anticipated to cause measurable long-term adverse impacts on air quality or climate change.

Table 1: Renourishment Cycle Criteria Pollutant and Greenhouse Gas Emissions

Source of Sand:	Tons per year					Metric tonnes per year			
	CO	NO _x	VOC	PM	SO _x	CO ₂	N ₂ O	CH ₄	CO ₂ e
Unnamed Shoal A									
TOTAL	23.4	170.6	6.4	5.6	4.2	7,731	0.2	0.1	7,449

Noise

In-Air Sounds

The operation of heavy equipment on the Wallops Island beach would be the most pronounced source of project-related sounds, including engine/radiator fans, back-up alarms, and connecting and moving onshore piping. Given the expected around-the-

clock work schedule, these sounds would be nearly constant for the 2-3 month duration of the project.

In general, construction noise levels at a particular receptor can be difficult to predict. Heavy construction vehicles, the major source of noise during construction projects, are constantly moving in unpredictable patterns. Therefore, no one receptor is exposed to construction noise for an extended period of time. However, in the case of beach nourishment, it would be expected that most of the noise-producing equipment would be located in approximately the same area on the beach (e.g., near the current location of the discharge pipe) and would move together in the same general direction.

Therefore, conservative estimates of “point source” sound levels can be determined using construction equipment sound level data collected by the Federal Highway Administration (FHWA) (2006). Typically, sound drops off at a rate of 6 decibels (dB) for each doubling of the distance from a point source (FHWA 2007). Employing this methodology, noise levels would fall within the upper range of background levels (50 dBA) at approximately 0.9 mi from the work site.

However, it should be noted that wind and surf conditions would play a major role in dictating the distances at which the construction-related sounds could be heard by nearby receivers. Studies have shown that the effects of wind on sound propagation can be substantial, with upwind attenuation approaching 25-30 dB more than downwind at the same distance from the source (Wiener and Keast 1959). Therefore, received construction-related noise levels would vary; however, they would not be expected to be substantial.

In-Water Sounds

It is expected that in-water sound levels generated by the Proposed Action would be similar to those reported by Reine et al. (*in prep.*), which summarizes recorded sound levels from hopper dredges operating in the nearshore waters off Wallops Island. Though the referenced study presents sound levels from three individual dredges, the sound levels presented for this analysis were logarithmically averaged into a single sound pressure level (SPL) for each activity in the dredging cycle.

Based upon data collected by Reine et al. (*in prep.*), sediment removal and the transition from transit to pump-out would be expected to produce the highest sound levels at an estimated source level (SL) of 172 dB at 3 ft. The two quietest dredging activities would be expected to be seawater pump-out (flushing pipes) and transiting (unloaded) to the borrow area, with expected SLs of approximately 159 and 163 dB at 3 ft, respectively.

These expected sound levels generally correlate with those presented in the *Final PEIS*, which were based upon levels recorded by Clarke et al. (2003). However, the new information does suggest that SLs and the region of elevated sound around the dredges could be higher than originally anticipated though not substantially different (discussed in more detail under *Marine Mammals*).

Based upon attenuation rates observed by Reine et al. (*in prep.*), it would be expected that, at distances approximately 1.6-1.9 mi from the source, underwater sounds generated by the dredges would attenuate to background levels. However, similar to in-air sounds, wind (and corresponding sea state) would play a major role in dictating the distance to

which project-related underwater sounds would be above ambient levels and potentially audible to nearby receptors.

Munitions and Explosives of Concern

During the initial fill cycle, Munitions and Explosives of Concern (MEC) were not encountered either at the offshore borrow area or along the Wallops Island beach. Accordingly, it is unlikely that MEC would be found while conducting the proposed renourishment. However, as a best management practice, NASA would ensure that its contractors performing the work are made aware of both the potential for encountering MEC and the reporting protocol should any be discovered.

Benthos

Offshore

Within the borrow area, bottom dwelling organisms would be entrained in the dredge. Based upon reports by biological monitors onboard the dredges during the initial beach fill cycle, the most commonly encountered macrobenthos included horseshoe crab (*Limulus polyphemus*), whelk (*Busycon canaliculatum*), and blue crabs (*Callinectes sapidus*).

Because of the dynamic nature of benthic communities on the nearshore continental shelf and their variability over time, the recolonization and recovery of the dredged area can proceed at various rates. A summary of post-dredge faunal recovery rates from 19 different projects in Europe and the U.S. compiled by Newell and Seiderer (2003) show a range from several weeks to more than ten years. The most rapid recovery rates were observed for muds and sands (i.e., several months up to two years), whereas the longest recovery periods (i.e., more than two years) were associated with gravel and reef habitats. Given that Unnamed Shoal A consists of fine sand, it can be estimated that the required benthic recovery time would be on the order of one year following cessation of dredging.

Nearshore and Onshore

Due to handling and pumping activities, the dredged sand would likely be devoid of live benthos. As a result, the recovery of benthos at the placement area would rely on immigration of adult organisms from adjacent undisturbed areas, as well as larval colonization from the water column. However, raising the elevation of the existing beach from intertidal to supratidal would effectively limit the landward extent of water driven organismal transport. As such, the re-establishment of an elevated beach berm would reduce the extent of the more biologically diverse intertidal zone.

Recovery time of benthos within the surf zone is expected to be more rapid than the offshore borrow area, given the dynamic conditions within the nearshore and surf zones. Burlas et al. (2001) estimated that the recovery time for benthos in a New Jersey study ranged from approximately 2 to 6 months when there is a good match between the fill material and the natural beach sediment. In the case of the Proposed Action, the fill material would not be substantially different (though slightly coarser) than native material. Therefore, it is expected that recovery time would be similar to that reported in the referenced study.

Wildlife

Onshore

Avifauna: In accordance with its Protected Species Monitoring Program, NASA conducted regular monitoring of the Wallops Island beach between March and September 2012 to determine the level of avian nesting activity. During the monitoring period, one American Oystercatcher (*Haematopus palliatus*) nest was identified outside the project area on north Wallops Island, however it was predated shortly after its discovery. In 2011, seven Oystercatcher nests were found on Wallops Island. Of the seven nests, six were on the north end and one on the south end, west of the beach. At least five of the 2011 nests were unsuccessful due to either predation or storm overwash, with the remaining two enduring through the hatch window with unknown end results. No colonial waterbird nesting activity has been observed on the Wallops Island beach since NASA began its regular beach nesting bird surveys in spring 2010 (NASA 2012).

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 for foraging birds could temporarily interrupt feeding activities or cause individuals to relocate to other areas of the beach. If nesting birds were to flush from nests as a response to disturbances, 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. Adverse effects would also occur from a reduction in available food sources during and following the placement of sand on the Wallops Island shoreline. Due to the nesting cycle of potentially affected species, the possibility of adverse effects would be greatest should the work occur between the months of April and September.

However, onshore construction would occur well 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 will be used by waterbirds, as the beach has not yet been in place for a full nesting season. The actual usage patterns will play a large role in dictating potential impacts. For example, if nesting occurs well outside the areas of greatest human activity, as it has in the past, species would be exposed to far fewer construction-related stressors that could adversely affect their nesting success. On the other hand, the presence of the new beach could draw birds into areas where construction activities would occur, thereby increasing the probability for adverse interactions. Effects on prey availability are expected to be a contributing factor and, given that the available beach forage within the project area is likely in a suppressed state due to the initial fill cycle, it is possible that avian species would congregate closer to more forage-rich areas outside of the affected area. As discussed in more detail under *Benthos*, following the proposed renourishment, available forage would again be suppressed. However, the infauna and epifauna would be expected to recolonize the affected area within approximately 1 year.

Due to the uncertainty in potential avian use (and potential adverse effects) during the proposed renourishment, if work were to be conducted between the months of April and September, NASA would ensure that the work site and adjacent areas are surveyed for nesting on a daily basis during construction. The biological monitor would coordinate

directly with onsite project employees to ensure that all parties are made aware of potential nesting status and any need to suspend or relocate work activities until nesting activities have ceased.

Long-term, the renourished beach could create suitable waterbird nesting habitat. At a time when storm intensity and frequency are expected to increase, having an elevated, sparsely vegetated beach and dune along the entire length of Wallops Island is expected to be of notable benefit to all beach nesting species.

Herpetofauna: Though Wallops Island is home to a number of amphibians and reptiles, the species most likely affected by activities on or adjacent to the beach is the diamondback terrapin (*Malaclemys terrapin*), which, in the past, has regularly nested on the north beach and locations west of the beach. However now that portions of the rock seawall have sand overtopping them, the species has easier access to the beach for its late spring to early summer nesting. The primary concern regarding diamondback terrapin would be the potential to crush or bury an individual or its nest should beach fill occur within the early summer months. To mitigate this potential effect, NASA's biological monitor (discussed under *Avifauna*) would report any known areas of concentrated nesting to construction personnel such that they could be avoided until the turtles have moved from the immediate area.

Offshore

Dredging the offshore shoal by an estimated additional 1.5-3 ft on average (10 ft maximum) would not measurably change shoal topography or impact the availability of seabird food sources as considered in the *Final PEIS*. The additional cut depth would only slightly increase the water depth such that diving species could still effectively forage on the shoal following dredging. However, forage sources would be suppressed for several seasons following the work. All additional sand would be removed within areas already disturbed; therefore it would not expand the footprint of the area having reduced available forage following the dredge event. Both adjacent undisturbed areas on Shoal A and neighboring shoals (discussed under *Coastal Geology and Processes*) would provide adequate forage should seabirds avoid the directly affected area.

Fisheries and Essential Fish Habitat

Offshore

Fisheries: Entrainment in the dredge would be the most pronounced direct impact on finfish. On-dredge protected species observers from the spring/summer 2012 initial fill reported that the most common species entrained in the dredge were northern stargazer (*Astroscopus guttatus*), summer flounder (*Paralichthys dentatus*), clearnose skate (*Raja eglanteria*), and hake. Additionally, dredging would temporarily reduce and/or modify the benthic organisms and assemblages upon which finfish at higher trophic levels feed. Conversely, dredging could also attract fish due to the suspension of benthic prey species in the water column along with the suspended sediment.

Essential Fish Habitat: Dredging at the proposed borrow area would be conducted in a manner generally consistent with the recommendations made in two recent MMS publications examining the dredging of offshore shoals in the mid-Atlantic (CSA

International, Inc. et al. 2009 and Dibajnia and Nairn 2011). These recommendations include targeting depocenters for extraction, avoiding active erosional areas, shallow dredging over large areas rather than deep pits, dredging shoals in less than 98 ft of water, and avoiding longitudinal dredging over the entire length of shoal.

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. Of these effects, the duration would be temporary in nature, with increased turbidity persisting on the order of hours and benthic recovery on the order of several seasons. Recovery of shoal topography would be a longer process. While all affected areas on the shoal would not be expected to regain their pre-dredge elevation, it is expected that over time, the site would regain its same general morphology, albeit at lower elevation.

Nearshore

Fisheries: The most pronounced effect on finfish within the nearshore zone would be the burial of existing intertidal and subtidal habitat within which they would forage. Increased turbidity downcurrent of the discharge pipe could also disrupt foraging behavior. However, as discussed under *Water Quality*, the extent and duration of such effects would be very limited.

Essential Fish Habitat: The placement of fill would bury of existing benthic habitat, thereby 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 would immediately reduce the availability of in-water habitat. However, from a regional perspective, the size of the reduction would not be substantial, and the area would return to an intertidal elevation as the beach erodes over time.

To stabilize the dune area and reduce borrow requirements (and potential effects on offshore habitat), NASA would plant the dunes with native vegetation and install sand fencing to trap windblown sand.

Marine Mammals

Potential adverse impacts to marine mammals would be associated with physical disturbance to habitats during dredging and fill, 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 the implementation of mitigation measures described below, adverse effects are expected to be minimal.

As discussed under *Noise*, NASA participated in a study (Reine et al. *in prep.*) to better characterize dredge noise within its project site. When compared to the assessment of effects presented in the *Final PEIS*, the revised estimates of distances to the Marine Mammal Protection Act harassment thresholds are comparable to the original analysis with the exception of the 120 dB root-mean-square (rms) level for continuous noise. However, despite an approximately twofold increase in distance to the 120-dB rms threshold, it is expected that adverse effects could still be avoided with a modification to

the observer protocol developed in consultation with the National Marine Fisheries Service (NMFS) for the initial fill cycle.

More specifically, NASA would ensure that a NMFS-approved bridge watch is stationed on each dredge at all times of year to scan the horizon for up to 1.2 mi for marine mammals. At this distance, marine mammals could be readily detected with the aid of binoculars. Should an individual be detected, the vessel would be required to turn off its pumps until the animal has left the immediate vicinity, upon which the dredging activity could resume. For the initial fill cycle, the distance to which observers were required to scan for species was approximately 0.6 mi.

Threatened and Endangered Species

Avifauna: NASA conducted regular piping plover (*Charadrius melodus*) surveys from March 2012 to September 2012, during which six nests were found on the recreational beach and north end of Wallops Island. All were outside of the area within which the beach was nourished. One nest had a 75 percent fledge rate, with three of four chicks fledging, and the remaining five nests were unsuccessful either due to inundation during storms or predation (NASA 2012). In 2011, prior to the initial beach fill, NASA undertook a similar monitoring protocol, during which three nests were found on Wallops Island. Two nests were on the north end and one on the south. One nest had a 0 percent fledge rate, the second had a 25 percent fledge rate, and the third had a 50 percent fledge rate (NASA 2011).

During the month of May 2012, NASA observed flocks of red knots (*Calidris canutus rufa*) ranging in size from just under 10 individuals to more than 650. All observed birds were on the recreational beach and north end of Wallops Island, as has been the case in previous years (NASA 2012).

Impacts on piping plovers and red knots would be generally the same as those discussed for non-listed avian species under *Wildlife*. 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 courtship and nesting activities. However, both plover and red knot activity on Wallops Island has historically occurred on the north end of the island, well outside of where work would occur under the Proposed Action. The potential exists for plover nesting activity to occur within the proposed project site and, accordingly, NASA would employ a biological monitor to survey the project site on a daily basis should work occur between the months of April and September.

Herpetofauna: In 2012, NASA identified two loggerhead sea turtle (*Caretta caretta*) nests, the first of which was located in June within the Recreational Beach area and was ultimately predated. In early July, two false crawls on different days led to a nest on the crest of the newly constructed dune just east of Navy Building V-10. After the closure of the hatch window, the nest was excavated under observation from the U.S. Fish and Wildlife Service (USFWS) and five live hatchlings were discovered and subsequently released to the ocean. One hundred hatched eggs shells were counted resulting in a 78% success rate, which is high (NASA 2012). No marine sea turtle activity was identified on Wallops Island during the 2011 season (NASA 2011)

Impacts to nesting sea turtles could include avoided nesting attempts due to 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 of hatchlings during their emergence and subsequent trip to the ocean.

In the long-term, it is possible that the replenished beach could prove unsuitable to nesting turtles due to a number of physical factors, including sand grain size, color, level of compaction, and scarping, which could impede access to the dry portion of the beach. However, given that the beach fill material is not substantially different from nearby native beaches, it is not expected that these effects would be deleterious to regional recruitment. Additionally, 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 the species.

Effects on in-water sea turtles could include entrainment in the dredge, interaction with the sediment plume, reduction in available forage, and disturbance due to vessel-created sounds. However, given the limited number of sea turtles expected to use the borrow area as habitat and the limited portion of available habitat affected, the potential for interaction is limited. This conclusion is supported by the recently completed initial beach fill cycle, conducted during the months of April and August. Protected species observers stationed on-board each of the three dredges evaluated every load and did not document a sea turtle interaction (i.e., sighting or entrainment).

Atlantic Sturgeon: Effects on sturgeon 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, and disturbance due to vessel-created sounds. However, given the limited number of sturgeon expected to use the borrow area as habitat and the limited portion of available habitat that would be affected, the potential for interaction is limited. Similar to in-water sea turtles, this conclusion is supported by the recently completed initial beach fill cycle. Endangered species observers stationed on-board each of the three dredges evaluated every load and did not observe a sturgeon entrained in the dredge.

Cetaceans: Similar to the discussion of impacts on non-listed marine mammals, potential effects could include ship strike, loss of habitat and prey species, interaction with the sediment plume, and exposure to elevated sound levels, which could interrupt normal behaviors, including foraging, migrating, and communicating. The likelihood of interaction with a listed whale would likely occur between November and April. However, the project is not in a concentration area; rather, the site is expected to be only a migratory corridor. Therefore, cetacean numbers in the area would be low. To mitigate potential effects on listed marine mammals, NASA would ensure that the dredge contractor followed the updated mitigation measures summarized under *Marine Mammals* and described in detail in the overall project's NMFS-issued Biological Opinion (BO).

Endangered Species Act Consultations: While preparing the *Final PEIS*, NASA consulted with both the USFWS and NMFS regarding the potential effects on listed species. Both agencies issued BOs for the beach nourishment program. In developing the BOs, NMFS (2012) and USFWS (2010) provided mandatory terms and conditions that NASA must follow to reduce potential effects on listed species. As such, NASA would ensure that its contractors implemented these measures on its behalf.

Cultural Resources

All dredging and sand placement would be conducted within areas previously surveyed for cultural resources. Given the lack of potential resources identified during the surveys, no archeological resources or aboveground historic properties would be impacted. However, if unanticipated archaeological artifacts or remains are identified during the project, the contractor would be required to halt work and immediately contact the WFF Historic Preservation Officer, who would consult with the Virginia Department of Historic Resources (VDHR) to 1) determine the significance of the resource; 2) evaluate the effects of the undertaking on the resource; and 3) identify the appropriate avoidance or mitigation measures.

NASA is currently consulting with VDHR to ensure the protocol employed for the initial beach fill would be appropriate for the proposed renourishment.

Consistency Determination

The Virginia Coastal Zone Management Program contains the following applicable enforceable policies:

- **Fisheries Management.** Administered by Virginia Marine Resources Commission (VMRC) and the Virginia Department of Game and Inland Fisheries (DGIF), this program stresses the conservation and enhancement of shellfish and finfish resources and the promotion of commercial and recreational fisheries.

The State Tributyltin (TBT) Regulatory Program is also part of the Fisheries Management program. The TBT program monitors boating activities and boat painting activities to ensure compliance with TBT regulations promulgated pursuant to the amendment. The VMRC, DGIF, and Virginia Department of Agriculture and Consumer Services share enforcement responsibilities.

- **Subaqueous Lands Management.** Administered by VMRC, this program establishes conditions for granting permits to use State-owned bottomlands.
- **Wetlands Management.** Administered by VMRC and the Virginia Department of Environmental Quality, the wetlands management program preserves and protects tidal wetlands.
- **Dunes Management.** Administered by VMRC, the purpose of this program is to prevent the destruction and/or alteration of primary dunes.
- **Non-point Source Pollution Control.** Administered by the Virginia Department of Conservation and Recreation, the Virginia Erosion and

Sediment Control Law is intended to minimize non-point source pollution entering Virginia’s waterways.

- **Point Source Pollution Control.** Administered by the State Water Control Board, the National Pollutant Discharge Elimination System permit program regulates point source discharges to Virginia’s waterways.
- **Shoreline Sanitation.** Administered by the Department of Health, this program regulates the installation of septic tanks to protect public health and the environment.
- **Air Pollution Control.** Administered by the State Air Pollution Control Board, this program implements the Federal Clean Air Act through a legally enforceable State Implementation Plan.
- **Coastal Lands Management.** Administered by the DCR Division of Stormwater Management-Local Implementation and localities in Tidewater, Virginia, the Chesapeake Bay Preservation Act guides land development in coastal areas to protect the Chesapeake Bay and its tributaries.

Based upon the following information, data, and analysis, NASA finds that the proposed beach renourishment and seawall extension are consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program. The table below summarizes NASA’s analysis supporting this determination:

Virginia Policy	Consistent?	Analysis
Fisheries Management	Yes	There would be short-term site-specific adverse effects on fish habitat within the fill placement area 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. Project vessels would comply with TBT regulations.
Subaqueous Lands Management	Yes	The proposed renourishment would affect existing subaqueous areas in the nearshore ocean environment. Elevated turbidity in marine waters would occur during and immediately after beach fill. NASA obtained a permit (10-2003) from VMRC for its initial beach fill. Recent correspondence with VMRC indicates that the proposed renourishment would be within the scope of the existing permit.
Wetlands Management	Yes	Project activities would not impact vegetated wetlands.
Dunes Management	Yes	The project would re-build the previously constructed dune. As discussed above under <i>Subaqueous Lands Management</i> , VMRC indicated

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 Wallops Island Post-Hurricane Sandy Beach Renourishment

Virginia Policy	Consistent?	Analysis
		that the proposed work would be within the scope of NASA's existing beach nourishment permit.
Non-point Source Pollution Control	Yes	Construction activities could temporarily increase non-point source runoff to the Atlantic Ocean during the duration of the project. NASA would implement appropriate BMPs to minimize the impact.
Point Source Pollution Control	Yes	The project would not involve a new point source discharge to Virginia waters.
Shoreline Sanitation	Yes	The project would not involve the construction of septic tanks.
Air Pollution Control	Yes	Use of fossil fuel-burning equipment for the seawall extension and movement of sand would generate emissions of both criteria pollutants and greenhouse gases. However, the project would not violate Federal or Virginia air quality standards.
Coastal Lands Management	Yes	The proposed project would not include land development activities that would impact the Chesapeake Bay or its tributaries. Moreover, although Accomack County has adopted the Chesapeake Bay Preservation Act restrictions for its seaside riparian areas, NASA's Wallops Island is specifically excluded from this overlay area.

Pursuant to 15 CFR section 930.41, the Virginia Coastal Zone Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR Section 930.41(b). Virginia's concurrence will be presumed if its response is not received by NASA on the 60th day from receipt of this determination. The State's response should be sent to:

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