DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

4 May 2016

Environmental Analysis Branch

Mr. Jeffery Zappieri
Department of State
Office of Planning and Development
99 Washington Ave., Suite 1010
Albany, New York 12231

Dear Mr. Zappieri:

With the passage of the Hurricane Sandy Disaster Relief Appropriations Act of 2013 (Public Law 113-2), the U.S. Army Corps of Engineers has been given the authority and funding to complete ongoing coastal storm damage risk reduction projects and studies in the Northeast. The Asharoken project is located in Village of Asharoken, Town of Huntington, Suffolk County, New York, and proposes measures along the 2.4 miles of Long Island Sound shoreline which forms Asharoken Beach. The proposed plan for includes the dredging and initial placement of approximately 600,000 cy of clean (sand) fill from a nearby borrow area in Long Island Sound, as well as providing periodic renourishment calculated at 60,000 cubic yards every 3 years trucked in to maintain an adequate project level of erosion and damage reduction at Asharoken Beach. The project will provide long-term storm damage protection for Asharoken Avenue and associated infrastructure and property. The closure of Asharoken Avenue during storms becomes a serious impediment to the residents of Asharoken and nearby Eaton's Neck. The loss of access creates a multitude safety hazards including the loss of fire, police, ambulance and other emergency services.

The New York District has determined that the project complies with both State and Long Island Sound CZM policies and project implementation will be conducted in a manner consistent with these polices. A Determination of Federal Consistency with both sets of coastal management policies is enclosed.

The U. S. Army Corps of Engineers (USACE) New York District, requests that your office review the proposed Asharoken Federal Coastal Storm Risk Management Project, for consistency with State Coastal Zone Management Policies (NY CZM) as well as the Long Island Sound Coastal Management Program (LIS CMP).

A draft copy of the initial draft Integrated Feasibility Report and Environmental Assessment (FR) has been available for your review at the following website:

http://www.nan.usace.army.mil/Missions/CivilWorks/ProjectsinNewYork/NorthShoreofLongIslandAsharoken.aspx

However, since the posting of the initial draft FR (above), the Tentatively Selected Plan (TSP) has been changed to Alternative 1, which consists of beach fill only, 600,000 cy dredged from the nearby LIS borrow area and 60,000 cy trucked in every 3 years. Alternative 1 has replaced Alternative 4 the original TSP, which consisted of an identical initial fill procedure plus 3 tapered rock groins and trucked in renourishment sand at 80,000 cy every 5 years. The change in these two measures (elimination of groins and change in renourishment cycle) is the essential difference between the two alternatives.

The District is confident that prior to the release of the revised FR, knowledge of the TSP change and the baseline data contained in the initial FR will be sufficient information for the state to complete its review of the District's updated Asharoken CZM determination.

Please find enclosed a copy of the District's CZM Determination addressing the aforementioned project's compliance with applicable State and LIS CZM policies.

The N.Y. District greatly appreciates your assistance with this essential regulatory process and looks forward to our continued collaboration. If you have any questions, or need additional project information, please contact the project biologist, Mr. Howard Ruben (howard.ruben@usace.army.mil) 917 790 8723.

Sincerely

Peter Weppler, Chief
Environmental Analysis Branch

Copies Furnished:
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NEW YORK STATE COASTAL MANAGEMENT PROGRAM

CONSISTENCY DETERMINATION

Project: Village of Asharoken, New York, Coastal Storm Damage Reduction Project.

The proposed plan for Asharoken Beach includes the dredging and placement of approximately 600,000 cy of fill material to rebuild the beach with a 50' wide berm and dune. The dune will be planted. The dune alignment fronting the Section 103 project will be shifted slightly seaward with 300 ft. to 500 ft. transitions at each end, to be able to wrap around the steel bulkhead seawall.

This alternative includes 12,400 linear feet of beach berm and dune fill, from intersection of Bevin Road and Asharoken Avenue south, east to the west jetty of the power facility's inlet basin. The beach design template includes a dune height at elevation +15 ft. NAVD with a 15 ft. dune crest width, landward and seaward dune slopes of 1V:3H, a 50 ft. berm width at elevation +8 ft. NAVD and a foreshore slope of 1V:15H to the existing bottom. The dune includes beach grass on the dune crest and landside slope, and sand fence on the dune seaward slope for dune enhancement and long-term performance. Note that the berm fill only section in front of the existing bulkhead at the southeastern 6,200 ft. shoreline.

The source of the initial sand for the beachfill will be a nearby Long Island Sound offshore borrow area. Periodic renourishment is anticipated at a frequency of 60,000 cy every 3 years with the renourishment sand trucked in from a certified upland source. Another re-nourishment source will be sand annually dredged from the LILCO power station inlet to the east and "by passed" to the project site (@15,000 CY annually).

A number of reasonable non-structural measures were evaluated in regard to implementing a plan to protect residential property and infrastructure from future erosion and storm damage. None of these measures were accessed as suitable solutions. Assessed not structural measures consisted of:

Buy-outs - not cost effective

Zoning - not within USACE prevue, not cost effective

Flood Proofing - not effective for most houses that face the LIS which are subject to erosion and wave attack.

House raising - not cost effective, would not prevent erosion.

Relocation - not cost effective, would not prevent erosion.

Road raising - not cost effective, would not prevent erosion or storm damage to homes

Applicant: U.S. Army Corps of Engineers, New York District.

Applicable Policies: Based on a review of the Coastal Management Program policies for New York, 19 were found to be applicable to the proposed project. These policies are listed below.

Determination: **Consistency Determination:** All of the applicable policies were evaluated with respect to the Project's consistency with their stated goals. The Project has been found to be consistent with each policy.

The construction of this storm damage reduction project will serve to protect the sole access roadway to Eaton's Neck and thus the community and allows the existing commercial uses and public infrastructure to continue to function within a safer and more secure environment. The nourishment of the beach will also improve the recreational opportunities of the beach as well as improve safety in regard to shoreline areas that front previously constructed bulkheads/seawall and are without beach. Therefore, the New York District has determined that the proposed project would be consistent with the 19 policies that were deemed applicable and evaluated with respect to the project's consistency with the stated goals.

POLICY 2: FACILITATE THE SITING OF WATER-DEPENDENT USES AND FACILITIES ON OR ADJACENT TO COASTAL WATERS.

Determination: The Asharoken project is water dependent, as it involves the siting and construction of erosion protection measures that interact with tidal and wave influences. As the use of the project site will not change with construction, existing facilities or services will be sufficient to support this project and the proposed activities are compatible with adjacent properties. The project will improve the existing environmental quality of the site, including the protection of coastal marsh resources in the western portion. Construction of the project will not have a significant adverse impact to water quality or biota, however short term localized impacts to these resources are anticipated. Thus this project is consistent with this policy.

POLICY 7: SIGNIFICANT COASTAL FISH AND WILDLIFE HABITATS WILL BE PROTECTED, PRESERVED, AND WHERE PRACTICAL, RESTORED SO AS TO MAINTAIN THEIR VIABILITY AS HABITATS.

Determination: The project site consists of beach and nearshore areas along the southern shoreline of Long Island Sound, and is adjacent to residential development as well as estuarine wetlands of national significance. The project area includes the offshore borrow site from which sand will be dredged and placed upon the beach. The project beach/shoreline has been regularly disturbed by various construction programs built to protect the shoreline, adjacent property, infrastructure and natural areas from erosion and storm damage.

The purpose of this project is to restore eroded coastal beach and berm habitat, which is in direct accord with this policy. Dredging, placement and grading will be the major activities at the project site. All aspects of construction including dredging will be conducted using best management practices to minimize environmental impacts. This includes dredging and placement during the season when impacts to spawning fish will be minimized, according to the NYSDEC. The project plan will include planting/seeding of native vegetation which will further restore lost ecological habitat functions as well as and help stabilize the dune strengthening its protective properties.

This policy requires that a narrative for each significant habitat be provided to aid in consistency determination. The following is a narrative for the project site, noting the five required items.

(1) The project site is located along the shoreline of Long Island Sound at Asharoken Beach, Asharoken New York. (2) Many different species of fish, birds, and other wildlife may utilize the project site and vicinity. These species are described in the existing conditions of the environmental assessment accompanying this determination. (3) Excavation, filling, grading will be implemented and will impact the existing habitat. All work will be undertaken using best management practices to minimize impacts to wildlife and habitats. Any construction related adverse impacts to terrestrial and aquatic species are expected to be minor and short term. 4) The results of the completed project are expected to have no significant adverse impacts to aquatic species or habitat functions of the site. Beach placement is expected to have beneficial impacts to terrestrial species and includes recreational benefits to residents. Prevention of future erosion will decrease potential threats to property, human safety and natural areas including the reduction of episodic fine sediment input to near shore waters know to be deleterious to many forms of sessile bottom dwelling organisms. 5) Existing conditions including the fish and wildlife communities, tidal patterns, and human use patterns at the project sites were observed, and assessed and incorporated the selection process of the recommended plan.

The Asharoken Storm Project has been found to be consistent with and furthering the goals of this policy.

The selected plan will not have long term significant adverse impacts to finfish species within the Project area. Dredging will be accomplished outside the work window which protects winter flounder and the spawning season of other important species. Turbidity and work activity from construction will cause elevated suspended sediment levels that may lower visual feeding efficiency, and may also affect respiratory function. Impact like these will displace resident fish to nearby localities elsewhere in the Sound

The existing borrow area habitats will be altered topographically and bathymetrically with the surface sediments being removed creating an even surface at greater depth (change in depth from @35’ to 45’). Benthic invertebrates will be entrained by the

dredge, some may survive when returned to the nearshore during placement. Most cast up on the breach will not survive as with those inhabiting the existing nearshore and intertidal which will be buried by the filling process. The placement site will gain in beach width and elevation.

These placement/intertidal area will recover within a relatively short period of time (6 months to a year) because that is the nature of this dynamic near shore zone and the organisms that inhabit it. Recovery at the dredging site will take from one to two years depending on the depth, the season when dredging occurred and the types of benthic communities that existed before the action was implemented.

Dredging and placement activities will provide a certain level of temporary benefit to those species able to feed on the organisms dispersed into the water column and exposed on the surface during construction activities. Sand placed on the shoreline will benefit many species of shorebirds including those that are beach nesters. Additional sand and beach width will benefit horseshoe crab spawning resulting in a secondary benefit to the endangered rufa red knot during its spring migration.

The adjacent wetlands will be protected from construction activities via best management practices including an environmental protection plan. The piping plovers, a federally threatened species will not be directly affected as construction will occur outside its residence time in NY State. The restored, enlarged beach area will be beneficial to this species. This project is compatible with this policy.

Because the total extent of the delineated borrow area is much larger than the area required for dredging, it is possible that any known sensitive areas can be avoided. Prior to the construction phase of the project the District will be conducting a pre-construction benthic community mapping survey in order to avoid any especially important /sensitive bottom habitats. The District will also be conducting a post construction borrow area survey to analyze short and long term impacts that may result from construction of the project.

By minimizing any potential effects to the project site ecosystem the District anticipates only minor, temporary disturbance impacts to occur to finfish. Recreational fishing may be temporarily affected in those areas proximal to construction activity. Fish are expected to move to adjacent areas when disturbed. However, some species may be attracted to the disturbance and the prey items disbursed into the water column at both dredging and placement sites. Most benthic invertebrates within the dredging and placement footprints will be temporarily eliminated by entrainment or burial, but are expected to recover within 6 months to 2 years, depending on location, season of construction and the type of benthic community previously established.

POLICY 9: EXPAND RECREATIONAL USE OF FISH AND WILDLIFE RESOURCES IN COASTAL AREAS BY INCREASING ACCESS TO EXISTING RESOURCES, SUPPLEMENTING EXISTING STOCKS, AND DEVELOPING NEW RESOURCES.

Determination: Construction of the project will augment the use of the project site as a water oriented community resource and expand recreational use and access as well as enhance the habitat of the project site, promoting productivity and use by various aquatic and terrestrial species. The project supports the use of the site as a water oriented recreational area which includes fishing and boating, as well as non-consumptive activities such as swimming, walking, sun bathing and wildlife/ bird watching. New access points and parking will be added. The project is consistent with this policy.

POLICY 12: ACTIVITIES OR DEVELOPMENT IN THE COASTAL AREA WILL BE UNDERTAKEN SO AS TO MINIMIZE DAMAGE TO NATURAL RESOURCES AND PROPERTY FROM FLOODING AND EROSION BY PROTECTING NATURAL PROTECTIVE FEATURES INCLUDING BEACHES, DUNES, BARRIER ISLANDS AND BLUFFS.

Determination: The purpose of constructing this project (beach, berm and dune) is to restore natural type barriers (beach and berm) such that these restored features once again provide designed levels of protection to inland habitats and residential properties from flooding and erosion. Construction of the project will help to maintain the coastal area including the marshes to the south of the project site. Best management practices will be used to minimize the impacts to natural habitats from construction procedures. Temporary impacts to both terrestrial and aquatic habitats and associated biota are anticipated with full recovery within 6 months to two years, depending on specific habitat types and locations. The project is consistent with this policy.

POLICY 13: THE CONSTRUCTION OR RECONSTRUCTION OF EROSION PROTECTION STRUCTURES SHALL BE UNDERTAKEN ONLY IF THEY HAVE A REASONABLE ROBABILITY OF CONTROLLING EROSION FOR AT LEAST THIRTY YEARS AS DEMONSTRATED IN DESIGN AND CONSTRUCTION STANDARDS AND/OR ASSURED MAINTENANCE OR REPLACEMENT PROGRAMS.

Determination: The proposed project action (beach, berm, dune) provides immediate protection, has an engineered project life of 50 years and provides for regular project maintenance to ensure effectiveness. The project is consistent with this policy.

POLICY 14: ACTIVITIES AND DEVELOPMENT, INCLUDING THE CONSTRUCTION OR RECONSTRUCTION OF EROSION PROTECTION STRUCTURES, SHALL BE UNDERTAKEN SO THAT THERE WILL BE NO MEASURABLE INCREASE IN EROSION OR FLOODING AT THE SITE OF SUCH ACTIVITIES OR DEVELOPMENT, OR AT OTHER LOCATIONS.

Determination: The erosion protection structures have been designed to prevent/minimize erosion and flooding at the project site and construction of and

existence of this project will not increase flooding or erosion at the project site or at any other flood/erosion protection features at other locations. This project is consistent with this policy.

POLICY15: MINING, EXCAVATION OR DREDGING N COASTAL WATERS SHALL NOT SIGNIFICANTLY INTERFERE WITH THE NATURAL COASTAL PROCESSES WHICH SUPPLY BEACH MATERIALS TO LAND ADJACENT TO SUCH WATERS AND SHALL BE UNDERTAKEN IN A MANNER WHICH WILL NOT CAUSE AN INCREASE IN EROSION OF SUCH LAND.

Determination: The purpose of constructing this project is to restore natural barriers (beach and berm) such that these restored features will provide increased levels of protection to inland habitats and residential properties and essential infrastructure. Constructing the beaches etc., will not interfere with the existing natural coastal process, which at this time have been altered by previous development. Existing beach erosion has been substantial as coastal processes are not supplying adequate material to the beach to compensate for erosion. Sand will be removed from an offshore shoal area such that with careful dredging a significant depression, which could act as a sediment trap. Analysis of the proposed dredging plan and project site has not revealed any anticipated increase in wave activity, angle of attack or other erosional forces that could be considered a change in natural coastal processes including longshore sediment transport. This project is consistent with this policy.

POLICY 16: PUBLIC FUNDS SHALL ONLY BE USED FOR EROSION PROTECTIVE STRUCTURES WHERE NECESSARY TO PROTECT HUMAN LIFE, AND NEW DEVELOPMENT WHICH REQUIRES A LOCATION WITHIN OR ADJACENT TO AN EROSION HAZARD AREA TO BE ABLE TO FUNCTION, OR EXISTING DEVELOPMENT; AND ONLY WHERE THE PUBLIC BENEFITS OUTWEIGH THE LONG TERM MONETARY AND OTHER COSTS INCLUDING THE POTENTIAL FOR INCREASING EROSION AND ADVERSE EFFECTS ON NATURAL PROTECTIVE FEATURES.

Determination: The non-structural erosion protection structures (beach etc.) are necessary to protect essential infrastructure, residences, and coastal features and habitats located adjacent to the LIS. Without installation of beach fill for erosion control it is anticipated that the current rates of erosion will continue to cause significant damage to vital roadways and property and includes serious threats to human safety. Unchecked erosion will also impact significant wildlife habitats of the back-bay. The public benefits outweigh the costs in that there will be a significant reduction in the potential threat to human life and property by permitting continued access and egress to and from Eaton's Neck by the residents as well as emergency and public service vehicles. This project is consistent with this policy.

POLICY 17: NON-STRUCTURAL MEASURES TO MINIMIZE DAMAGE TO NATURAL RESOURCES AND PROPERTY FROM FLOODING AND EROSION SHALL BE USED WHENEVER POSSIBLE.

Determination: The major component of this shore protection project is beach fill, a non structural measure. This project is consistent with this policy.

POLICY 19: PROTECT, MAINTAIN, AND INCREASE THE LEVEL AND TYPES OF ACCESS TO PUBLIC WATER-RELATED RECREATION RESOURCES AND FACILITIES.

Determination: The project is restoration of beach and berm. Restoring the beach to increase storm and erosion protection also creates an expanded area for recreational activities. Expenditure of public funds will require provision of expanded parking facilities and an increase in public accessibility points and will include ADA compatible access. This project is consistent with this policy.

POLICY 20: ACCESS TO THE PUBLICLY-OWNED FORESHORE AND TO LANDS IMMEDIATELY ADJACENT TO THE FORESHORE OR THE WATER'S EDGE THAT ARE PUBLICLY-OWNED SHALL BE PROVIDED AND IT SHALL BE PROVIDED IN A MANNER COMPATIBLE WITH ADJOINING USES.
Determination: Where best suited, public access accommodations will be provided in a manner compatible with adjoining uses. Access to publicly owned lands will be safeguarded. This project is consistent with this policy.

POLICY 21: WATER-DEPENDENT AND WATER-ENHANCED RECREATION WILL BE ENCOURAGED AND FACILITATED, AND WILL BE GIVEN PRIORITY OVER NON-WATER-RELATED USES ALONG THE COAST.
Determination: The project will restore the beach and protect and enhance access to it. Parking along the project site will be expanded. Water related recreational use is consistent with the project's purpose of preserving, enhancing, and restoring coastal resources. No boat launching facilities are located within project sites, however kayaks and canoes can access the water from the site and restoration of the beach will enhance this activity. No accepted water related uses are expected to be adversely affected. Expanded parking and access features will encourage greater use of these recreational areas. The project is consistent with this policy.

POLICY 22: DEVELOPMENT, WHEN LOCATED ADJACENT TO THE SHORE, WILL PROVIDE FOR WATER-RELATED RECREATION, WHENEVER SUCH USE IS COMPATIBLE WITH REASONABLY ANTICIPATED DEMAND FOR SUCH ACTIVITIES, AND IS COMPATIBLE WITH THE PRIMARY PURPOSE OF THE DEVELOPMENT.
Determination: The project may be considered "development" of the shoreline and in doing so provides for active and passive water-related recreational use of the site which is compatible with the project's purpose. The project is consistent with this policy.

POLICY 25: PROTECT, RESTORE OR ENHANCE NATURAL AND MAN-MADE RESOURCES WHICH ARE NOT IDENTIFIED AS BEING OF STATEWIDE SIGNIFICANCE, BUT WHICH CONTRIBUTE TO THE OVERALL SCENIC QUALITY OF THE COASTAL AREA.
Determination: The project will preserve and restore shorefront beach habitat, enhancing a highly eroded area that includes sections of damaged bulkhead. The scenic coastal environment of Asharoken is important to all who reside or visit there. Its restoration and protection maintains this essential natural resource. The project will enhance and maintain these scenic resources of this section of Long Island Sound shoreline. This project is found to be consistent with and furthers the goals of this policy.

POLICY 30: MUNICIPAL, INDUSTRIAL, AND COMMERCIAL DISCHARGE OF POLLUTANTS, INCLUDING BUT NOT LIMITED TO, TOXIC AND HAZARDOUS SUBSTANCES, INTO COASTAL WATERS WILL CONFORM TO STATE AND NATIONAL WATER QUALITY STANDARDS.
Determination: Pollutant discharge is not anticipated as a result of this project. Best management practices including an environmental protection plan regarding construction equipment, fueling sources etc., will be implemented to prevent leakage, spills and contaminations etc. The District has prepared and Environmental Assessment that contains the appropriate analysis and regulatory documentation as required by NEPA including a NY state water quality certificate, an HTRW analysis/investigation and Clean Air Act State Implementation Plan. No significant discharges of HTRW are anticipated. No onsite (pre-project) HTRW sources are known to exist or are expected to be located on the project site. The project is consistent with this policy.

POLICY 35: DREDGING AND FILLING IN COASTAL WATERS AND DISPOSAL OF DREDGED MATERIAL WILL BE UNDERTAKEN IN A MANNER THAT MEETS EXISTING STATE PERMIT REQUIREMENTS AND PROTECTS SIGNIFICANT FISH AND WILDLIFE HABITATS, SCENIC RESOURCES, NATURAL PROTECTIVE FEATURES, IMPORTANT AGRICULTURAL LANDS, AND WETLANDS.
Determination: The Asharoken project includes offshore dredging and beach fill which will cover areas of the nearshore and intertidal zone. Approximately 600,000 cubic yards will be dredged and placed. The dredged sand will be placed on the beach from mean high water (MHW) to the subtidal toe of fill which will cover approximately 74 ac along the shoreline. These operations will temporarily impact fish and wildlife and their habitats, localized to the immediate project site and vicinity. All construction actions will be in compliance with state and federal regulations including NEPA and NYSDEC permit conditions. This includes clean, compatible sand to be used as fill and as needed, best management plans to minimize all impacts to significant habitats, flora, fauna, scenic resources and protective features. Dredging activities will be consistent with permit conditions including dredging windows which will provide protection to sensitive species, including summer spawning fish and the piping plover. All construction related adverse impacts are expected to be localized and short term, with

recovery to preconstruction conditions at both the offshore area and the placement site expected within 1 to two years. The project is consistent with this policy.

POLICY 38: THE QUALITY AND QUANTITY OF SURFACE WATER AND GROUNDWATER SUPPLIES WILL BE CONSERVED AND PROTECTED, PARTICULARLY WHERE SUCH WATERS CONSTITUTE THE PRIMARY OR SOLE SOURCE OF WATER SUPPLY.
Determination: The project will not impact ground water. Surface waters do not constitute primary or sole source water supplies. However LIS surface waters will be temporarily affected on a localized scale by construction measures. The relatively shallow near shore waters of the project site are relatively turbid due to wind mixing and resuspension of nearshore fine particles. Any additional turbidity due to the project actions will be temporary and localized. Sand fill will not significantly impact any surface water or ground water parameters resources in the long term. Impact such as localized increases turbidity will minimized by best management practices such as maximizing construction actions during low tide and strictly adhering to all best management practices. These impacts created by construction of the project are similar to those naturally occurring through coastal storms and in fact are of a much smaller magnitude because they are so localized. The project is consistent with this policy.

POLICY 41: LAND USE OR DEVELOPMENT IN THE COASTAL AREA WILL NOT CAUSE NATIONAL OR STATE AIR QUALITY STANDARDS TO BE VIOLATED.
Determination: No State Air Quality Standards will be violated with the construction of this project. Final emissions calculations will be computed when the construction plans are finalized. However, due to the fact that Suffolk County NY is a severe non-attainment area there is no anticipated exceedence of deminimus trigger levels from any of the controlled pollutants. Construction plans will be coordinated with the State and configured so as not to violate any State air quality laws. There are no long-term emissions expected from this project. This project is consistent with this policy. The project is consistent with this policy.

POLICY 44: **PRESERVE AND PROTECT TIDAL AND FRESHWATER WETLANDS AND PRESERVE THE BENEFITS DERIVED FROM THESE AREAS.**
Determination: The project (beach) site is only a short distance from Northport Bay and wetland habitats. Construction of the project will be conducted in such a way using best management practices as to protect these areas from impact during construction. These practices will include restrictive, protective covenants for storage of equipment and fuel together with regulations preventing damage to wetlands by vehicle activity, runoff from the project site or any other kind of contaminant or pollutant input. Rebuilding the beach will decrease the frequency of overwash events which have filled in proximal area's and have since been subject to invasive phragmites of little habitat value in regard to marsh productivity. The project is consistent with this policy.

LONG ISLAND SOUND COASTAL MANAGEMENT PROGRAM POLICIES

Project: Village of Asharoken, New York, Coastal Storm Damage Reduction Project.

The proposed plan for Asharoken Beach includes the dredging and placement of approximately 600,000 cy of fill material to rebuild the beach with a 50' wide berm and dune. The dune will be planted. The dune alignment fronting the Section 103 project will be shifted slightly seaward with 300 ft. to 500 ft. transitions at each end, to be able to wrap around the steel bulkhead seawall.

This alternative includes 12,400 linear feet of beach berm and dune fill, from intersection of Bevin Road and Asharoken Avenue south, east to the west jetty of the power facility's inlet basin. The beach design template includes a dune height at elevation +15 ft. NAVD with a 15 ft. dune crest width, landward and seaward dune slopes of 1V:3H, a 50 ft. berm width at elevation +8 ft. NAVD and a foreshore slope of 1V:15H to the existing bottom. The dune includes beach grass on the dune crest and landside slope, and sand fence on the dune seaward slope for dune enhancement and long-term performance. Note that the berm fill only section in front of the existing bulkhead at the southeastern 6,200 ft. shoreline.

The source of the initial sand for the beachfill will be a nearby Long Island Sound offshore borrow area. Periodic renourishment is anticipated at a frequency of 60,000 cy every 3 years with the renourishment sand trucked in from a certified upland source. Another re-nourishment source will be sand annually dredged from the LILCO power station inlet to the east and "by passed" to the project site (@15,000 cy annually).

A number of reasonable non-structural measures were evaluated in regard to implementing a plan to protect residential property and infrastructure from future erosion and storm damage. None of these measures were accessed as suitable solutions. Assessed not structural measures consisted of:

Buy-outs - not cost effective

Zoning - not within USACE prevue, not cost effective

Flood Proofing - not effective for most houses that face the LIS which are subject to erosion and wave attack.

House raising - not cost effective, would not prevent erosion.

Relocation - not cost effective, would not prevent erosion.

Road raising - not cost effective, would not prevent erosion or storm damage to homes

Applicant: U.S. Army Corps of Engineers, New York District.

Applicable Policies: Based on a review of the LIS Coastal Management Program policies for New York, 11 policies (with attendant sub-policies) were found to be applicable to the proposed project. These policies are listed below.

Consistency Determination: All of the applicable policies were evaluated with respect to the Project's consistency with their stated goals. The Project has been found to be consistent with each policy and the proposal will be conducted in a manner consistent to the maximum extent practicable with the LIS CMP.

Policy 1: **Foster a pattern of development in the Long Island Sound coastal area that enhances community character, preserves open space, makes efficient use of infrastructure, makes beneficial use of a coastal location, and minimizes diverse effects of development.**

1.1 ***Concentrate development and redevelopment in or adjacent to traditional waterfront communities.***

Determination: The project will serve to stabilize the existing infrastructure including protection of residential property. In the without-project condition, erosion west of the power plant jetties was forecast to continue at an average accelerated rate about 50 percent greater than the regional average rate. The continued erosion will further reduce the width and elevation of the down drift beaches causing continued damages to existing bulkheads and even a need to construct more bulkheads. With or without bulkheads, the erosion will continue to cause accelerated land losses, which would increase the risk of damage to nearby residences and reduce community character, open space and recreational use of the beach. Therefore, it has been determined that the project conforms to this sub-policy.

1.3 ***Protect stable residential areas.***

Determination: Along with the potential possibility of a breach, the Asharoken shoreline west of the power station continues to erode which contributes to failure of existing bulkheads and loss of any beach fronting them. The erosion has been accelerated due to the presence of the power plant jetties. The preferred project alternative will protect existing homes, the essential roadway and utilities. Therefore, the project conforms to this sub-policy.

1.4 ***Maintain and enhance natural areas, recreation, open space, and agricultural lands.***

Determination: The proposed alternative will decrease beach/berm erosion and help rebuild the beach, maintain the natural areas including the beach, bay marshes and recreational open space. By restoring the beach the project will also enhance the aesthetics of the site. The project is consistent with this sub-policy.

1.5 ***Minimize adverse impacts of new development and redevelopment.***

Determination: The project will incorporate Best Management Practices during all phases of construction minimizing any impacts related to implementation of this project. Also, the completed project will significantly decrease erosion and buffer impacts from episodic storms etc. including the risk of a breach and resulting loss of natural resources as well residences. Therefore, the project is consistent with this sub-policy.

Policy 2: **Preserve historic resources of the Long Island Sound coastal area.**
Determination: Based on a Phase I Cultural Resources survey conducted for the project, there are no significant historic or archaeological resources within the project area, thus no cultural or historic resources will be affected. Thus the project is consistent with this policy.

Policy 3**: Enhance visual quality and protect scenic resources throughout Long Island Sound.**

3.1 ***Protect and improve visual quality throughout the coastal area.***
Determination: The eroding beaches and failing bulkheads have impaired the visual quality of the project area. By rebuilding the beach the proposed project will improve the scenic quality of the shore front.

3.2 ***Protect aesthetic values associated with recognized areas of high scenic quality.***
Determination: The aesthetics of the project area will be greatly improved by rebuilding the beach and dune.

Policy 4 **Minimize loss of life, structures and natural resources from flooding and erosion.**

4.*1* ***Minimize losses of human life and structures from flooding and erosion hazards*****.**
Determination: The project provides storm/flooding protection to residences and utilities and infrastructure. The chosen alternative will provide the best level of protection for citizens and property while minimizing adverse environmental impacts. The project is located in an established residential area, which precludes relocation of the existing road, utilities and potentially adjacent residences. The preferred alternative provides the highest level of protection while minimizing adverse environmental impacts. Therefore, the project complies with this policy.

4.2 ***Preserve and restore natural protective features.***
Determination: The preferred alternative is designed to decrease erosion and help maintain a protective beach buffer. Ultimately, the project will maintain the beach, berm and dune which area the protective features. Thus, the project is consistent with this sub-policy.

4.5 ***Ensure that expenditure of public funds for flooding and erosion control projects results in a public benefit.***

Determination: Implementation of the preferred alternative will protect an essential roadway and protect public utilities including emergency services. The project will also greatly improve the beach aesthetics and recreational opportunity and well being. Therefore this project is consistent with this policy.

4.6 ***Consider sea level rise when sitting and designing projects involving public expenditures.***

Determination: The project as formulated has a 50-year project life and is designed to accommodate expected sea level rise. Therefore, the project is consistent with this policy.

Policy 5: **Protect and improve water quality and supply in the Long Island Sound coastal area.**

5.1 ***Prohibit direct or indirect discharges, which would cause or contribute to contravention of water quality standards.***

Determination: Project construction processes including storage and fueling procedures will utilize agency mediated regulatory guidelines and Best Management Practices including an HTRW protection plan will minimize the potential for spills or exposure to any potential contaminants or other hazardous materials. The completed project will significantly decrease erosion thus decreasing the input of surface or soil related pollutants or fine sediment material known to degrade near shore areas. The preferred alternative supports this policy.

5.2 ***Manage land use activities and use best management practices to minimize nonpoint pollution of coastal waters.***

Determination: An erosion control plan will be developed and implemented during construction to minimize sedimentation to the sound. Additionally, an oil spill, HTRW contingency plan will be prepared for the construction equipment. Therefore, the project is consistent with this sub-policy.

5.3 ***Protect and enhance the quality of coastal waters.***

Determination: The preferred alternative supports this sub-policy by decreasing erosion of upland sediments thus minimizing the introduction of soils and potential contaminants into the Sound from surrounding properties, including the potential for inputs of toxic household material that might occur from storm damage to residences.

Policy 6: **Protect and restore the quality and function of the Long Island Sound ecosystem.**

6.1 ***Protect and restore ecological quality throughout Long Island Sound.***
Determination: The project will contribute to improvements of local water quality by reducing the potential of upland soil erosion and ensuing sedimentation within the shallow surface waters of project area. Storm damage protection also decreases the potential for input of house hold contaminants into the Sound that could result from flooding/damage of residences. Wash over protection prevents further infilling of the wetlands and the spread of the invasive common reed.

6.2 ***Protect and restore Significant Coastal Fish and Wildlife Habitats.***
Determination: Increased levels of storm protection will decrease the likelihood of significant infilling of the adjacent marshes of Northport Bay and the propagation of invasive Phragmites. The restored beach and berm will decrease the potential for upland erosion and sedimentation of nearshore waters. Dredging and placement can only occur during a time window (October-January) as regulated by the State DEC and designed to minimize impacts to resident (spawning) fish. Dredging and placement will have temporary adverse impacts on the benthos and finfish of the borrow area and the intertidal and littoral areas of the placement site. However, monitoring of these types of impact areas has shown that these areas recover within 6 months (intertidal) to 2 years (borrow area) depending on the location and the previously established communities. These are temporary relatively localized impacts are compensated for by the existence/availability of similar habitats regional in scope.

A project specific habitat mapping survey will analyze bottom habitats before and after project dredging. This data will be used to evaluate any possible project impacts to fish and benthos and will also be essential for estimating impacts and recovery times for any potential future uses of Long Island Sound sand sources.

6.3 ***Protect and restore tidal and freshwater wetlands*.**
Determination: The selected alternative is not expected to have any direct impacts to tidal wetland areas. However, the standard procedures of using Best Management Practices will minimize any unanticipated wetland impacts. The completed project will decrease the spread of invasive species (Phragmites) on the adjacent shoreline of Northport Bay. Therefore, the project is consistent with this sub-policy.

6.4 ***Protect vulnerable fish, wildlife and plant species, and rare ecological communities.***
Determination: The selected plan will not have significant adverse impacts to species within the Project area. Dredging will be accomplished outside of the most sensitive spawning windows. Turbidity and activity from construction activities will displace resident fish to localities elsewhere in the Sound. The temporary impacts to fish and benthic organisms will be localized. Habitat would be temporarily affected during beach fill placement, as elevated suspended sediment levels may impact visual feeding efficiency, and may also affect respiratory efficiency likely causing displacement of mobile individuals. Sessile benthic invertebrates will be buried or entrained and

ultimately lost during construction. These areas will recover within a relatively short period of time 6 months to two years depending on type of habitat and season of dredging. Dredging and placement activities will provide a certain level of benefit to those species able to feed on the organisms dispersed into the water column and exposed on the surface during construction activities.

The adjacent wetlands will be protected from construction activities via best management practices including and environmental protection plan. The piping plovers, a federally threatened species will not be directly affected as construction will occur outside its residence time in NY State. The restored, enlarged beach area will be beneficial to this species. This project is compatible with this policy.

Policy 7: ***Protect and improve air quality in the Long Island Sound coastal area.***

7.1 ***Control or abate existing and prevent new air pollution.***
Determination: An air quality analysis will be completed for the project. Based upon the completed analysis, the emissions from the project are considered to have an insignificant impact on the regional air quality, and according to 40 CFR 93.153 (f) and (g) the proposed project is presumed to conform to the State Implementation Plan.

7.4 ***Limit sources of atmospheric deposition of pollutants to the Sound, particularly from nitrogen sources.***
Determination: An air quality analysis was completed for the project. Based upon the completed analysis, the emissions from the project are considered to have an insignificant impact on the regional air quality, and according to 40 CFR 93.153 (f) and (g) the proposed project is presumed to conform to the State Implementation Plan. See Policy 7.1

Policy 8: ***Minimize environmental degradation in the Long Island Sound coastal area from solid waste and hazardous substances and wastes***

8.2 **Manage hazardous wastes to protect public health and control pollution.**
See policy 5. All project/construction activities will be governed by an environmental protection plan and SOP, including the HAZMAT plan that will be developed in the next planning phase of the project

8.3 ***Protect the environment from degradation due to toxic pollutants and substances hazardous to the environment and public health.*** The environmental protection plan will have contingencies to cover any potential contamination contingencies as well as best management plans to minimize potential hazards, spills etc.

8.4 ***Prevent and remediate discharge of petroleum products.***
Determination: An oil spill prevention plan outlining precautionary measures to be taken during construction and rapid responsiveness strategies should an accidental oil

spill occur will be developed. Petroleum spills and clean up strategies will developed for the project and located in the Hazardous material

8.5 ***Transport solid waste and hazardous substances and waste in a manner which protects the safety, well-being, and general welfare of the public; the environmental resources of the state; and the continued use of transportation facilities.***
Determination: All hazardous materials will be regulated under the project HTRW guidelines and Best Management practices developed in the project SOP.

Policy 9*:* **Provide for public access to, and recreation use of, coastal waters, public lands, and public resources of the Long Island Sound coastal area.**

9.1 ***Promote appropriate and adequate physical public access and recreation throughout the coastal area.***
The Asharoken project does include a project specific Public Access plan that includes parking space and appropriate number of cross over access points. The plan will be finalized with when coordination with the village has been completed.

Policy 10*:* **Protect Long Island Sound's water-dependent uses and promote siting of new water-dependent uses in suitable locations*.***

10.1 ***Protect existing water dependent uses.***

Determination: The rebuilding and stabilizing of Asharoken beach will protect/preserve all water dependent uses generally associated with the utilization of a residential recreational beach. The project is compatible with this policy

10.3 ***Allow for development of new water dependent uses outside of maritime centers.***

Determination: The restoration of the beach will make access to the water safer along the revetment of the 103 area as well as increase the usable beach surface appropriate for most recreational activities typical of beaches.

Policy 11 **Promote sustainable use of living marine resources in Long Island Sound**

11.2 ***Provide for commercial and recreational use of the Sound's finfish, shellfish, crustaceans and marine plants.***

Determination: The rebuilding of Asharoken beach will cause temporary localized impacts to the benthic and finfish communities of the dredging and placement site. The nearshore/intertidal communities are anticipated to recover within 1 year. The borrow area may take a somewhat longer recolonization period (1-2 years) as it is not as dynamic an environment as the nearshore/intertidal. Once re-colonization has begun at the intertidal and nearshore, the overall diversity and of the finfish and invertebrates is

expected to remain the same. The restored beach and new groins will offer enhanced access to shoreline fishing under safer conditions promoting and enhancing recreational (surf) fishing.

11.4 ***Promote recreational use of marine resources.***

Determination: The rebuilding and expansion of Asharoken beach will provide enhanced recreation opportunities and promote utilization of the beach for a variety of recreational activities including passive activities as sunbathing/walking, better, safer access to waterside activities such as fishing swimming and personal watercraft usage (kayaks, canoes etc).

DRAFT
ENVIRONMENTAL ASSESSMENT

North Shore of Long Island, Asharoken, Suffolk County, New York Coastal Storm Risk Management Feasibility Study.

U.S. ARMY CORPS OF ENGINEERS

New York District

May 2016

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) New York District (NYD) proposes to provide long-term coastal storm risk management for Asharoken Avenue by depositing beachfill and providing periodic sand nourishment to reduce erosion affecting Asharoken Beach (Study Area) in the Village of Asharoken, Town of Huntington, Suffolk County, New York. The Village of Asharoken is located along the north shore of Long Island from Eaton's Neck Point to the northwest and Long Island Lighting Company (LILCO) Northport Power Station to the southeast. Long-term and storm-induced erosion threatens to continue to degrade remaining protective line of beach, dune, private bulkhead, and the previously constructed USACE Section 103 Project along the north (Long Island Sound) side of Asharoken Avenue.

The study area consists of a narrow section of land (tombolo) and developed shorefront with Long Island Sound to the north and Northport Bay to the south extending approximately 2.4 miles along Asharoken Avenue from the boarder of the Village of Eaton's Neck to the west to the edge of Northport Basin – the cooling water intake lagoon at the Northport Power Station to the east. Asharoken Avenue, which runs parallel to the south shore of Long Island Sound provides the only access to the Village of Eaton's Neck, and thus represents the sole evacuation route to a community of approximately 1,500 residents west of the project site.

The purpose of the proposed action is to stabilize the beach and prevent erosion and flooding and the resultant damages to Asharoken Avenue, associated infrastructure and residences. Storm induced over washing of sand across the western section of Asharoken Ave. has caused environmental damage to areas of Northport Bay salt marsh that lie immediately south of the project site. The Proposed Action is needed because the study area has continually experienced, moderate to severe episodes of storm-induced waves and wave run-up resulting in beach erosion, damage to, and closure of, Asharoken Ave, as well as damage to associated infrastructure and adjacent residences. The frequency of the weather events that cause these erosive conditions is expected to increase as a consequence of climate change.

Closure of Asharoken Avenue becomes a serious impediment to the residents of Asharoken and Eaton's Neck. The loss of access creates a multitude safety hazards including loss of fire, police, and ambulance, emergency services. Although there is a firehouse on Eaton's Neck, no additional resources are available to fight a large fire when the road is impassable. While Asharoken Avenue was blocked during the December 1992 storm, two residents of Eaton's Neck had to be evacuated by helicopter for medical treatment. In the March 1993 northeaster, fire fighters were unable to reach a burning residence due to flooding on Asharoken Avenue (USACE-NYD, 2013). In 2012, during Hurricane Sandy, waves overtopped the bulkheads, causing storm damage, surface erosion and flooding, as well as direct damage to several structures in this area (USACE-NYD, 2013). Flooding from Sandy carried with it high volumes of sand and debris which smothered wetlands and maritime forest understory plants when the tides and floodwaters receded.

The proposed plan for Asharoken Beach includes the dredging and placement of approximately 600,000 CY of fill material to rebuild the beach, berm and dune. The sand used for the initial 600,000 placement will be dredged from a nearby offshore borrow area (delineated as borrow area "A") located about ½ mile offshore of the western section of the project beach. Dredging is to be

conducted on the side of a ridge of sand, removing areas of higher relief minimizing the potential of leaving a significant depression that can exacerbate the development of hypoxia in bottom waters. Dredging will be conducted during the fall (October-December) to minimize potential impacts to stationary or slow moving early life stages of various marine fish and invertebrate species. Dredging during this period will also help to minimize the potential for low dissolved oxygen. Periodic re-nourishment is anticipated at a frequency of 80,000 CY every 3 years. Sand for each re-nourishment will be trucked in from a fully permitted upland site. Presently about 10,000 CY of sand is annually dredged from the LILCO power station inlet and is "by passed" on to the eastern most section of the project beach, adjacent to the LILCO property. This practice is expected to continue for the life time of the project.

Based on the past storm events and existing and expected without-project shoreline conditions, it is clear that wave attack and over topping of dunes and bulkheads will continue to cause shoreline recession, damage to existing protection structures, infrastructure and residences, accelerating with time in a without project future. The TSP would reduce the risk of damages from wave energy and overtopping forces. The implementation of the proposed Project will have significant overall beneficial impacts to the adjacent communities, including shoreline stabilization, reduced risk of damage and expanded recreational opportunities. The TSP will also offer protection of marsh habitats, and increase in the availability of suitable habitat for Federal and state-listed species of shorebirds.

Impacts to marine and terrestrial resources in the proposed Project Area are expected to be minor and temporary. There will be some short-term adverse impacts to terrestrial and aquatic habitats and the species that utilize the habitats. These impacts would be largely limited to the dredging, sand placement areas and their immediate vicinity. Impacts are expected to be local temporary in nature coinciding with the initial construction period and nourishment activities. There will be project life duration impacts in terms of changes to habitat once the project is completed. Such impacts include the changes in habitat created by a different beach profile, berm and near shore and the new topography created at the borrow area. Direct adverse impacts during construction are expected to be minor because many affected species will utilize other suitable habitat nearby if disturbed. Many sessile species will be lost, but are expected to rapidly re-colonize once the disturbance has ended. Mobile species displaced by construction activities will utilize other suitable nearby habitats for foraging activities etc. Much of the existing upper beach and dune areas within the Project Area are currently of relatively low value to most wildlife species.

The project related direct and indirect adverse impacts to environmental resources including potential loss of benthic invertebrate species, finfish, submerged aquatic vegetation and/or disturbance affects will be minimal and will not be significant to local resident or migratory populations. The use of Best Management Practices (BMP) during construction will be implemented through all phases of construction and include measures to be implemented prior to, during and after completion of the project. To minimize depth related impacts to water quality such as the potential for low oxygen excavation will be conducted along the side of a ridge which is expected to all but eliminate typical impacts related to creating a deep pit with steep side slopes. Dredging during the late fall and early winter will also minimize the potential for low oxygen concentrations. To minimize impacts to sensitive early life stages of important aquatic organisms dredging will be conducted during specific seasonal window (October to mid-January) as regulated by the NYSDEC. The use of a cutterhead pipeline dredge is the expected method of dredging to

be used for this project. Other than the direct impact to sediment born organisms and a temporary localized increase in turbidity, no other significant impacts to water quality or biota are anticipated. If used hopper dredges would be equipped with state of the art turtle and sturgeon deflectors to decrease the probability of impacting or taking either species. Qualified individuals will be placed on board all dredges to monitor for the presence of any ESA species in the vicinity of the dredge as well as monitor for ESA takes due to entrainment. A pre and post construction benthic characterization program as requested by the NYSDEC will be implemented to assess the any impacts to offshore habitats. All concerned species management and protection will be guided by USFWS and NMFS recommendations including any measures recommended in regard to potential impacts from the project's public access sites.

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APPENDICES

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Appendix B Asharoken and Bayville Nearshore Investigation. Final 2005 Finfish, Invertebrate Infauna and Water Quality Summary Report (2005)
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LIST OF ABBREVIATIONS AND ACRONYMS

The List of Abbreviations and Acronyms section will define the abbreviations and acronyms referenced throughout the Environmental Assessment.

°F	degrees Fahrenheit
APE	Area of Potential Effect
BMP	Best Management Practice
CAP	Continuing Authority Program
CERCLIS	Comprehensive, Environmental Response, Compensation and Liability Information System
CO	carbon monoxide
COC	contaminant of concern
cy	cubic yard(s)
DO	Dissolved Oxygen
DPS	Distinct Population Segments
DWT	displaced weight tons
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ft	foot/feet
fps	feet per second
FWOP	Future Without Project
in	inch(es)
IPCC	Intergovernmental Panel on Climate Change
L	liter(s)
LILCO	Long Island Lighting Company
LIS	Long Island Sound
LPIL	lowest possible identification level
mg	milligram(s)
MHW	mean high water
MHHW	mean higher high water
MLLW	mean lower low water
MLW	mean low water
mm	millimeter(s)
MSFCMA	Magnuson Stevens Fisheries Conservation and Management Act
MSGC	Metropolitan Sand and Gravel Company
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NED	National Economic Development
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation

NYSDOS	New York Department of State
O_3	Ozone
PAH	Polycyclic aromatic hydrocarbon
Pb	Lead
PM-2.5	particulate matter less than 2.5 microns in width
ppt	parts per thousand
RCRIS	Resource Conservation and Recovery Information System
SHPO	State Historic Preservation Office
SLR	Sea Level Rise
SO_x	sulfur oxides
TRIS	Toxic Release Inventory System
USACE-NYD	United States Army Corps of Engineers New York District
USEPA	United States Environmental Protection Agency
yr	year(s)

1.0 INTRODUCTION AND SITE DESCRIPTION

Asharoken Beach Project is located in Village of Asharoken, Town of Huntington, Suffolk County, New York. The project beach and study area is located along the north shore of Long Island from Eaton's Neck Point to the northwest and Long Island Power Authority (LIPA) Northport Power Station to the southeast. The U.S. Army Corps of Engineers (USACE) New York District (NYD) proposes to provide long-term coastal erosion and storm protection for the Village of Asharoken including Asharoken Avenue by rebuilding the beach and dune and providing periodic sand nourishment to maintain the project design template.

The study area consists of a narrow section of land and developed shorefront along Long Island Sound Northport Bay to the south, extending approximately 2.4 miles between along Asharoken Avenue between Bevin Road intersection and the eastern edge of Northport Basin – the cooling water intake lagoon at the Northport Power Station (Figure 1). The width of the beach at mean low water (MLW) varies along this section of beach from 50 feet at the northwestern section near Bevin Road to approximately 100 feet (ft) at the southeastern limit near the power plant. Asharoken Avenue, provides the only access to the villages of Asharoken and Eaton's Neck, a community of approximately 1,500 residents based on a 2010 census.

Figure 1. Map of Study Area

In the late 18th century, a shoal began to form between Long Island and Eaton's Neck Island as a result of longshore sediment transport, gradually becoming only navigable by ship at high tide. Continued accretion of the shoal, supplied predominantly with sediment from shores to the east, eventually joined Eaton's Neck with Long Island (USACE-NYD, 2013).

In the 1930s, the Metropolitan Sand and Gravel Company (MSGC) built two jetties into Long Island Sound to connect to a basin being enlarged for excavation of sand, currently known as Northport Basin. A permit for this construction was issued in March 1930 with the condition that the jetties would be temporary and removed in five years. MSGC excavated sand from Northport Basin, periodically requesting and receiving time extensions for the jetty permit until March 1968, when LILCO bought the property and started construction of the power plant. In 1977, LILCO requested and subsequently received a change of permit for permanent maintenance of the jetties. Erosion to the west of the jetties and accretion to the east of the jetties began to occur after the jetties were constructed. Tugs and other vessels use the basin and the channel between the jetties to service a fuel platform located 2 miles offshore where 50,000 Displaced Weight Tons (DTW) tankers dock to unload oil for the power plant. Recreational boaters and some commercial fisherman also use the Basin to launch their vessels. Since the construction of the power plant, LILCO has dredged material from the channel serving the cooling water intake lagoon and deposited the material (15k CY annually) on the beach west of the jetties.

To counter the erosion at Asharoken Beach, timber bulkheads were constructed by homeowners and five interlocking concrete groins were placed by the New York State Department of Public Works in 1956. Old photos of the eroded shoreline after the Thanksgiving 1950 northeaster show evidence of old sheet pile or timber groins, apparently as an earlier effort to stem erosion at Asharoken. A concrete and stone groin was also constructed in Reach 1 (Figure 2) approximately 1,000 feet southeast of Bevins Road in 1952 (USACE-NYD, 2013).

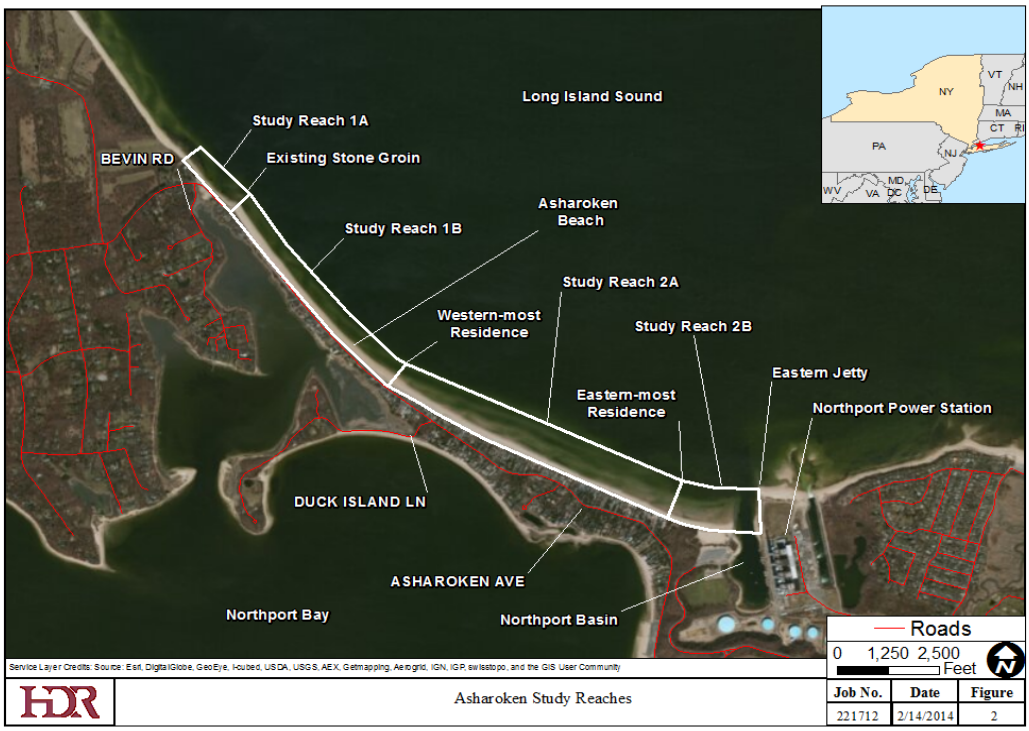


Figure 2 Asharoken Study Reaches

During past storm events, municipal and residential structures have suffered minor damage. However, flooding of Asharoken Avenue has occurred at the northwestern portion of the study area. Additionally, during past storms the northwestern portion of the study area has experienced wave attacks which have caused overtopping of the dune system. This overtopping has deposited sand and debris and has created ponding of water on Asharoken Avenue causing the road to be impassible for more than 24 hours. Since the shoreline continues eroding, the roadway and properties will be subject to increasing storm damage without additional shore protection measures.

Asharoken Beach suffered severe erosion losses in the 1962 Ash Wednesday storm. To repair this damage, about 840,000 cy of sand (640,000 by New York State and 200,000 by the Village of Asharoken) were taken from nearby offshore borrow area and placed on the beach in the Village of Asharoken. This borrow areas can still be identified by current bathymetry and the that remains has been shown to be responsible for an erosional hot spot (nodal point) on the adjacent beach front (USACE-NYD, 2013).

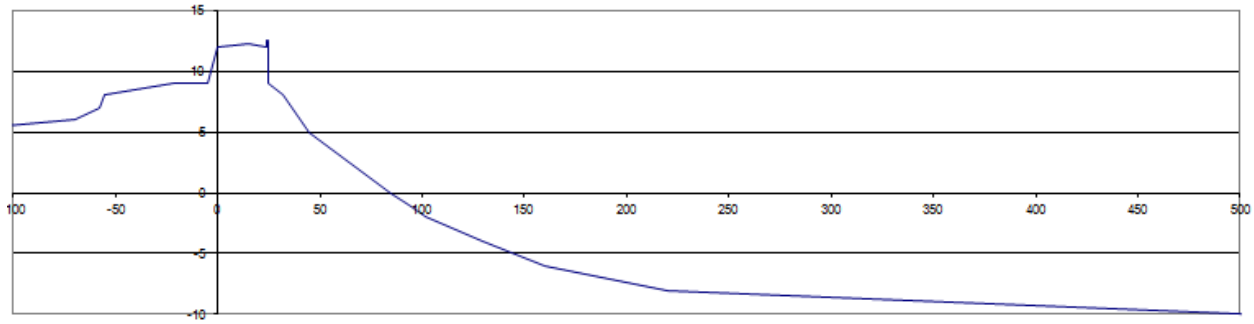
Following the December 1992 northeaster, Congress authorized a study of storm damage problems on the North Shore of Long Island. To expedite protection for the critical area along the northwestern 900 linear feet of Asharoken Avenue near Bevin Road, (see Figure 2), an emergency shoreline protection project was implemented in 1997 by the USACE. This was done in partnership with the New York State Department of Environmental Conservation (NYSDEC), under the authority of Section 103 of the Rivers and Harbors Act of 1962, part of the USACE's Continuing Authority Program (CAP). The project design included a 10-ft-tall steel sheet pile wall with riprap toe protection on the seaward side and sand backfill on the landward side. The steel sheet pile has a top elevation of 12.5 ft National Geodetic Vertical Datum (NGVD) and is supported by steel strut beams and whalers connected to deadmen 15 ft landward of the sheet pile. The 800-pound riprap with a side slope of 1 ft vertical on 3.5 ft horizontal was covered by sand fill with the same side slope (Figure 3). A 20-ft-wide artificial dune behind the wall was stabilized with geotextile matting and planted with American beach grass (*Ammophila breviligulata*). The roadway protection was designed for up to a 22-year storm event to temporarily protect the most vulnerable portion of Asharoken Avenue near Bevin Road.

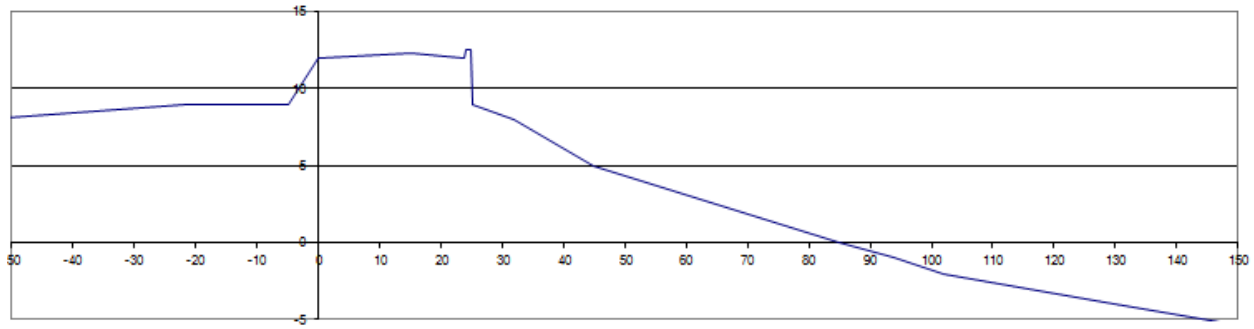
Figure 3 Repaired/Modified 103 Project (Reach 1a)

Since its construction several powerful storms damaged the bulkhead and dune project, necessitating repairs. Damage from Tropical Depression Ernesto in September 2006 required emergency repairs in two phases in 2007. The Nor'Ida coastal storm in November 2009 and a northeaster in March 2010 damaged the project and a short length of the roadbed of Asharoken Avenue, again requiring emergency repairs. The project was damaged during Hurricane Irene in August 2011 and Hurricane Sandy in October 2012, and was again repaired. The temporary protection project continues to provide a low level of protection to Asharoken Avenue in Reach 1, up to a 10 percent (10-year, if communicating risk in the manner prior to E.R. 1105-2-101 guidance) storm event, and has a remaining life of seven years.

For engineering and economic analyses, the present project's study area has been subdivided into two primary reaches along the Long Island Sound Shorefront – based on the presence or absence of shorefront residences – with each primary reach sub-divided into two sub-reaches. The definition/delineation of each reach is presented below:

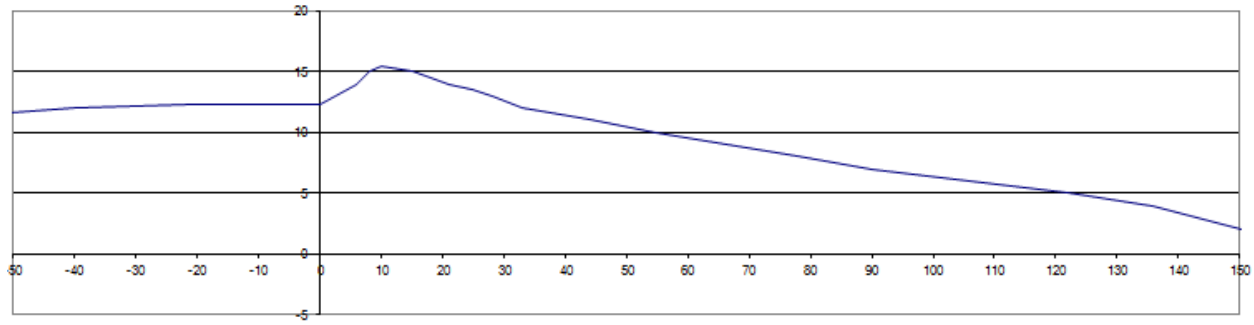
> ***Reach 1a***. This reach starts from the western border of project shoreline near the intersection of Bevin Road and Asharoken Avenue, extending east approximately 900 ft along the waterfront shoreline. A stone groin is located to the eastern limit of this reach. This shoreline was washed over during the 1992 northeaster and was since rebuilt to a 15 year design life erosion control structure under the authority of Section 103 Small Shore Protection Projects. The Section 103 design includes a steel sheet pile at +12.5 ft NGVD crest elevation, a riprap toe protection and an approximately 20 ft wide backfill. The road elevation behind this reach is approximately 9 ft above NGVD. Beach profile of this stretch of shoreline is characterized by a relatively steep foreshore slope and a narrow berm averaging +6 ft NGVD elevation in front of the steel bulkhead. The foreshore slope is approximately 1 vertical on 8 horizontal down to elevation –6 ft NGVD. Asharoken Avenue is located landward of the backfill. Beach widths in this reach range from 0 ft to 20 ft measured from the MHHW (+3.9 ft. NGVD) shoreline to bulkhead toe line with riprap protection. The offshore slope is approximately 1 vertical on 100 horizontal.

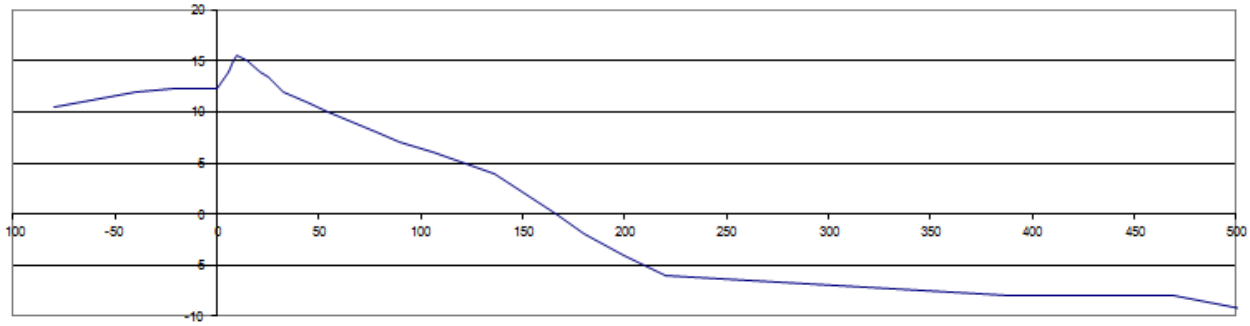




Typical Profiles for Reach 1a Shoreline

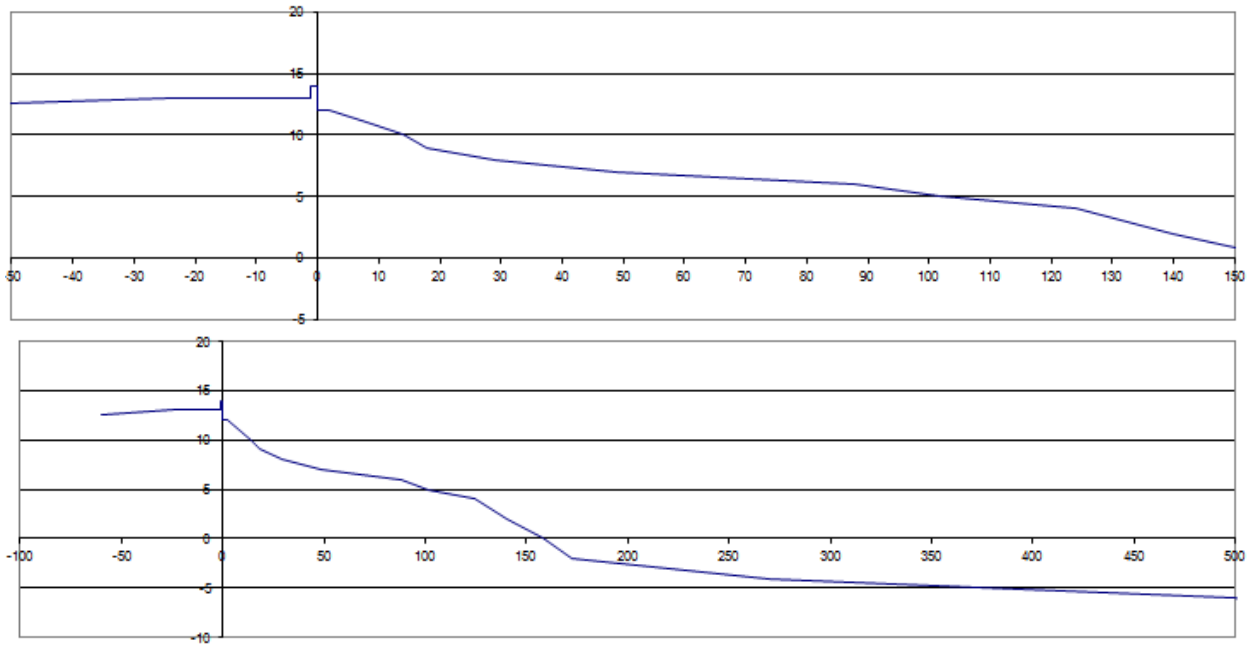
Reach 1b. This reach extends approximately 5,300 ft along the shoreline from the stone groin east to Duck Island Lane. The waterfront along this stretch of shoreline is a typical dune and beach formation with approximately +15.5 ft NGVD dune crest, sloping berm, steep foreshore slope, and mild offshore slope. Asharoken Avenue is located landward of the dune with private properties located further landward of the road. The average ground elevation (of Asharoken Ave.) behind the dune is approximately 12 ft above NGVD. The 50 ft wide sloping berm changes from +10 ft NGVD at the toe of dune down to +4 ft NGVD. Foreshore slope along this reach is approximately 1 vertical on 8 horizontal. The average beach width from base of dune to 0 ft. NGVD shoreline is approximately 100 ft. Offshore slope is approximately 1 vertical on 100 horizontal.





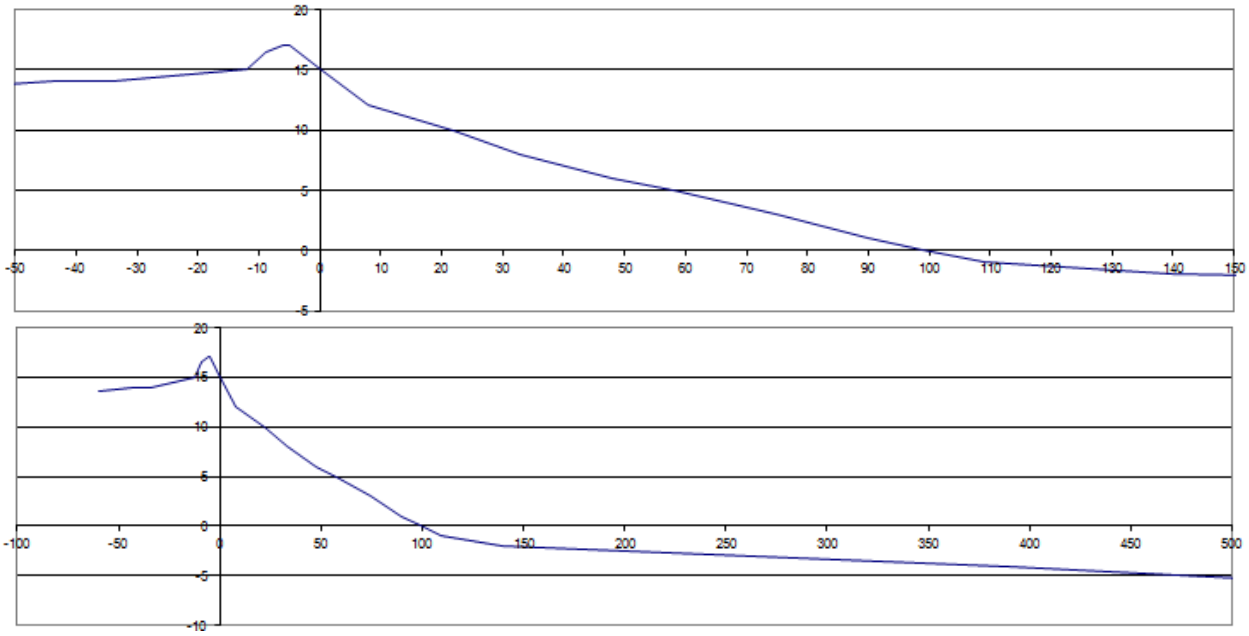
Typical Profiles for Reach 1b Shoreline

Reach 2a. This 5,000 ft reach, extending from Duck Island Lane (located at approximately the first house on the waterfront) east to the last house on waterfront (approximately 1,200 ft west of west jetty) is characterized by waterfront properties protected with timber bulkheads at an average of approximately +14 ft NGVD crest elevation. The average ground elevation behind the bulkhead is approximately +13 ft NGVD. There is a stretch of approximately 800 ft shoreline without bulkhead but protected with dune crest at an average of +15 ft NGVD. Typical beach profile in this reach is comprised of a relatively low berm and a steep foreshore slope at 1 vertical on 8 horizontal. The average seaward berm elevation stands at +4 ft NGVD and gently slopes up to +12 ft NGVD. Riprap toe protection fronting the bulkhead is scattered along the entire length of the reach. The average beach width from bulkhead to MHHW (+3.9 ft. NGVD) shoreline ranges between approximately 0 to 120 ft. The offshore slope is approximately 1 vertical on 100 horizontal.



Typical Profiles for Reach 2a Shoreline

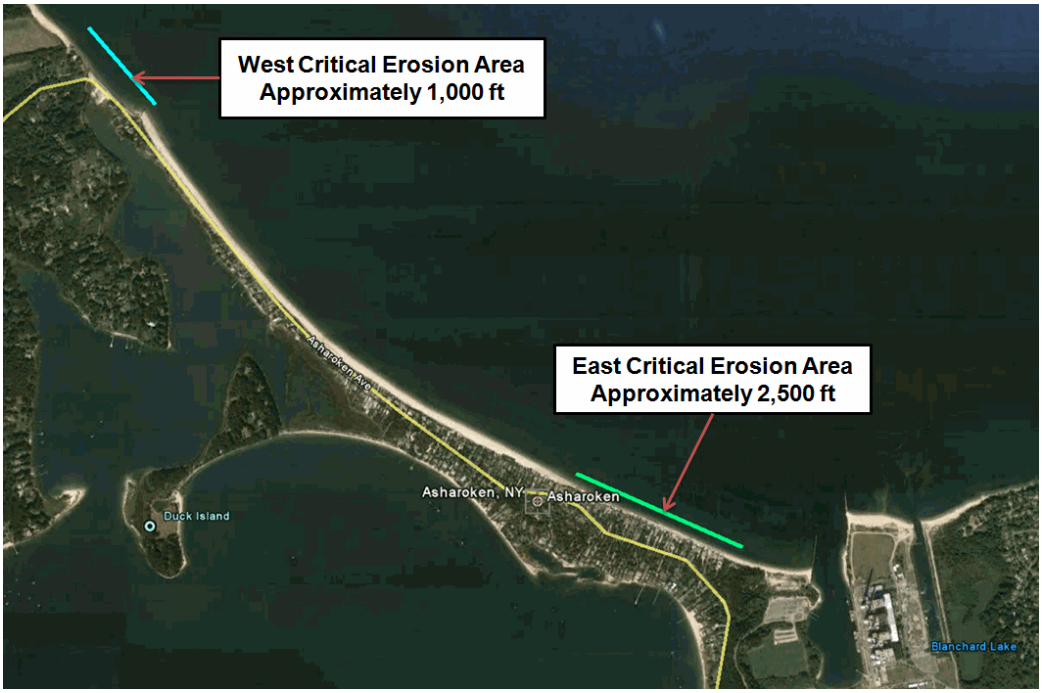
Reach 2b. This reach extends approximately 1,200 ft along the shoreline from eastern limit of private houses (approximately 1,200 ft west of the west jetty) to the west jetty of the intake lagoon. This stretch of shoreline is a typical dune and beach formation with approximately +17 ft NGVD dune crest, sloping berm continuous with a steep foreshore slope to elevation –2 ft NGVD and a mild offshore slope. The average ground elevation behind the dune is approximately 14 ft above NGVD. The foreshore beach slope is approximately 1 vertical on 8 horizontal. Offshore slope is approximately 1 vertical on 100 horizontal. Seaward dune slope is approximately 1 vertical on 3 horizontal. The average beach width from base of dune to MHHW (+3.9ft. NGVD) shoreline is approximately 40 to 60 ft.



Typical Profiles for Reach 2b Shoreline

In addition to the general shoreline recession in the four Reaches described above, there are two critical erosion areas located near the western and eastern boundaries of the project shoreline as shown in Figure 4.

Figure 4. Asharoken Beach Critical Erosion Areas



The Asharoken shoreline faces northeast and is thus exposed to erosion from surges and waves on Long Island Sound generated from northerly to easterly winds. These coastal effects dominate the erosive processes along Asharoken Beach. The effects of these erosive forces are exacerbated by the lack of accretion on the beach due to existing sediment transport conditions.

Shoreline sediment transport analyses indicate that the Northport Power Plant inlet and jetties form a littoral block. This littoral block effectively limits the westward movement of sediment – the predominant direction of littoral transport along the northern shore of Long Island – and contributes to the long-term erosion of the study area. Aspects of power plant operation are shown in Figure 5. To the east, the warm water discharged by the power plant flows over a weir. Since the original construction of the jetties, the shoreline just east of the jetties has accreted, while the shores to the west and northwest have eroded. The only sand that is bypassing around the jetties is the inlet dredged material placed on the beach (Reach 2B) just west of the west jetty as part of the power plant operation (USACE-NYD, 2013).

Figure 5. Northport Power Station

1.1 Objectives

Planning objectives were identified based on the problems, needs, and opportunities, as well as the existing physical and environmental constraints present in the study area. The primary Federal objective is to contribute to the National Economic Development (NED) account consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders and other Federal planning requirements. Accordingly, the following objectives were identified:

- Reduce the probability of storm-induced damages in the Village of Asharoken.
- Reduce emergency costs in responding to overwash and repair work associated with maintaining Asharoken Avenue.
- Contribute to the national economy by reducing repair, rehabilitation, and flood-fighting costs associated with flood damage to structures and supporting infrastructure.
- Maximize NED benefits in all plan components, in accordance with the limits of institutional participation.

1.2 Purpose and Need for Action

The purpose of the proposed action is to stabilize the beach and prevent erosion and flooding along Asharoken Avenue. The Proposed Action is needed because the study area has experienced moderate to severe beach erosion from storm-induced waves and wave run-up. The coastal hazards of long-term and storm-induced erosion and wave attack pose the greatest threat to residential structures, Asharoken Avenue, and, in particular, the remaining protective beach along the Long Island Sound. As Asharoken Avenue is the only vehicular access to Eaton's Neck, one of the most critical problems for the study area is wave attack and severe beach erosion fronting Asharoken Avenue in Reach 1A at the northwestern end of Asharoken Beach near the intersection with Bevin Road. In addition, some residences in the study area are susceptible to inundation by high storm surge levels and have previously experienced first-floor flooding, resulting in damages to the contents and, to a minor extent, structures of buildings (USACE-NYD, 2013).

Asharoken Avenue has been damaged numerous times as a result of wave action and storm-induced erosion. In the Thanksgiving storm of 1950, Asharoken Avenue was partially destroyed when erosion undermined the road, causing the concrete to buckle. Evacuation delays were incurred in addition to high utility repair and road restoration costs. During more recent storms, the northwestern portion of the study area (Reaches 1A and 1B) has continued to experience storm surge and wave attack that have caused overtopping of the dune system and erosion of the beach. This overtopping has deposited sand and debris on Asharoken Avenue, obstructing the road for hours and causing damage to utilities and the road bed. Damage during the December 1992 northeaster occurred primarily along a 900-ft section of the road (Reach 1A) near the vicinity of Bevin Road. During the March 2010 northeaster, which sustained Level I Hurricane gusts, a length of Asharoken Avenue's roadbed was damaged and fiber optic cables were exposed (USACE-NYD, 2013).

Closure of Asharoken Avenue disrupts access for the residents of Eaton's Neck. The loss of access creates a safety hazard as Eaton's Neck is cut off from emergency services including fire, police, and ambulance. Although there is a firehouse on Eaton's Neck, no additional resources are available to fight a large fire when the road is impassable. While Asharoken Avenue was blocked during the December 1992 storm, two residents of Eaton's Neck had to be evacuated by helicopter for medical treatment. In the March 1993 northeaster, fire fighters were unable to reach a burning residence due to flooding on Asharoken Avenue (USACE-NYD, 2013).

During the 1992 Northeaster, several homes on the Northport Bay and Eaton's Neck reported flooding problems caused by high surge. Flood levels have ranged from 1 to 2 ft above the first floor in some structures. Local officials agreed that Long Island Sound storm forces are the main problem, and the bayside flooding problems are relatively minor. None of the structural measures considered for Asharoken in this report are designed to reduce the risk of flooding from Northport Bay. As is discussed later in this report, non-structural measures were considered for threatened residences along the Northport Bay side of Asharoken Avenue (USACE-NYD, 2013).

The southeastern portion of Asharoken Beach (Reach 2A) is also susceptible to storm-induced erosion. Residents have constructed a nearly continuous line of private bulkheads to protect approximately 70 year-round residences located between Long Island Sound and Asharoken Avenue. These bulkheads vary in height, construction material, and condition, providing

inconsistent levels of protection. During the December 1992 northeaster, several residential structures in this area were damaged by erosion, and privately constructed bulkheads were damaged due to erosion and wave attack.

In 2012, during Hurricane Sandy, waves overtopped the bulkheads, resulting in surface erosion and flooding, as well as direct damage to several structures in this area (USACE-NYD, 2013). Heavy flooding, carrying with it high volumes of sand and associated debris remained covering wetlands and understory plants when the tides and floodwaters receded.

1.3 Proposed Action

The proposed plan for Asharoken Beach includes the dredging and placement of approximately 600,000 CY of fill material to rebuild the beach with a 50' to 100' wide berm depending on location. The source of the initial sand for the beachfill will be an offshore borrow area (Figure 6). Periodic re-nourishment is anticipated at a frequency of 60,000 CY every 3 years with the re-nourishment sand trucked in from a certified source. Another re-nourishment source will be sand dredged from the National Grid power station inlet to the east and "by passed" to the project site (@15,000 CY annually).

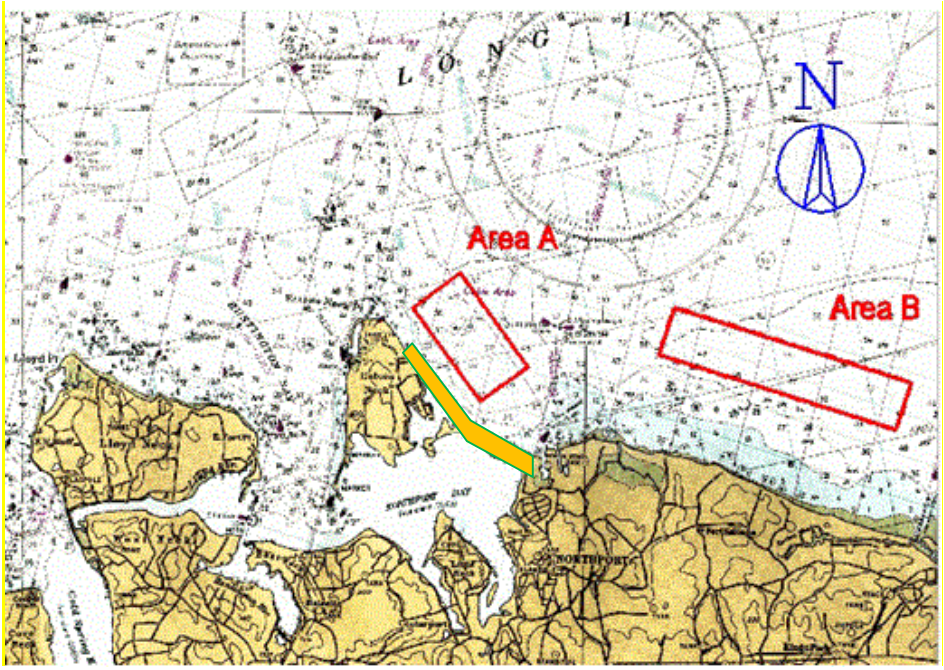


Figure 6. Borrow Source (Area A) General Location Map

1.4 Project Authorization

The North Shore of Long Island, New York, study was authorized by the Committee of Public Works and Transportation, United States House of Representatives, adopted 13 May 1993. To wit:

> Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, That, the Secretary of the Army, acting through the Chief of Engineers, is requested to review the report of the Chief of Engineers on the North Shore of Long Island, Suffolk, County, New York, published as House Document 198, Ninety-second Congress, Second Session, and other pertinent reports to determine whether modifications of the recommendations contained therein are advisable at the present time, in the interest of beach erosion control, coastal storm risk management and related purposes, on the North Shore of Long Island, New York, particularly in and adjacent to the communities.

2.0 SELECTED PLANNING ALTERNATIVES

The USACE-NYD developed multiple coastal storm risk management alternatives consistent with both Federal objectives and the desires of the community. The alternatives that best met the economic, environmental, health and safety, and technical criteria for this study area consisted of Alternatives 1, 4, and 5, of 5. Alternative 4 was chosen as the Tentatively Selected Plan, TSP. A description of all five of the final alternatives including why two were eliminated, is located in the Feasibility Report. The following paragraph and associated table give a brief overview/comparison of the 3 short listed Alternatives and each one's environmental effects.

Table 1

	Alternative 1	**Alternative 4**	**Alternative 5**
	Beachfill Only	Beachfill+3 West Groins	Beachfill+11 Groins
Initial Fill Volume (CY)	600,000	600,000	600,000
Coastal Structures	n/a	3 rock groins	11 rock groins
Nourisment (cy/period)	80,000 cy/3 yrs	80,000 cy/5 yrs	100,000 cy/10 yrs
Total Nourishment in 50yrs	1,000,000 cy	800,000 cy	500,000 cy
Advantages	Low Initial Cost	Reduced Erosion Rate	Reduced Erosion Rate
		Reduced Nourishment	Reduced Nourishment
		Volume and Frequency	Volume and Frequency
		Stabilized West	Stabilized both East and
		Shoreline	West Shoreline
		Reduced Seawall Damage	Reduced both Seawall and
			Timber Bulkhead Damages
Disadvantages	Frequent Nourishment	Need Downdrift Mitigation	Need Downdrift Mitigation
	Frequent Seawall and		
	Bulkhead Damage Repair		

Area of Groin Footprints: Alternative 4 = 0.58 acre /Alternative 5 2.54 acres

As one can see from the above table, the initial beach fill operation is identical among all the alternatives as would be the environmental effects of this construction phase. Thus any differences in environmental impacts would arise from the variations in re-nourishment cycles and volumes. In regard to re-nourishment cycles and volumes placed, there might be difference in benthic recovery and benthic diversity between Alternative 1 and Alternative 4 and 5 because of the higher frequency of placement of Alternative 1. The difference in impacts related to the frequency of re-nourishment between 4 and 5 is probably not significant because benthic recovery is anticipated to be complete after 1-2 years. Because Alternative 1 is likely to place sand every two years it is likely that these shorter recovery periods would develop a less mature near-shore sub-littoral benthic/population/habitat, at least within the placement foot print.

2.1 Tentatively Selected Plan

The Tentatively Selected Plan (TSP) consists of approximately 2.4 miles of initial beachfill and periodic nourishment of sand. A preliminary design baseline has been set up along the existing permanent features, which include the existing steel bulkhead seawall at the western border of the study area, Asharoken Avenue, and the timber bulkhead along the eastern half of the project shoreline.

Details of the selected protection plan are described below by section reach. The beach nourishment template can be seen as Figure 7. Planned Project Beach Profiles are located in Table 2.

Station 0+ 00 to 9+00 – Initial 100 ft Width Composite Beachfill and 500 ft Beachfill Tapers
This 900-ft shoreline fronts the existing steel bulkhead seawall and would receive beachfill with a high berm elevation of +12 ft North American vertical Datum (NAVD) and low berm at +8 ft. The crest width of the +12 ft berm is 50 ft, with 1 vertical on 5 horizontal seaward slope. The +8 ft berm is 30 ft wide with a 1 vertical on 15 horizontal foreshore slope. The composite beachfill will provide storm wave protection to the existing bulkhead seawall.

Station 11+ 00 to 61+00 – 100 ft Width Composite Dune and Beachfill (no advance fill)
A composite 100 ft wide dune and beachfill will be provided in this stretch of shoreline. The dune feature is a +15 ft crest width with 1 vertical on 3 horizontal side slopes on both landward and seaward sides. The berm is 50 ft wide with 1 vertical on 15 horizontal foreshore slopes. The proposed dune and beachfill will provide a total of 200 ft wide beach and a higher dune elevation.

Station 63+ 00 to 124+00 – 100 ft Width Beachfill including 50 ft Advanced Nourishment The stretch of shoreline with existing timber bulkheads would receive berm and beachfill totaling 100 ft. The proposed beachfill will include a 50 ft wide berm at +8 ft NAVD and 1 vertical on 15 foreshore slopes, plus an additional 50 ft berm width equivalent to 5 years of advance nourishment volume, including contingency due to outdated offshore bathymetry.

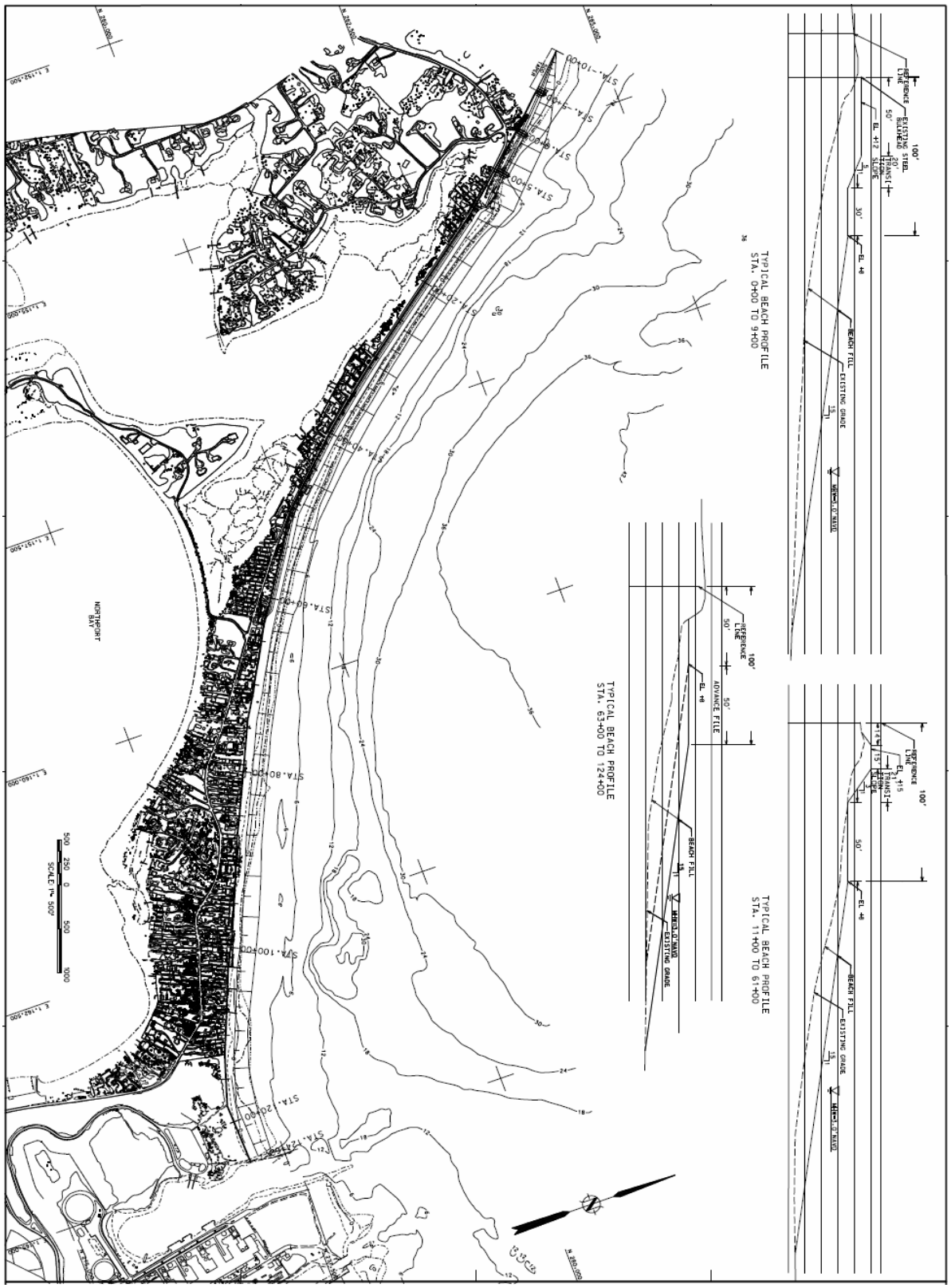


Figure 7. Beach Nourishment Template (see Engineering Appendix)

Tapering and Transition Beachfill

A 500 ft beachfill taper will be provided from Station -5+00 to -10+00. This transition will provide a continuous beachfill shoreline and stability. Two 200 ft beachfill transitions will be provided at station ranges from 9+00 to 11+00 and from 61+00 to 63+00 to maintain a continuous shoreline.

Periodic Nourishments

Beach re-nourishment is required over the life of the project to counteract long-term and storm-induced erosion and additional erosion from sea level rise. In addition to the advance nourishment during initial fill, an estimated 80,000-cy nourishment would be provided every 5 years to maintain the design beachfill profile. The nourishment would be placed between stations 62+00 to 124+00 as both beachfill and feeder beach. However, this nourishment would be adjusted based on the actual shoreline response, particularly the response of the 900 ft steel bulkhead seawall site.

Following nourishment, the dune elevation would be approximately 15 ft. NGVD, with a 15-ft dune crest width, 1V:5H dune slopes, and a 50-ft berm width having a berm crest at elevation +7 to 8 ft NGVD (historically the most stable berm crest elevation to prevent scarping) with a historically stable 1V:15H foreshore slope, and sand fence and beach grass for added dune stability. A typical beach nourishment profile with berm and dune fill is shown in Figure 9.

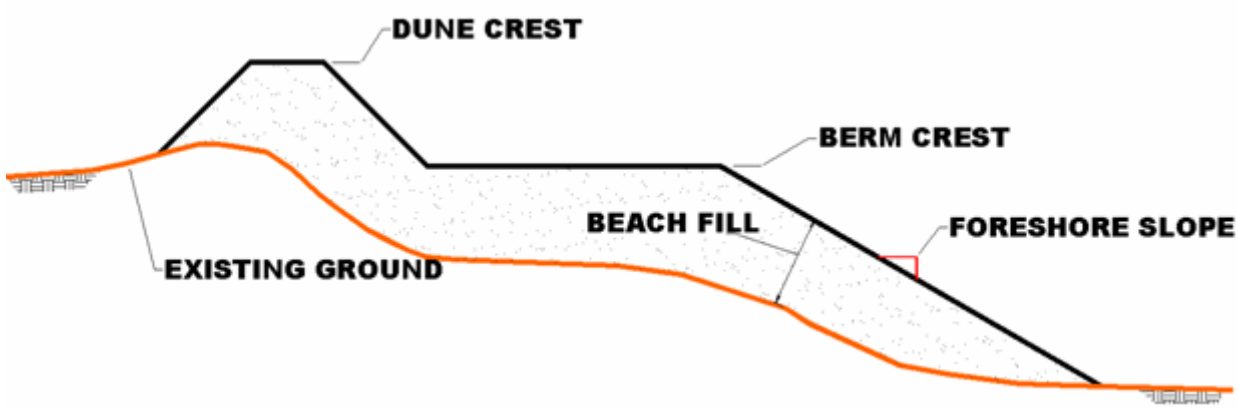


Figure 8

Borrow Source

The initial fill and advance fill source would be from Borrow Area A, just northeast of Asharoken Beach as shown in Figures 9 and 10. The boundaries of borrow area (north and south respectively) range from about 0.43 to about 0.85 miles offshore, perpendicular to the shore line. The water depth at the borrow site ranges from about 20 to 40 feet. Sand will be removed from an existing

ridge minimizing any depression left by the dredge foot print within the surrounding bottom surface. Figure 11 displays the post dredge bathymetry profiles of transects lines 5 through 8 as seen in Figure 10. Depth at the bottom of the dredge footprint will parallel the contour of the ridge that is being cut back, thus the depth will vary from 35' to 37' and will not leave a large depression.

Figure 9 Detail of Borrow area A footprint from within the larger Area A box

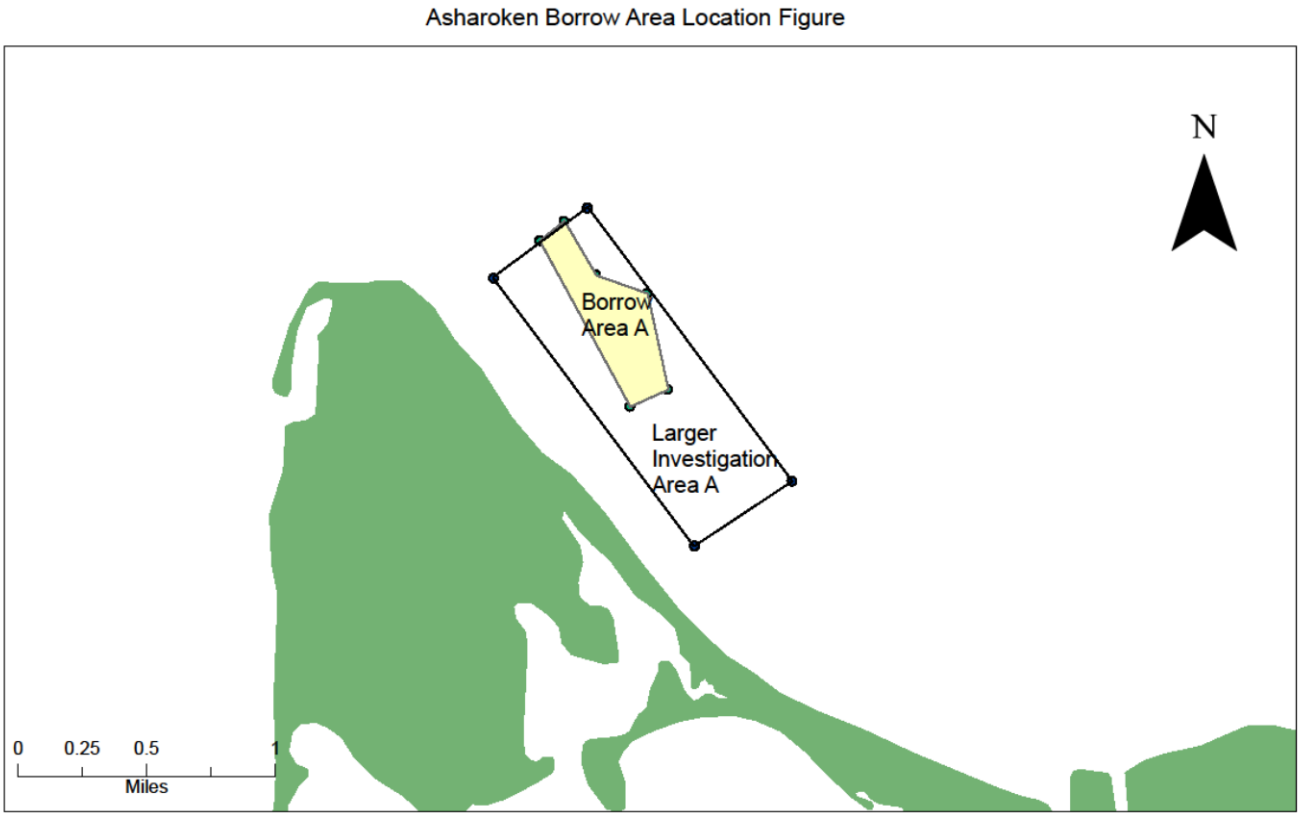


Figure 10. Dredge footprint detail note transect lines

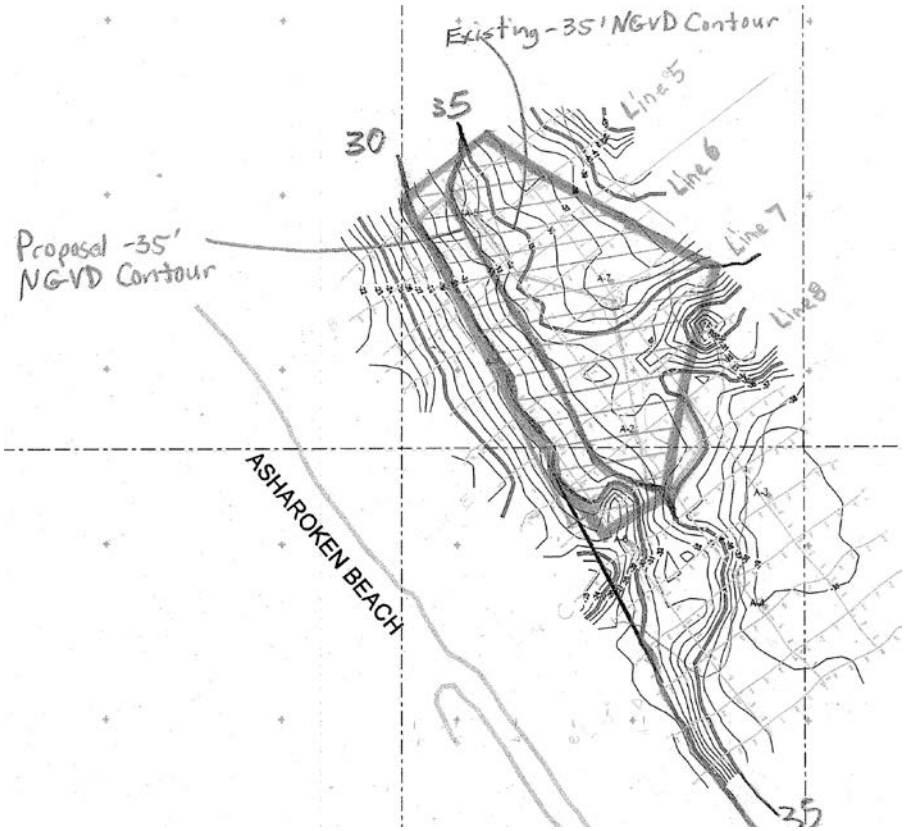
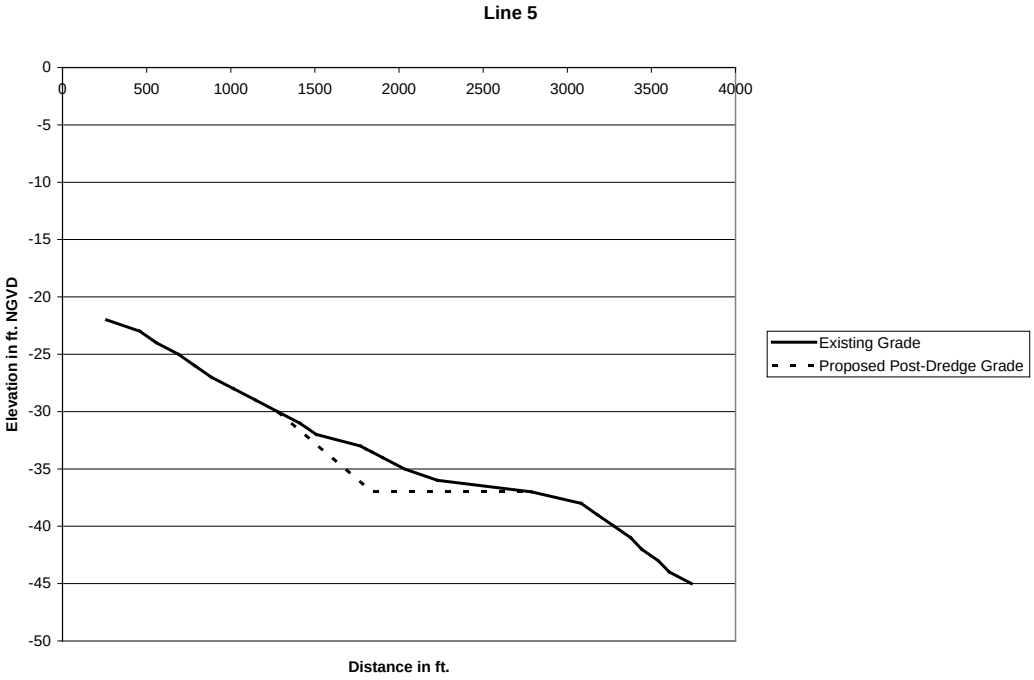
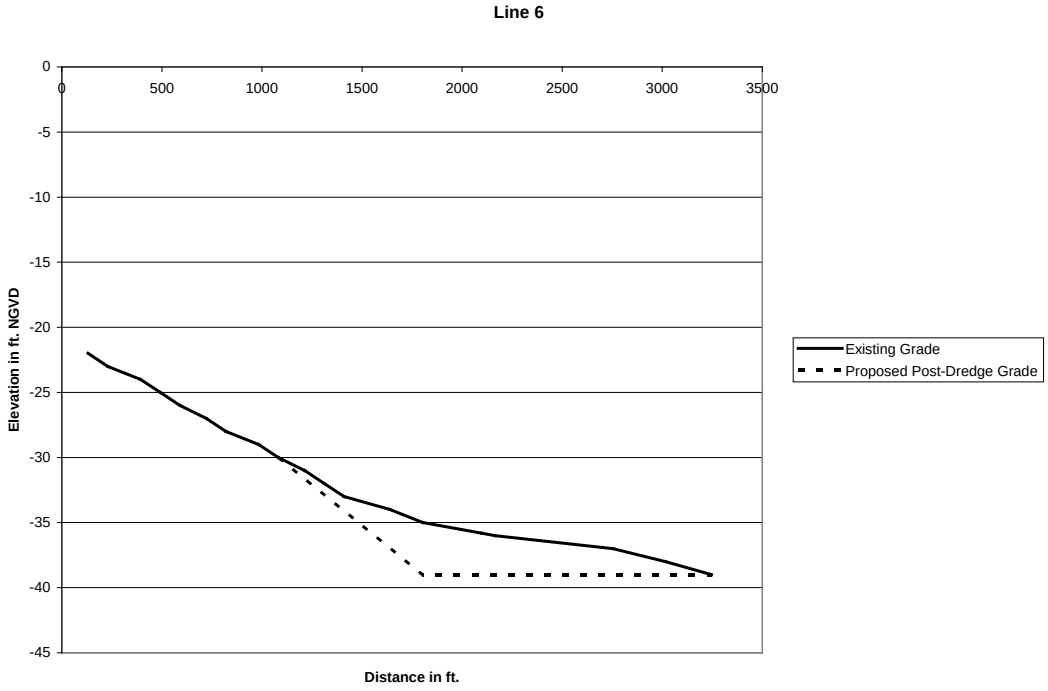
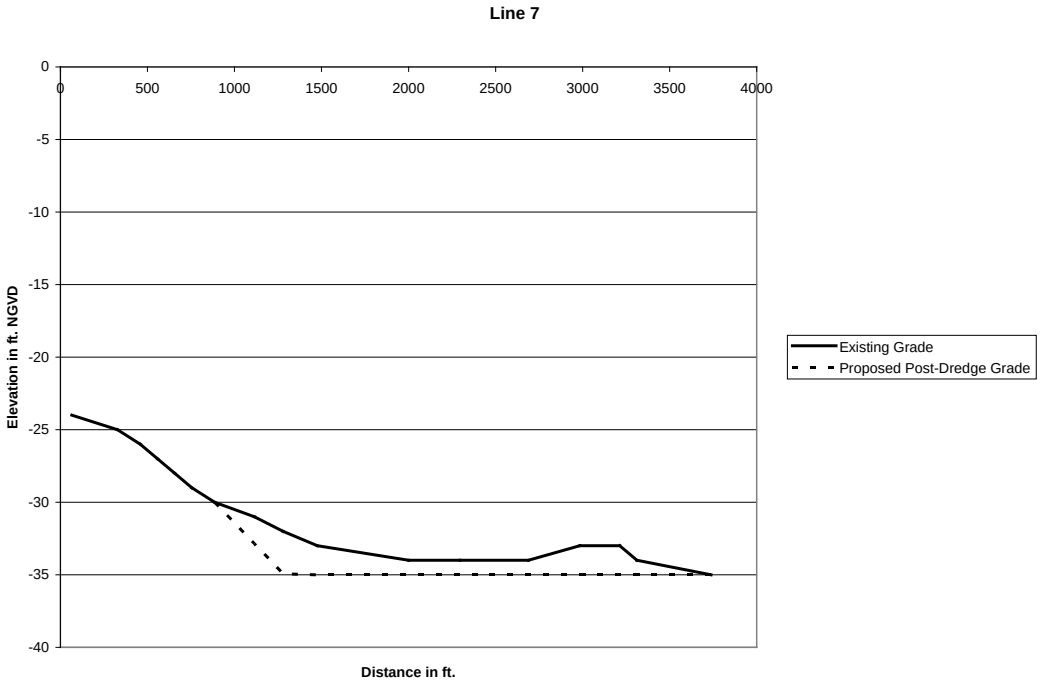


Figure 11 Borrow Area dredge transect bathymetry profiles




Line 6
0
500
1000
1500
2000
2500
3000
3500
-5
-10
-15
-20
-25
-30
-35
-40
-45
Elevation in ft. NGVD
Distance in ft.
Existing Grade
Proposed Post-Dredge Grade


Line 7
0
500
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4000
-5
-10
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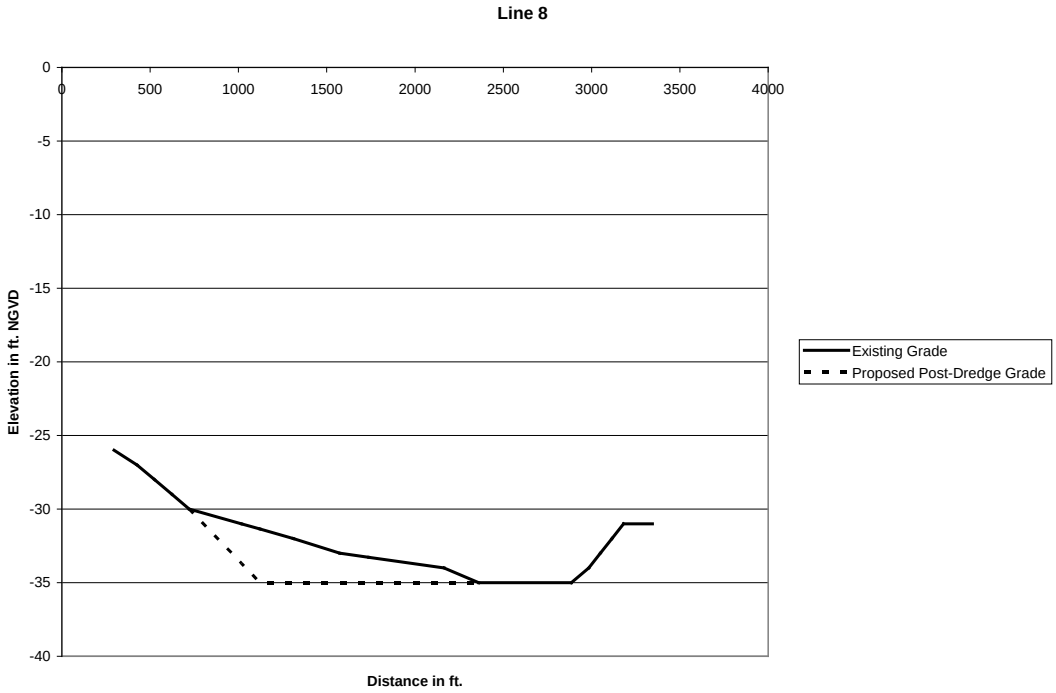
-30
-35
-40
Elevation in ft. NGVD
Distance in ft.
Existing Grade
Proposed Post-Dredge Grade



Cutterhead dredge would be the preferred method of dredging in Area A since it combines the qualities of high productivity in difficult soils with the ability to transport via pipeline to shore over distances of up to 15,000 feet and 30,000 feet with a booster pump. However, the Cutter Suction is unsuitable for large production in cobbles. Bars may be installed at the input end of the suction tube to reject large cobbles at their source. Where the cutterhead dredge cannot efficiently work, the backhoe or clamshell dredge would be utilized. A certified upland borrow source would be used for periodic re- nourishment cycles (80,000 CY every 5 years if needed).

Because public funding is being used to build this (beach) project, under 33 **U.S.C.** § **426e** (d), public access must be provided as part of the final project construction. As per USACE regulation access points must be available every ½ mile providing ingress or egress from the site within a quarter mile of any place on the project beach. Five access points are planned with the 2.5 miles of the project reach, with extra parking locations planned at the east and west ends.

2.2 Future Without Project, No Action Alternative

Under the Future Without Project (FWOP) condition, no action would be taken to stabilize the shoreline. Long term shoreline erosion and recession would continue along Asharoken Beach, particularly near the intersection of Asharoken Avenue and Bevin Road, and would increase the risk of damage to the Asharoken Avenue roadbed. Storm events would have the potential to obstruct Asharoken Avenue due to roadbed damage, flooding, or the deposition of sand and debris, disrupting emergency services for residents of Eaton's Neck. As Asharoken Avenue is the only vehicular access to Eaton's Neck, first responders during an emergency situation, such as fire, police, and ambulance services, would be impeded if Asharoken Avenue is obstructed. The protective beach along the southeastern portion of Asharoken Beach, adjacent to approximately 70 residences, would continue to erode, flood and increase the risk of damage to residential

structures and bulkheads. Wave run-up and over topping would continue and lead to additional property damage.

In the absence of a shore protection project, it is assumed that the current coastal features (jetties, groins, Section 103 project, bulkheads, etc.) would remain in place and be repaired as necessary. It is also assumed that the power plant would continue to operate in a similar manner, periodically placing dredged material from the intake channel on the immediate down drift (western) shore. For evaluation purposes, the average yearly quantity of dredged material is estimated to remain at 15,000 cy/yr, as noted in recent historic records and the most recent dredging permit. It is also assumed that no additional littoral material would be transported to Asharoken Beach from the eastern shoreline. The expected future without project conditions for each of the four reaches are discussed below (USACE-NYD, 2013).

In addition, the two critical erosion areas would continue to be impacted. For the Western area, the continued destabilization of existing riprap, frequent seawall damage, overtopping and roadway damage as well as worsened down drift bluff erosion. For the Eastern Area, sediment deficits, un-natural shoreline alignment of timber bulkheads, deep water hole offshore which would worsen erosion and storm wave overtopping.

2.2.1 Reach 1A

Reach 1A from the vicinity of Bevin Road to the stone groin is the site of the temporary Section 103 project bulkhead and dune, constructed by the USACE in 1996 to 1997 and repaired in 2007, 2010, and 2013. This project was designed to reduce the threat of compromising Asharoken Avenue until a more comprehensive solution could be developed. The road elevation in this reach is approximately +7 to 9 ft NGVD. The beach profile in this reach is characterized by a steep foreshore slope and a narrow berm at +8 ft NGVD in front of the steel bulkhead. The foreshore slope is approximately 1 ft vertical on 8 ft horizontal down to elevation -6 ft NGVD. Beach widths in this reach range from 80 to 100 ft from the bulkhead to the 0 ft NGVD shoreline. The offshore slope ranges from 1 vertical ft to 15–100 ft horizontal.

The 1996-97 bulkhead and dune project has prevented the erosion of Asharoken Avenue for over 15 years. However, without a regular supply of littoral material, which is partially impeded by the groin structure, the beach to the north of this project has almost disappeared and moderately high tides and waves have attacked the bulkhead and the toe stone. In the Future without Plan scenario, the small remaining beach would continue to recede, eventually causing bulkhead failure. In addition, storm-induced overtopping waves would cause the bulkhead to fail with rapid dune erosion, leading to frequent over-washes of Asharoken Avenue and damage to the road itself, interrupting access to Eaton's Neck. The existing beach protection provides for the equivalent of a surge from an approximately 10 percent storm event, which, due to erosion, is reduced to an approximately 20 percent storm event in the Future Without Plan scenario (USACE-NYD, 2013).

For evaluation purposes, it is assumed that the project would not completely fail until 2020, depending on the intensity of storms. Once failure occurs, it is assumed that, to save the road, the Village of Asharoken would undertake remedial measures or repairs consisting of driving steel sheet pile with rock armor toe protection and placing sand beachfill. This local work would

provide protection against a storm with a surge elevation equivalent to a 20 percent storm event. Repairs would be repeated as necessary to maintain useable and safe road conditions

2.2.2 Reach 1B

This 5,300-ft-long reach extends from the extant stone groin southeast to the westernmost residential structure near Duck Island Lane. This reach is a dune and beach area with a dune crest of +15 ft NGVD, a sloping berm, a steep foreshore slope, and a mild offshore slope. Asharoken Avenue lies just landward of the narrow dunes with residential structures located further landward. Some of the dunes in this reach are no more than steeply sloped fill material placed just seaward of the road. Moving from northwest to southeast, the dunes become wider and more vegetated. The average ground elevation behind the dune is approximately +12 ft NGVD. The 100-ft-wide sloping berm changes from +12 ft NGVD at the toe of the dune down to +5 ft NGVD. The foreshore slope is about 1 ft vertical to 8 ft horizontal. The average beach width ranges between 100 and 150 ft. The offshore slope is approximately 1 ft vertical on 100 ft horizontal.

The long-term horizontal erosion rate in Reach 1B is about 1 ft/yr. Wave attack during moderate to severe storms would cause dune failure, particularly from wave overtopping and overwash. Initially, dune lowering would deposit sand on the road and nearby landward properties but wave attack during surge elevations of 5 to 15-year storm events would eventually damage the road and the structures behind the road.

As a recent example, the waves and high surge from Hurricane Sandy in October 2012 essentially destroyed the dunes in Reach 1B. Sand from the road area and approximately 5,000 CY of trucked-in sand were used to build a narrow triangular-shaped dune immediately seaward of Asharoken Avenue. This is considered a typical response to storm events in the FWOP scenario, and would be repeated as necessary after storm events (USACE-NYD, 2013).

2.2.3 Reach 2A

This 5,000-ft reach, extending from the westernmost residential structure near Duck Island Lane southeast to the easternmost residential structure on Asharoken Beach, is characterized by waterfront properties protected by timber bulkheads, some with riprap toe stone protection, at an average crest elevation of +14 ft NGVD. The average ground elevation behind the bulkhead is +13 ft NGVD. There is a stretch of shoreline without bulkheads within the reach that is 800 to 1,000 ft long and includes dunes with a crest elevation averaging +15.5 NGVD. The beach berm has a maximum elevation of +12 ft NGVD, which gentle slopes down to an average berm height of +4 ft NGVD. The beach width ranges between 150 and 180 ft. The offshore slope is approximately 1 ft vertical on 100 ft horizontal.

The long-term horizontal erosion rate in this reach is approximately 1 ft/yr. In the Future Without Plan condition, the existing bulkheads and dunes would eventually exhibit intermittent failure due to toe scour and wave overtopping forces. It is estimated that a storm surge elevation associated with a 5 to 15 year storm event would initiate bulkhead failures and a rapid loss of inland material, leading to damage of any residential structures located near the bulkheads.

In the future without project condition, it is expected that residents would try to prevent the undermining of their homes by performing remedial bulkhead maintenance when less than 5 ft of

littoral material remains in front of the bulkheads. Such remedial maintenance would consist of a single row of timber bulkhead with limited rock armor toe protection, placement of sand fill on the nearby foreshore and landward sides of the bulkhead.

2.2.4 Reach 2B

This reach is 1,200 ft long, extending from the last shorefront resident to the east jetty at the power plant. This undeveloped shoreline has a large dune system with a +17 ft NGVD dune crest, a sloping berm down to -2 ft NGVD, and a mild offshore slope of 1 ft vertical on 100 ft horizontal. The average ground elevation behind the dunes is approximately +14 ft NGVD. The average beach width is approximately 100 feet. Horizontal erosion in this reach is estimated at 5 ft/yr. Dune overwash and overtopping from waves is considered minimal in this reach due to the high dune elevations. Erosion is partially offset by the periodic placement of material dredged from the power plant cooling water intake channel.

Based on the above assessment of the existing conditions and expected Future Without Project, the primary storm damage would continue to be long- term erosion, and overtopping of dunes and bulkheads due to wave attack. Storm surges in both Long Island Sound and Northport Bay have the potential to inundate Asharoken Avenue and damage structures, and pose a serious threat to low-lying properties along the bay side. Erosion forces along the bay side of Asharoken Avenue are considered to be negligible.

3.0 AFFECTED ENVIRONMENT / EXISTING CONDITIONS

The following sections describe the existing environment of the study area and surrounding lands and water.

3.1 Land Use/Zoning

The land use in Asharoken and Eaton's Neck is predominantly single family housing. Of the 1500 acres in the Village of Asharoken, less than 500 acres are vacant. Within the incorporated Village of Asharoken and the Unincorporated section of Eaton's Neck there are four institutional uses: The Village Hall and Police Station, the US Coast Guard station, the Eaton's Neck Firehouse and the Town of Huntington Beach House. The power plant is located within the study area, but not within the Village of Asharoken.

3.2 Geological / Topography and Soils

Long Island belongs to the inner part of the Atlantic Coastal Plain. Major topographic features include the north shore plateaus, which are glacial moraines, and the southern sloping plains. Portions of the island consist of true coastal plain deposits, whereas the greater portion of both the surficial and underlying materials were formed during the Pleistocene age and consist of moraine-derived and outwash accumulations associated with the continental glaciers (USACE-NYD, 2002).

Two terminal moraines of the Wisconsin ice sheet, the Ronkonkoma and the more northerly Harbor Hill moraine, deposited material from New England and New York forming two low,

roughly parallel ridges across what would become Long Island. The ice sheet also crushed and re-deposited the existing cretaceous sedimentary rocks. The surface adjacent to these moraines was then built up from gravels, sands, and muds from glacial outwash and a brief interglacial period. Sea level rise during the early Holocene then filled the lower-elevation Long Island Sound and left the elevated moraines and their outwash separated from southern New England, forming the island. The local topography was then shaped by water courses flowing from the moraine ridges south or north through the outwash sediments.

Along the north shore, bays and harbors alternate with peninsulas and necks that are backed in some areas by fresh cliffs or bluffs of shore scarp, creating a highly irregular shoreline. The north shore harbors and bays are in locations of former Cretaceous-era valleys of the north-draining streams. The Manhasset formation covered Cretaceous rocks, and the area was subsequently covered by Wisconsin drift and till. Materials eroded from the necks, headlands, and offshore islands have been deposited as spits, bay mouth bars and tombolos (bars, like Asharoken Beach, which connect offshore islands to the mainland). The extensive unconsolidated sediments underlying the study area range from fine silts and clays to sands and coarse gravel (USACE-NYD, 2002).

The Asharoken shore is oriented to the northeast on Long Island Sound, located between the Eaton's Neck Point bluffs to the northwest and the power plant to the southeast. The narrow beaches of the necks are generally backed by bluffs approximately 30 ft high, with some bluffs over 75 ft high in Eaton's Neck. Elevations decrease easterly from Eaton's Neck Point to the vicinity of Bevins Road, leveling off at approximately 10 to 15 ft NGVD until reaching the west jetty of the power plant cooling water intake lagoon.

Asharoken Beach is sustained by littoral sediment from the east that is transported by reflected wave energy from the northeast. Littoral materials also come from the west as the Eaton's Neck bluffs erode, supplying sediment driven southeastward by waves from the northwest. The jetties and lagoon at the east end of Asharoken Beach, significantly changed the previous pattern of littoral movement. Since the construction of the jetties the shoreline east of the basin has accreted, while the shoreline west of the jetties has retreated. Based on dredging records from the Northport Power Station, the average bypassing rate dredged from the intake channel deposited on the beach just northwest of the west jetty in the period 1962–2001 was approximately 10,000 cy/yr.

The composition of the beach has changed since the construction and subsequent rehabilitation of the jetties by LILCO. Before 1930, the mean grain size of the sand on the beach was about 0.3 millimeters (mm); the current mean grain size is about 0.9 mm. This increase in mean grain size was due to the preferential erosion of fine-grained sand without a continuous supply of fine-grained sand from the east. Consequently, the sand on the beach is coarser than the sand that is being trapped east of the jetties (USACE-NYD, 2013).

The volume of sand transported from the east has decreased over the past 70 years from an estimated 30,000 cy/yr to approximately 15,000 cy/yr. This reduction in the volume of sand was the result of increased property development, particularly the construction of bulkheads and groins along the up drift shorelines west of the Northport Power Station (USACE-NYD, 2013).

A Sediment Transport Analysis was performed for the area located between the Northport Power Station to the east and Eaton's Neck to the west in order to forecast the potential future condition of Asharoken Beach and to determine the volumes of beachfill material necessary for an alternative plan to protect the community and stabilize the shoreline (USACE 2915 Engineering Report). Ten sediment budget cells were established at coastal structure boundaries and where shoreline orientation changes are significant as shown in Figure 13. The 1976–2001 sediment budget illustrates the recent sediment transport pattern at the project shoreline and is used for transport rate estimates. This sediment budget excludes the effect of an 840,000 CY beachfill, which was a non-representative, one-time project in the mid-1960s, but includes the current and ongoing sediment bypassing by the power plant.

Useful key erosion and transport rates derived from this sediment budget (USACE-NYD, 2004) are summarized as follows:

- Based on the 1976–2001 sediment budget, the erosion rate on the eastern shoreline immediately west of the jetties (Cell 4, which includes study Reach 2A and a portion of Reach 1B) is eroding at approximately 10,000 cy/yr in addition to the 10,000 cy/yr bypassed from upstream by the power plant for a total erosion rate of 20,000 cy/yr;

- The shoreline in the middle of Asharoken Beach (Cells 2 and 3, including the majority of Reach 1B) are more stable, experiencing minor shore erosion at approximately 4,000 cy/yr;

- Beach erosion increases along the western shoreline (Cell 1, which includes Reach 1A) at approximately 18,000 cy/yr. This 900-ft shoreline experiences higher erosion due to interruption of sediment supply by the 1996-97 USACE concrete/stone groin located just east of this section;

- The sand spit outside the study area just west of Eaton's Neck Point (Cell 0) is growing at a rate of 16,000 cy/yr, representing net sediment transport into this cell, less sediment lost offshore;

- The sediment supply from the up drift shoreline to the east of the study area is approximately 15,000 cy/yr from Cell 8 to Cell 6, with 10,000 cy/yr being bypassed (via dredging) downstream to Cell 4 (Reach 2B) and approximately 5,000 cy/yr retained in Cell 6 or lost offshore.

In addition, sand has been transported across Asharoken Avenue near Bevin Road from Asharoken Beach to the bayside in Duck Island Harbor.

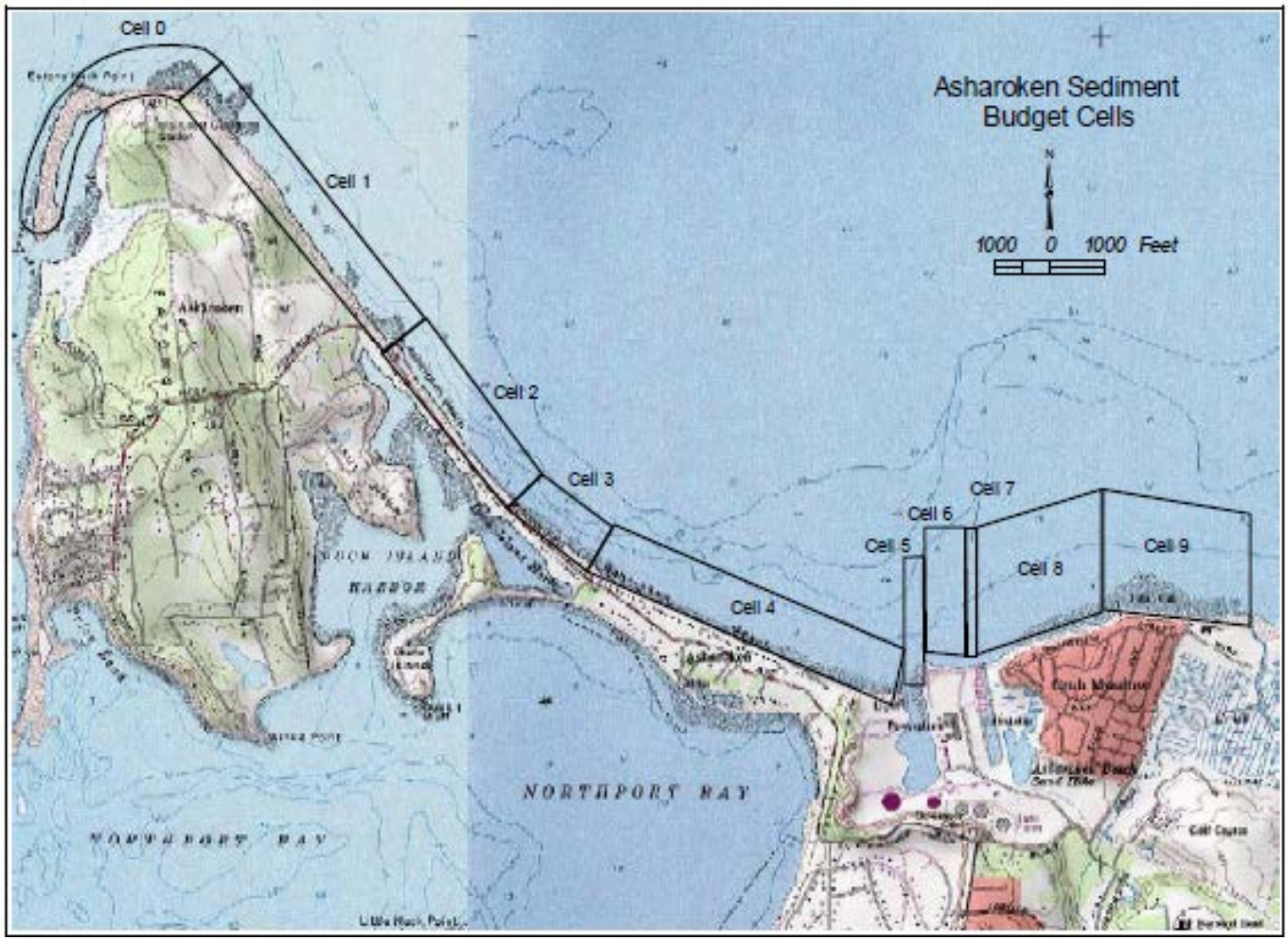


Figure 12. Asharoken Sediment Budget Cells

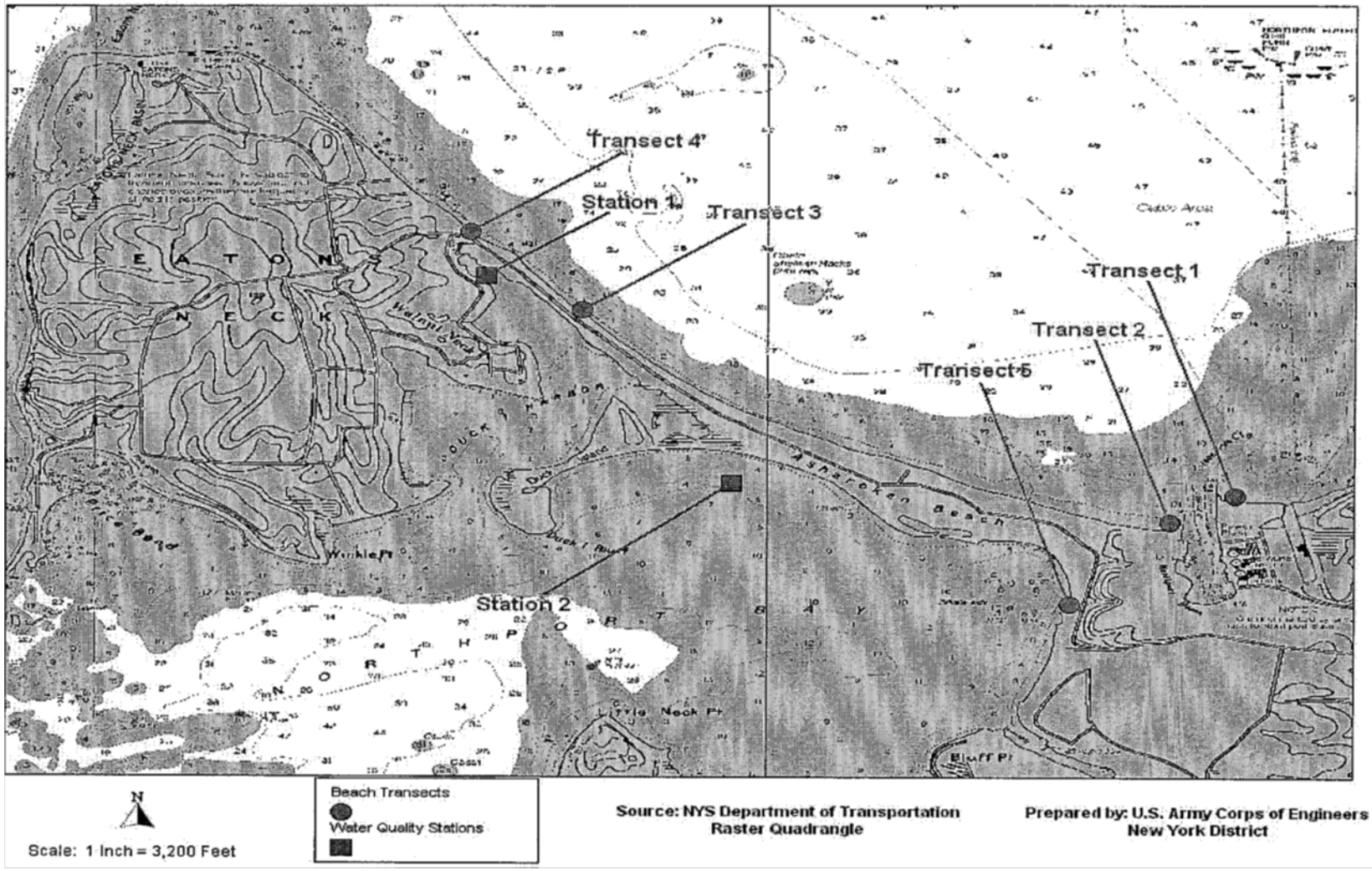


Figure 13. Asharoken beach sample transects and water quality stations.

In association with biological investigations at Borrow Areas A and B, grain size samples were collected during fall 2003 and spring 2004 (USACE-NYD 2007). Samples were taken at 34 stations from Borrow Area A, and from 15 stations in Borrow Area B. (Appendix A). Medium grain size sands were the dominant sediment fraction collected in both Areas A and B (comprising 45 percent in each). Fine sand was the second most abundant fraction, particularly in Borrow Area B. No pebble-sized (or larger) sediments were collected, and only small amounts of silt or clay fractions were present at either site (Figure 9).

In addition to the grain size sampling analysis, a total of 12 samples were collected for analysis of contaminants of concern (COCs) at Borrow Area A. The only COC detected at levels exceeding New York State Technical and Administrative Guidance Memorandum cleanup objective criteria was Chrysene, a polycyclic aromatic hydrocarbon (PAH) typically derived from cigarette smoke, coal tar pitch volatiles, coke oven emissions and diesel exhaust. Chrysene was detected in two out of the 12 Area A samples. A total of six samples were collected for analysis of chemical constituents in Area B. As with Borrow Area A, the only COC found to exceed New York State criteria was Chrysene, which occurred in four out of the six Area B samples. Chrysene is formed in small amounts during the burning or distillation of coal, crude oil, and plant material

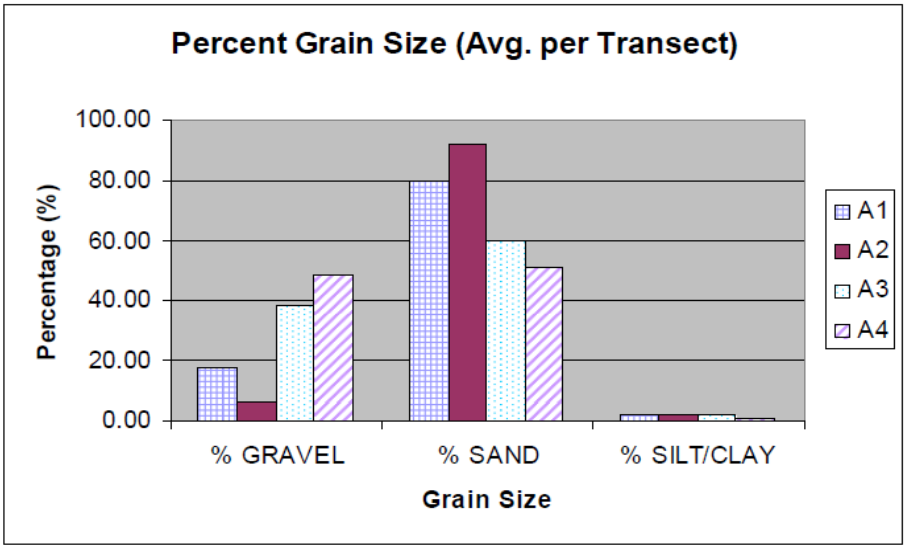


Figure 14. Percent grain size per transect for Asharoken*

*Transects in Asharoken are labeled as 'A [Transect #]'. Transect 5 was conducted in Northport Harbor and was not included in this analysis.

3.3 Climate

The climate in the vicinity of Asharoken, New York, is temperate, with an average annual temperature of 54 degrees Fahrenheit (°F). January and February, the coldest months, have a mean temperature of approximately 34°F, and July and August, the warmest months, have a mean temperature of 74.5°F (Figure 10) (NWS, 2012). The total annual precipitation is, on average,

45.86 inches (in) (NWS, 2012), and in 2011 was 59.19 in (Figure 10) (NOAA, 2014). The predominant winds are to the east-northeast or the west with an average speed of 6 miles per hour (Windfinder, 2014). Damaging waves are produced by northerly clockwise to easterly winds, which occur approximately 36.5 percent of the time throughout the year. Winds that persist through numerous tidal cycles have caused the most severe wave and erosion damages along the study area (Windfinder, 2014).

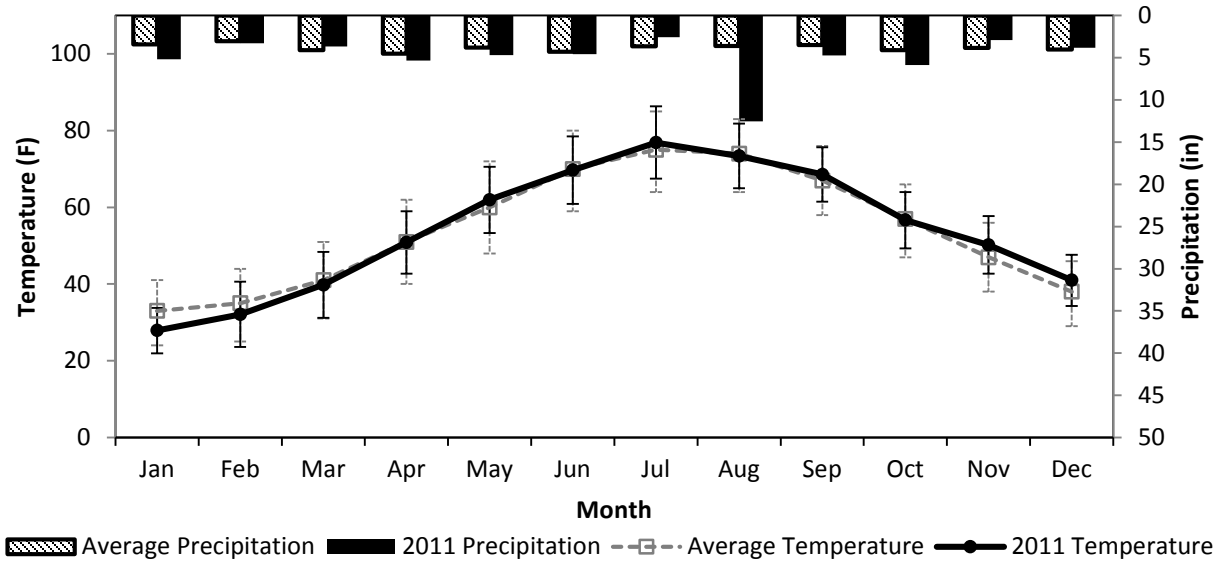


Figure 15. Average and 2011 Monthly Temperature and Precipitation for Asharoken, NY.

The two major types of storms that can affect the study area are (1) Hurricanes and (2) Northeasters. Hurricanes typically occur between June and November, and are uncommon in the study area. Extra-tropical storms, such as northeasters, tend to be less intense than tropical storms, such as hurricanes, but are usually longer in duration. Northeasters occur between October and March, often cause high water levels and intense wave conditions, and can be responsible for significant damage and flooding in the northeastern United States.

3.4 Water Resources

3.4.1 Regional Hydrogeology and Groundwater Resources

Nearly all of the 2.8 million residents of Nassau and Suffolk counties obtain their drinking water from large underground aquifers associated with the glacial moraine. The upper glacial aquifer lies just below the ground surface. Beneath the upper glacial aquifer lies the extensive Magothy aquifer, which supplies drinking water for most of the residents of Nassau and about one-half the residents of Suffolk County. Most of the residents of Eaton's Neck obtain their water from the Suffolk County Water Authority. Asharoken Beach and Eaton's Neck are located within distribution area 9, which has seven active wells on the mainland. There are few private wells in service on Eaton's Neck today.

In the immediate vicinity of the proposed Project Area, the soils are saturated at about 25 ft below the road surface, which corresponds to 5 ft above mean higher high water. Groundwater springs are present at the toe of slope. Groundwater seepage is particularly evident during low tide due to the steep hydraulic gradient, in conjunction with the excessively drained soils. The high velocity of the groundwater flow contributes to slope failure by undermining the toe of the slope (USACE-NYD, 2004).

3.5 Surface Water

Tides along Asharoken in Long Island Sound are semidiurnal (twice daily) with a mean tide range of 7.1 ft and spring range of 8.2 ft (Table 4). Tidal inundation in the study area is caused by storm-induced water level rise combined with astronomical tide. Storm-induced water level rise has several causes: storm surge, which consists of storm winds that exert shearing forces on the water surface and decreased atmospheric pressure; and wave setup, which consists of storm waves that raise the water level along the shore. Stage frequency curves, which relate storm water elevations to the expected risk of occurrence, were developed for Long Island Sound and Northport Bay based on the calculated water elevations for the range of storm return periods. A storm with a return period of 100 years is calculated to have an associated water level elevation of 14.25 ft NGVD with wave setup on Long Island Sound and 12.16 ft NGVD on Northport Bay.

At Eaton's Neck, the average maximum current velocity is 2.4 feet per second (fps) for both flood and ebb tides. The tidal current velocity at Asharoken Beach is expected to range from 0.3 to 0.8 fps along the study shoreline. The 1976–2011 mean water temperatures in the Long Island Sound (LIS) are: 39ºF for winter; 51ºF for spring; 67ºF for summer; and 53ºF for fall (LISS, 2014). The mean salinity at the western end of LIS is approximately 23 parts per thousand (ppt), increasing to 35 ppt at the eastern end (LISS, 2014).

Water quality measurements were taken at a depth of 1 meter in five locations on Asharoken beach during six sampling events between September 2003 and July 2004; water temperature ranged from 54ºF to 76ºF; salinity ranged from 24.30 ppt to 27.50 ppt with a mean of 26.38 ppt; dissolved oxygen ranged from 3.98 mg/L to 8.15 mg/L with a mean of 6.40 mg/L; and pH ranged from 6.97 to 8.20 with a mean of 7.70 (USACE-NYD, 2005).

The north shore wave regime is dominated by wind-generated waves across the Long Island Sound fetch. For Asharoken Beach, only waves originating from the northwest clockwise to the east-southeast would impact the near shore area due to the orientation of the shoreline. Table 5 also contains information on the deep water and nearshore (breaking) waves used to design the project alternatives (USACE-NYD, 2013). Surface freshwater supplies (permanent ponds, streams) do not exist in Asharoken Village or on Eaton's Neck due to the coarse nature of the unconsolidated glacial sediments that underlie the surficial geology of the area.

3.5.1 Sea Level Rise

The design and implementation of coastal restoration projects requires consideration of the effects of climate change, including global sea level rise. The primary impact of sea level rise on coastal environments and infrastructure is the direct loss of land and habitat from inundation. A secondary impact is the migration of coastal landforms inland (transgression). However, in urbanized areas

such as New York City, the likelihood of this process taking place is severely restricted as a result of centuries of shoreline development and re-alignment (Titus, et al., 2009). Accelerated rates of sea level rise have the potential to increase the risk of storm damages beyond the evaluations of this project.

Sea Level Change (SLC) is the combined effect of the eustatic (i.e. global average) sea level increase due to increasing temperature and the land movement in the region. The New Jersey coastline is one of the areas experiencing land subsidence due to geologic process; therefore, the net relative sea level change at the project area is higher than the eustatic SLC. The future SLC for the project area is estimated based on the National Research Council (NRC) and Intergovernmental Panel for Climate Change (IPCC) estimates of eustatic SLC and corrected to include the local land subsidence. Both the historic SLC trend and the future accelerated rate are identified and used for planning, design, sensitivity and risk & uncertainty analysis if required. The most recent guidance recommends both the National Research Council report (NRC, 1987) and the Intergovernmental Panel for Climate Change report (IPCC, 2007) findings for prediction of future sea level change.

Projections of SLC are estimated by combing the following:

1) An extrapolation of the historic rate of local mean-sea-level rise used as the low rate. The local SLC chart and curve are calculated based on the online calculator provided by USACE. Both the USACE and NOAA curves and charts are calculated and presented in the project engineering appendix. The online calculator is located at:

http://www.corpsclimate.us/ccaceslcurves.cfm

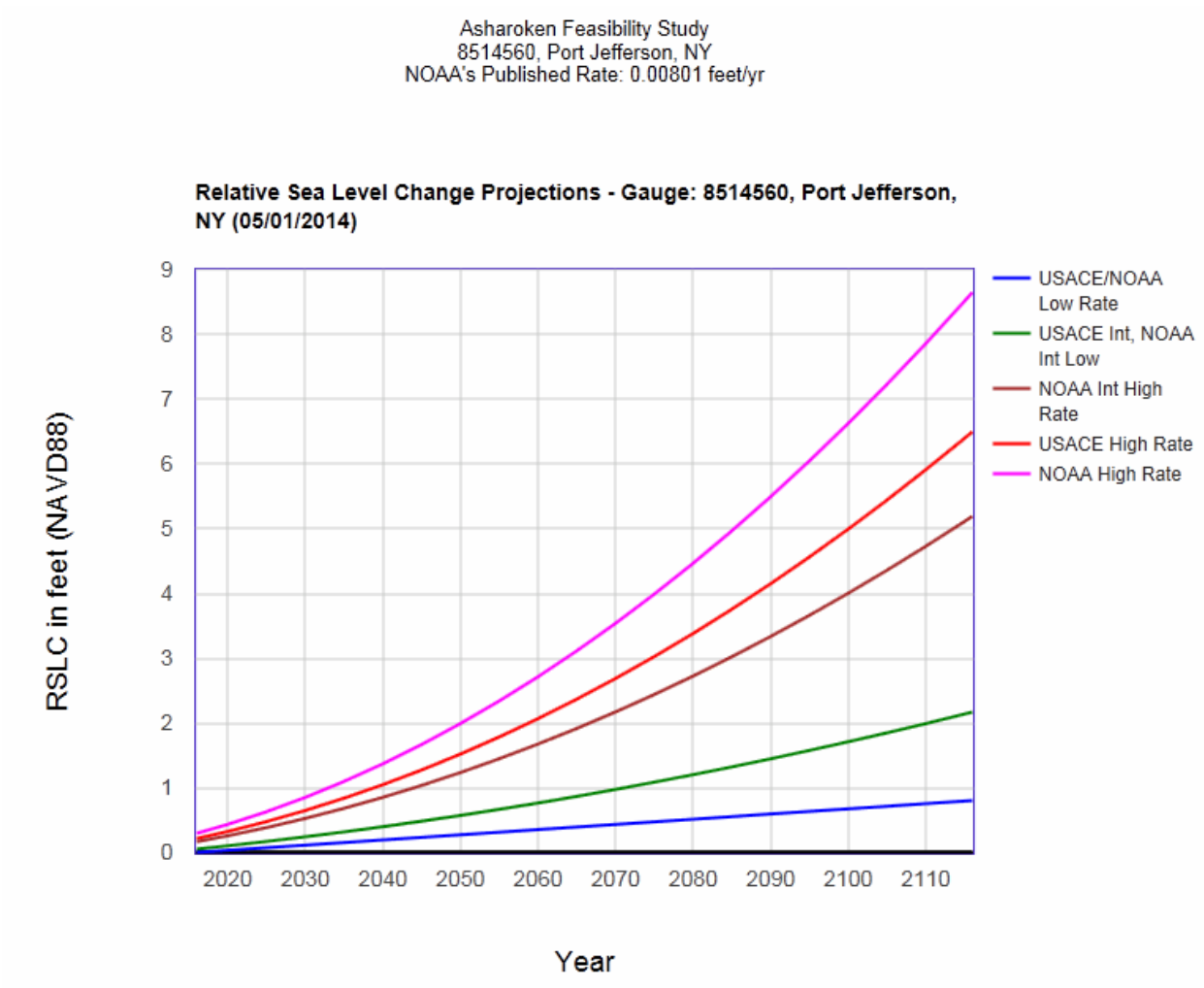
2) An intermediate rate of local mean sea-level change utilizing the modified NRC Curve equations, combined with the local rate of vertical land movement.

3) An upper rate of local sea level change estimated by considering the modified NRC high value, and combining these numbers with the local rate of vertical land movement. This scenario of high rate of local mean sea level rise exceeds the upper bounds of the IPCC estimates from both the 2001 and 2007 and also includes additional sea-level rise to accommodate the potential for rapid loss of ice from Antarctica and Greenland.

4) The sensitivity, risk, and uncertainty analysis were not conducted since it is not required for this designed and authorized project.

The local SLC chart and curves for both USACE and NOAA rates for year 2016 to 2116 in 5-year interval are estimated based on the on-line calculator and shown Figure 16 below (also see Table 6).

Figure 16



The following local Sea Level Rise (SLR) rates are recommended for use: The extrapolation of historical rate of +0.7 ft/50 years or 1.4 ft/100 years with 95% confidence is used for project planning, design, and analysis. Sensitivity, Risk and Uncertainty analyses will be conducted to determine how sensitive recommended designs are to these various rates of future local mean SLR, how this sensitivity affects calculated risk, and what design of operations and maintenance measures can be implemented to minimize adverse consequences while maximizing benefits. The intermediate rate of +1.3 ft and high rate of +2.6 ft in year 2060 will be used for sensitivity, risk & uncertainty analysis.

3.6 Vegetation

A coastal vegetation survey of the Asharoken study area was conducted by the USACE-NYD in September 2001 (Table 7; USACE-NYD, 2002). The study area encompasses a dynamic marine

environment with coastal beach, dune, estuarine marsh, maritime scrub-shrub, and maritime woodland habitats. The beach and frontal dune plant community consists mainly of American beach grass (*Ammophila breviligulata*) and seaside goldenrod (*Solidago sempervirens*). Smaller numbers of seaside spurge (*Chamaesyce polygonifolia*), sea rocket (*Cakile edentula*), common saltwort (*Salsola kali*), and halberd-leaved orach (*Atriplex patula*) were also observed. Scattered patches of American Beach Grass, sea rocket, beach pea, and sea chickweed (*Honckenya peploides*) occur along the northern reach of Asharoken Beach (Eaton's Neck) (USACE-NYD, 2002).

Backdune and roadside areas contain a mix of native and non-native species including: Virginia creeper (*Parthenocissus quinquefolia*), water dock (*Rumex orbiculatus*), prickly pear (*Opuntia drummondii*), yucca (*Yucca aloifolia*), woolly mullein (*Verbascum thapsus*), ragweed (*Ambrosia artemisiifolia*), common cocklebur (*Xanthium strumarium*), Japanese knotweed (*Polygonum cuspidatum*), *Aster* spp., field pepperweed (*Lepidium campestre*), pitch pine (*Pinus rigida*), American beach grass, and seaside goldenrod (USACE-NYD, 2002).

In some areas, property owners have landscaped the backdune and roadside areas with native and non-native vegetation. Reach 1A was planted with American beach grass to provide habitat benefits and dune stabilization during emergency shoreline protection project in 1997. A sand-dune plant community occurs adjacent to the *Spartina* marsh in Duck Island Harbor at the intersection of Asharoken Avenue and Bevin Road to the north of the emergency shoreline protection project (Figure 11). Characteristic plant species in this area include beach grass, seaside goldenrod, dusty miller (*Artemisia stellariana*), beach pea, poison ivy (*Rhus radicans*), and common reed (*Phragmites australis*). A woodland and open meadow area occurs on the upland bluff of Eaton's Neck adjacent to Reach 1A.

A variety of vegetation has developed on the Reach 1B/2A study area backdune as a result of property owners landscaping the backdune and roadside areas with native and non-native vegetation. In Reach 2A, a scrub-shrub area developed in the backdune and a woodland community supports a variety of deciduous trees, shrubs, and evergreens (USACE-NYD, 2002). A scrub-shrub area has developed west of the Northport Power Station, containing autumn eleagnus (*Elaeagnus umbellata*), and common reed, with a ground cover of seaside goldenrod, American beach grass, field pepperweed, ragweed and mugwort (*Artemisia vulgaris*). A maritime woodland including northern bayberry (*Myrica pensylvanica*), red cedar (*Juniperus virginiana*), pin oak (*Quercus palustris*), staghorn sumac (*Rhus hirta*), large-toothed aspen (*Populus grandidentata*), Norway maple (*Acer platanoides*), with a ground cover of ragweed, beach heather (*Hudsonia tomentosa*), seaside goldenrod and a variety of grasses exists further west of the power station (USACE-NYD, 2002).

Figure 17. Sand-dune habitat on bayside of Asharoken Avenue at Duck Island Harbor.

3.7 Aquatic Resources

The project area and surrounding waters support diverse assemblages of marine biota. A Nearshore Investigation (USACE-NYD, 2005) gathered baseline biological information near Asharoken and Bayville, New York, from fall 2003 through summer 2004. Sampling activities included beach seining to characterize fish assemblages, beach cores to characterize benthic macroinvertebrate communities, and water quality measurements. A concurrent Borrow Area Investigation characterized fish and benthic macroinvertebrates at Borrow Areas A and B from 2003 to 2004.

3.7.1 Finfish

Nearshore waters are recognized as an important habitat for numerous fish species. Seasonally many individuals in the surf zone are small (e.g., anchovies or silversides) or juvenile stages of larger species. Nearshore and intertidal shallows are considered to be important pathways for juveniles moving in and out of estuarine nursery areas, as well as for adult fish migrating along the coast. Fish which occupy the surf zone are typically small species or juveniles taking advantage of the shallow water refuge, tending to be opportunistic feeders and will change their dietary preferences according to season and prey availability. The USACE-NYD's Nearshore Aquatic Resources Investigation along Asharoken Beach in 2003–2004 (Appendix B), resulted in the collection of 6,407 fish and macroinvertebrates representing a total of 20 species Table 8, (USACE-NYD 2005).

The two most abundant species were Atlantic silverside (*Menidia menidia*) and Atlantic menhaden (*Brevoortia tyrannus*), which accounted for 46 percent and 38 percent of the total catch respectively. Atlantic menhaden were observed in large schools offshore of the beach, which made them particularly susceptible to capture using a beach seine. Additional fish species collected in relatively high abundance in nearshore habitats included bay anchovy (*Anchoa mitchilli*), weakfish (*Cynoscion regalis*), striped killifish (*Fundulus majalis*), and mummichog (*Fundulus. heteroclitus*).

Seasonal patterns in relative abundance and distribution were evident. The fall beach seine catch was dominated by Atlantic menhaden and Atlantic silversides, along with striped killifish and mummichog. The spring catch was dominated by bay anchovy, along with American sand lance (*Ammodytes americanus*), bluefish (*Pomatomus saltatrix*), and Atlantic silversides. The summer catch was dominated by Atlantic silversides and Atlantic menhaden, along with bluefish, weakfish, and blueback herring (*Alosa aestivalis*). Taxa richness was comparable among the three seasons, with 11, 11 and 14 total taxa present in the fall, spring and summer catches, respectively.

Concurrent with the Nearshore Investigation, a Borrow Area Investigation monitored the biological resources at Borrow Areas A and B during 2003–2004 (USACE-NYD 2007, Appendix A). A total of 34 species of fish and 10 species of macroinvertebrates (including several species for which Essential Fish Habitat [EFH] is designated in the study area) were collected during fall, winter, spring and summer sampling events (Table 9). Species diversity was the highest during spring with 25 species, followed by fall (23 species), summer (22 species), and winter (10 species). Excluding a very large number of bay anchovies collected during summer and fall sampling events (2,443 and 45,606 respectively), scup (*Stenotomus chrysops*) was the dominant fish species collected among the two borrow areas, accounting for 60.7 percent of the total. Other common species collected were winter flounder (*Pseudopleuronectes americanus*), spider crab (*Libinia dubia*), weakfish, Atlantic butterfish (*Peprilus triacanthus*) and long-finned squid (*Loligo pealei*). Together these six species represented 88.5 percent of the total abundance across all four seasonal borrow area collections.

Seasonal patterns in relative abundance and distribution (exclusive of bay anchovy) were again evident. Spring catches were dominated by spider crabs and winter flounder; summer catches were dominated by winter flounder and blueback herring, along with windowpane flounder (*Scophthalmus aquosus*), spider crabs, and Atlantic horseshoe crabs (*Limulus polyphemus*); fall catches were dominated by scup, along with weakfish, Atlantic butterfish and long-finned squid; and winter catches were dominated by grubby (*Myoxocephalus aenaeus*) and cunner (*Tautogolabrus adspersus*), along with winter flounder and Asteriid seastars (*Asterias forbesi*).

Total biomass across all four seasons was dominated by horseshoe crabs (*Limulus polyphemus*; 23.6 percent), bay anchovies (22.0 percent), and spider crabs (20.4 percent). Horseshoe crabs and spider crabs represent biomass disproportional to their abundance due to the presence of heavy exoskeletons (USACE-NYD 2007).

3.7.2 Benthic Invertebrates

3.7.2.1 Nearshore Benthic (Infauna) Invertebrates

USACE-NYD conducted a Nearshore Aquatic Resources Investigation at Asharoken Beach in LIS during 2003-2004. This sampling program included characterization of shallow water and intertidal benthic infaunal invertebrates along nearshore transects at Asharoken Beach as well as in the bay (back-barrier) side of Eaton's Neck (USACE-NYD 2005). A total of 8 phyla consisting of 47 taxa were collected and identified throughout the study period (Table 9).

The most commonly abundant phylum was Annelida which represented 84.1% of the total macro-invertebrates encountered. The majority of the Annelids identified were Oligochaetes of various

species. The Nematoda phylum was also abundant (9.2%) followed by Mollusca (2.6%) and Nemertinae (2.0%) to lesser degree. Despite the relatively low abundance of Mollusca, it represented 15.1 grams or 77.3% of the total biomass. This was largely composed of the Gastropods *Crepidula fornicate* and *Ilyanassa obsolete.* Annelida (20.5%) and Arthropoda (1.34%) also significantly contributed to the total biomass.

During both seasons surveyed (fall 2003, spring 2004) nearshore assemblages were dominated by annelids (84–90 %) and nematodes (4.3–9.3%). Greater taxonomic richness/diversity was observed during spring (8 phyla, 31 individual taxa) relative to fall (5 phyla, 19 individual taxa) (USACE-NYD 2005).

3.7.2.2 **Offshore Benthic Invertebrates**

Concurrent with the Nearshore Investigation, a Borrow Area Investigation monitored the biological resources at Borrow Areas A and B, located offshore of Asharoken during 2003-2004 (USACE-NYD 2007 Appendix A). Infaunal invertebrates were sampled at the two borrow areas during fall (2003) and spring (2004). The benthic sampling design allocated a greater number of grab samples at Borrow Area A than at Borrow Area B (35 vs. 15) during both seasonal sampling events. The disproportionate sampling effort due to the size of the borrow areas, Borrow Area A being larger, probably influenced the observed higher taxonomic richness/diversity in Borrow Area A.

During fall 2003, a total of 86 macro-invertebrate taxa, represented by >26,700 individuals was collected in both borrow areas (Table 10). Taxa richness was considerably higher in Borrow Area A (83 taxa) than in Borrow Area B (51 taxa). Nematodes, annelids, and oligochaetes were abundant at both borrow areas. Representative polychaete taxa included *Ampharete spp.*, *Ampharete lindstroemi*, *Cossura longocirrata*, *Cirratulidae spp.*, *Nephtys spp.*, *Scalibregma inflatum*, and *Polydora cornuta*. Molluscs and arthropods were consistently present in both borrow areas, but were markedly less abundant than annelids.

Nematodes were the numerically dominant taxon in Borrow Area A, accounting for 49.9 percent of the total fall assemblage. Cirratulid polychaetes and oligochaetes were secondary dominants, each representing 13.3 percent of the total. Two additional polychaetes, *Polydora cornuta* and *Cossura longocirrata*, accounted for 5.3 percent and 2.4 percent, respectively. Nematodes were also the numerically dominant taxon of the total fall assemblage in Borrow Area B, accounting for 70.5 percent. Oligochaetes and cirratulid polychaetes were secondary dominants in Borrow Area B, representing 9.4 and 8.5 percent of the total, respectively. The tube-dwelling amphipod *Ampelisca abdita* accounted for 2.5 percent.

During spring 2004, a total of 88 invertebrate taxa, represented by > 26,900 individuals was collected in the borrow areas combined (Table 11). Taxa richness was considerably higher in Borrow Area A (85 taxa) than in Borrow Area B (67 taxa). Nematodes, annelids, and oligochaetes were abundant at both borrow areas. Representative polychaete taxa included *Ampharete finmarchica*, *A. acutifrons*, *Streblospio benedicti*, *Nephtys picta*, *Capitella capitata*, *Spionids* spp. (lowest possible identification level [LPIL]), *Tharyx acutus*, *Glycera* spp. (LPIL), and *Polydora ligni*. Neither gastropods nor bivalves were abundant in either of the two borrow areas, with fewer than 100 individuals of each collected. Arthropods were present in moderate abundance, primarily

represented by the copepod, *Temora longicornis*, and the tube-dwelling amphipod, *Ampelisca abdita.*

Nematodes were the numerically dominant taxon in Borrow Area A, accounting for 50.9 percent of the total assemblage. Oligochaetes were a secondary dominant, representing 7.7 percent of the total. Three additional polychaetes, *Temora longicornis, Ampharete finmarchica* and *Streblospio benedicti* accounted for 4.4 percent, 4.1 percent and 3.6 percent, respectively. The tube-dwelling amphipod *Ampelisca abdita* represented 3.3 percent. Nematodes were also the dominant taxon in Borrow Area B, accounting for 62.5 percent of the total assemblage. Oligochaetes were secondary dominants in Borrow Area B, representing 6.2 percent of the total. Other abundant taxa included the polychaetes *Streblospio benedicti, Capitella capitata* and *Ampharete finmarchica* at 5.5 percent, 5.5 percent and 3.8 percent, respectively.

3.8 Terrestrial Wildlife

3.8.1 Reptiles and Amphibians

Marine reptiles that may potentially occur seasonally within the study area include the green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). Of these species the green and the leatherback are the least likely to occur in the western Sound. In addition, the northern diamondback terrapin (*Malaclemys terrapin, a brackish water species)* may be found in the Project Area (USACE-NYD, 2004).

Most of the sea turtles that have been observed in Long Island Sound have been juveniles which have migrated north during the summer to take advantage of the abundant food resources offered by inland embayments. Green sea turtles feed primarily on vegetation and may be the least likely of the turtles to be seen in the Sound due to the relative paucity of sea grasses found in the Sound. Kemp Ridleys and loggerhead turtles prey largely on marcro-crustateans and bivalves which are found in abundance in nearshore areas. The leatherback turtle's diet consists largely of jellyfish. The leatherback turtle is a highly pelagic fast swimming open water animal and not an expected visitor to the western Sound. Marine turtles do not nest further north than Delaware.

Diamondback terrapins are medium-sized turtles that live in brackish water, primarily in the vicinity of cordgrass (*Spartina* spp.) marshes, from Massachusetts to Texas. They occur throughout the Hudson River Bight (Burke 2006). Diamondback terrapins are known to nest in and around the sandy marsh areas like those associated with the of the project site.

Non-marine reptiles which could potentially occur proximal to the study area (in adjacent fields, wetlands or woodlands) may include the eastern box turtle (*Terrapene carolina*) and the eastern garter snake (*Thamnophis sirtalis*) Few amphibians are expected to occur in the immediate vicinity of the Project Area because of the high salinity regime and salt spray within the beach and adjacent dune systems. However, spring peeper (*Pseudocris crucifer*), Fowler's toad (*Anaxyrus fowleri*), and gray tree frog (*Hyla versicolor*) may be present within maritime forests near the boundaries of the project site should moist/wet conditions persist

3.8.2 Birds

A variety of avian species use habitats in Asharoken Beach as a breeding area (Table 12). Confirmed breeding species include: piping plover (*Charadrius melodus*), barn swallow (*Hirundo rustica*), black-capped chickadee (*Parus atricapillus*), eastern tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), European starling (*Sturnus vulgaris*), yellow warbler (*Dendroica petechia*), northern cardinal (*Cardinalis cardinalis*), common grackle (*Quiscalus quiscula*), brown-headed cowbird (*Quiscalus major*), and house sparrow (*Passer domesticus*) (USACE-NYD 2002, NYSDEC 2008).

Avian species observed feeding along Asharoken beach include: Laughing gulls (*Larus atricilla*), herring gulls (*Larus argentatus*), ring-billed gulls (*Larus delawarensis*), great black-backed gulls (*Larus marinus*), double-crested cormorants (*Phalacrocorax auritus*) and sanderlings (*Calidris alba*) (USACE-NYD 2002). In addition, an osprey (*Pandion haliaetus*) nest was observed across from the beach on Asharoken Avenue during a field visit on 30 December 2013.

Avian species in the tidal wetlands located within or adjacent to Duck Island Harbor include: mallard duck (*Anas platyrhynchos*), black duck (*Anas rubripes*), old squaw (*Clangula hyemalis*), scaup (*Aythya sp*.), snowy egret (*Leucophoyx thula*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), clapper rail (*Rallus longirostris*), black-bellied plover (*Squatarola squatarola*), semi-palmated plover (*Charadrius semipalmatus*), belted kingfisher (*Megaceryle alcyon*), common tern (*Sterna hirundo*), and yellowlegs (*Tringa sp*.) (USACE-NYD 2002).

3.8.3 Mammals

The maritime scrub-shrub, meadow and woodland landscapes in the vicinity of the project area provide habitat for a variety of terrestrial mammals including: common rat (*Rattus norvegicus*), eastern cottontail (*Sylvilagus floridanus*), white-footed mouse (*Peromyscus leucopus*), white-tailed deer (*Odocoileus virginianus*), gray squirrel (*Sciurus* carolinensis), eastern chipmunk (*Tamias striatus*), northern short-tailed shrew (*Blarina brevidauda*), meadow vole (*Microtus pennsylvanicus*), little brown bat (*Myotis lucifugus*), red fox (*Vulpes vulpes*), opossum (*Didelphis virginiana*), and raccoon (*Procyon lotor*) as well as the possibility of feral cats and dogs..

Several species of marine mammals have been documented offshore of Asharoken Beach, including gray seal (*Halichoerus grypus*) and harbor seal (*Phoca vitulina*). These two species are increasing in southern New England (including Long Island Sound) and may be present in the Project Area from late fall to April. Sightings of harp seals (*Phoca groenlandic*) and hooded seals (*Cystophora cristata*) have increased in Long Island Sound in recent years. Bottlenose dolphin (*Tursiops truncatus*) are periodically observed offshore of the project area (USACE-NYD 2002; NOAA, 2009).

3.9 Threatened and Endangered Species

3.10 Federal Listed Species

Federally listed threatened/endangered species that may potentially occur in Long Island Sound waters of Suffolk County, New York (and therefore in the vicinity of Asharoken Beach), include five species of marine turtles (green sea turtle, loggerhead sea turtle, leatherback sea turtle, Kemp's ridley sea turtle and hawksbill sea turtle, all of which may seasonally range into western Long Island Sound) and are discussed in Section 3.7.1. (Table 13). However, due to the highly pelagic nature of the leatherback and the dietary requirements (sponges) of the more tropical hawksbill the presence of these two species far less likely than the remaining three species. Atlantic sturgeon (*Acipenser oxyrichus oxyrinchus*) was recently listed as an endangered species under the Endangered Species Act and is known to occur in western Long Island Sound. Because of its potential for interaction with the project, particularly the Borrow Area, life history information is presented in some detail. A Section 7 Consultation biological assessment was submitted to the NMFS as part of the USACE-NYD required NEPA obligations (Appendix C).

Atlantic sturgeons are anadramous, spending the majority of their adult phase in marine waters, returning to their natal freshwater rivers to spawn. Five Distinct Population Segments (DPS) of Atlantic sturgeon were listed as threatened or endangered under the Endangered Species Act, including a New York Bight DPS. Known spawning populations for the New York Bight DPS exist in two rivers: the Hudson and Delaware Rivers. In the Hudson River estuary, spawning, rearing, and overwintering habitats were reported to be intact by Bain (1997), supporting the largest remaining Atlantic sturgeon stock in the U.S. However, a population decline from overfishing has also been observed for this area (Bain 1997, Bain 2001). General factors that may impact Atlantic sturgeon include: dam construction and operation; dredging and disposal; and water quality modifications such as changes in levels of dissolved oxygen (DO), water temperature and contaminants (ASSRT, 2007). Other threats to the species include vessel strikes. Many authors have cited commercial over-harvesting as the single greatest cause of the decline in abundance of Atlantic sturgeon. Although little is known about natural predators of Atlantic sturgeon, there are several documented fish and mammal predators, such as sea lampreys, striped bass, common carp, minnow, smallmouth bass, walleye, grey seal, and fallfish (ASSRT 2007). These predators interact with Atlantic sturgeon over a range of life stages from egg through juveniles. Note that most of the species listed above would not exist in LIS. However, it is likely many species of gulls, loons, cormorants and mergansers may prey on young sturgeon as well as other species of predatory fish such as blue fish and summer flounder.

Sturgeon are bottom feeders that use their protractile, mouth to siphon up sediments containing benthic prey items The diet of adult sturgeon includes mollusks, gastropods, amphipods, isopods and fish, while juveniles generally feed on aquatic insects and other invertebrates.

In regard to the New York Bight, including Long Island Sound (LIS), knowledge of Atlantic sturgeon oceanic habitat is generally limited to information regarding broad-scale marine migrations and an exchange of populations among river systems based on tag recaptures and commercial fisheries data. Satellite tag and fisheries-dependent data indicate that most oceanic Atlantic sturgeon inhabit shallow inshore areas of the continental shelf and are largely confined to depths of less than 65 ft. Concentrations of Atlantic sturgeon appear to occur during the fall and

spring corresponding to the mouths of large bays and estuaries, including those that are the outlets of known spawning rivers such as the Hudson. In general, migrations are northerly during summer and southerly during winter. Regional temperatures along the coast likely influence sturgeon movements and migration patterns, thus affecting the length of time sturgeon spend in a particular area of the marine environment. Although little is known about the abundance or distribution of Atlantic sturgeon in LIS, because the Sound is open to both the Atlantic Ocean and the (natal) Hudson River the probability of numbers of sturgeon within the Sound is high. Recent fishery studies within the nearshore areas of the New York Bight have shown that the largest trawl catches of Atlantic sturgeon occurred in the western end of Long Island Sound, confirming their use of the Sound and their seasonal aggregation corresponding to their spawning and overwintering estuaries.

Limited information exists on the feeding behavior and marine diet of the Atlantic sturgeon. Physical parameters including temperature, currents, salinity and sediment character strongly influence the availability of prey resources, and in turn may influence Atlantic sturgeon movements. Some important prey organisms for Atlantic sturgeon include polychaetes, oligochaetes, amphipods and isopods, and mollusks. Results of a study by Johnson et al. 1997, showed polycheates were the primary prey group consumed, although the isopod (*Politolana concharum*) was the most important individual prey eaten. Amphipods were also consumed. In this study mollusks and fish contributed little to the diet. Some prey taxa (i.e., polychaetes, isopods, amphipods) exhibited seasonal variation in importance in the diet of Atlantic sturgeon.

Federally listed bird species known or suspected to occur in proximity to Asharoken Beach includes roseate tern (*Sterna dougallii dougallii*) and the least tern (*Sterna antillarum*.) The recently listed red knot (*Calidris canutus*) may forage at Asharoken Beach during its annual migrations. The piping plover (*Charadrius melodus*) is known to nest on Asharoken Beach. Nesting surveys conducted in recent years reveal that 3 to 4 pairs return to this beach each season. In general they have nested perpendicular to Duck Island.

Piping plovers are very sensitive to disturbance and predation, especially by raccoons and other mammals adapted to the presence of humans. The species was federally listed as endangered in the Great Lakes and threatened along the remainder of its range in 1986 (USFWS 1996b). Piping plovers arrive at breeding grounds in late March–early April and depart by early September. They nest above MHW on beaches, gently sloping fore-dunes and washover fans. They typically prefer un-vegetated habitats, but will occasionally nest under American beach grass or other vegetation. Piping plovers often nest in association with least terns. They typically fledge a single brood per season but may re-nest if broods are lost. Typical clutch size is four eggs (Cairns 1982). Chicks fledge by late July. Piping plovers feed along the lower beach face, or on moist overwash fans, mudflats and along wrack lines (Cairns 1982, Burger 1994). As of the summer of 2013, the Village of Asharoken has installed protective fencing around two beach areas known to support piping plover nesting (Cohen 2013). During the 2000 piping plover monitoring season, two nests within the proposed study area were observed to have a total of six fledged chicks. Four other nesting attempts within the vicinity of the study area were not productive due to possible chick and egg predation or by flooding (USACE-NYD 2002). Piping plover nest locations along Asharoken Beach are found in Figure 12 below. Please note that in 2015 nest occurred seaward of house numbers **405, 359, 307 and 222.** In addition Table 14 summarizes Piping Plover survey results near the Project Area.

Figure 18. Piping Plover Nest Locations for Asharoken Beach

As of January 2015 the Rufa red knot (*Calidris canutus rufa)* was listed as a Federally listed species. The Rufa red knot is a medium-sized shorebird about 9 to 11 inches (in.) in length. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States (Southeast), the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed. There are several major stop over areas along the Atlantic Coast of Long Island. No such areas have been reported for the north shore of Long Island, although it is likely that the Sound side is utilized. Red Knot listed as being found potentially occurring at the project site by USFWS.

The rufa red knot breeds in the tundra of the central Canadian Arctic, flying up to 9,300 miles (mi.) from south to north every spring and reverse the trip every autumn, making the rufa red knot one of the longest-distance migrating animals. Migrating red knots converge on critical stopover areas to rest and refuel along the way. Large flocks of red knots arrive at stopover areas along the Delaware Bay and New York/New Jersey's Atlantic coast each spring, with many of the birds

having flown directly from northern Brazil. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Horseshoe crab spawning May-June.

Rufa red knots also feed on small clams, mussels, and snails, crustaceans and marine worms. On the breeding grounds, knots mainly eat insects. Mussel beds on New Jersey's southern Atlantic coast and intertidal/wrack line areas on New York's coast are also important forage habitats for migrating knots.

Hard structures such as groins may enhance red knot foraging habitat because shoreline discontinuities like creek mouths, jetties and groins and other artificial obstructions can act to concentrate drifting horseshoe crab eggs creating a feeding hotspot. Such structures often create a localized low energy environment creating highly suitable conditions for horseshoe crab spawning over a wider variation of weather and sea conditions.

Regional threats to the rufa red knot, include stopover roosting and foraging area habitat loss via erosion, coastal development and shoreline stabilization which through various pathways can lead to reduced food availability and greater susceptibility to predation. Commercial harvest of horseshoe crabs has been implicated as a causal factor in the decline of the rufa red knot by decreasing the availability of horseshoe crab eggs. Disturbance by human activity, usually related to recreational activities including exclusion of shorebirds from preferred habitats has been noted throughout the red knot's non-breeding range.

Finback and Humpback whales are listed as potentially occurring in the offshore waters of Long Island Sound offshore of Suffolk County, New York. However, and occurrence in the western Sound would be considered extremely unlikely.

The northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) potentially occurs along Suffolk County beaches; however, no recent sighting of this species has been reported in the vicinity of Asharoken Beach/Eaton's Neck.

The recently listed northern long-eared bat may occur in the region that includes the Project Area (Suffolk County NY). Maintenance of long-eared bat populations in the vicinity of Asharoken Beach would depend on the integrity of suitable upland (forested) nesting habitat. Long-eared bat populations throughout the northeastern United States are suffering from a widespread fungal disease ("white nose syndrome"), which could potentially threaten/eradicate the local population under either the FWOP or project implementation scenario.

Federally listed and proposed plant species which may potentially occur in the Project Area include seabeach knotweed (P*olygonum glaucum)* and seabeach amaranth (*Amaranthus pumilus*). All three species have experienced significant population declines along the U.S. Atlantic coast as a result of beach stabilization practices, shoreline development/infrastructure, grazing/disturbance by feral wildlife, and off road vehicle use.

In New York, seabeach knotweed is known only from maritime beaches and the margins of adjacent dunes and salt marshes. It may be the dominant plant in areas of little or no other vegetation. It grows in open conditions on a variety of substrates, including, sand, silt, pebbles or

cobbles, and dredging spoils (New York Natural Heritage Program 2011. Therefore it is not expected in the vicinity of Asharoken Beach/Eaton's Neck (NYHP 2015 http://acris.nynhp.org/guide.php?id=8699).

Seabeach amaranth typically occur on barrier island beaches between the fore dune and the wrack line and also on open overwash areas behind the fore dune. In New York, it is only known from Long Island, ranging from Coney Island to near the east end of the South Fork along the southern shore (NYHP 2015 http://acris.nynhp.org/guide.php?id=8699). Therefore it is not expected in the vicinity of Asharoken Beach/Eaton's Neck.

3.10.1 State Listed Species

In New York State there are three classifications for evaluating the status of rare or declining species; endangered, threatened and species-of-special-concern. The New York listings duplicate some of the Federal listings but also add species that have been documented as in decline or warrant monitoring for changes in their populations in New York.

Several bird and marine reptile species listed as endangered or threatened by the State of New York occur in the Asharoken Project Area. These include least and common tern, which are listed as endangered and threatened respectively in New York. Piping plover, listed as endangered, and bald eagle, listed as endangered in New York (although de-listed federally since 2007). Both terns and piping plover are known to nest in the vicinity of Eaton's Neck. Osprey are listed as threatened in New York State and an osprey nest was observed adjacent to Asharoken Beach during a field visit on 30 December 2013.

Kemp's ridley sea turtle is listed as endangered and the loggerhead sea turtle is listed as threatened in New York State and both may use the western Sound as important early developmental habitat in late summer and early fall.

3.11 Essential Fish Habitat (EFH)

The regional fisheries management councils, with assistance from NOAA-Fisheries, are required under the 1996 amendments to Magnuson-Stevens Fishery Management and Conservation Act to delineate Essential Fish Habitat (EFH) for all managed species, to minimize to the extent practicable adverse effects on EFH, and to identify other actions to encourage the conservation and enhancement of EFH. In compliance with the Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA 16 United States Code §1801-1883), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), the New District of the USACE submitted to NOAA Fisheries, an EFH assessment for the Asharoken Shore Protection Project is located in Appendix E. This assessment includes an analysis of the direct, indirect, and cumulative effects of the proposed project on EFH, including prey and forage species of EFH-managed species that might use the habitat, and on EFH-managed species and life stages for which the Project Area has been designated as EFH (Tables 15 and 16).

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (NOAA-Fisheries 2004). In addition, the presence of adequate prey species is one of the biological properties that can define EFH. The regulations further clarify EFH by

defining “waters” to include aquatic areas that are used by fish (either currently or historically) and their associated physical, chemical, and biological properties: “substrate” to include sediment, hard bottom, and structures underlying the water; areas used for “spawning, breeding, feeding, and growth to maturity” to cover a species’ full life cycle; “prey species” as being a food source for one or more designated fish species (NOAA-Fisheries 2004).

In regard to EFH for this project, 16 species of finfish (various life stages) were identified within the appropriate 10 degree by 10 degree North Shore of Long Island, Long Island Sound EFH Quadrant which is bounded by the following coordinates; N 41 00.0, E 73’N 20.00, S 40 50.0, W 73 30. This area includes Atlantic Ocean/Long Island Sound waters from Northport NY west to Cooper Bluff NY. This square includes Northport Bay, Huntington Bay, Oyster Bay and Cold Spring Harbor as well as the quadrant bounded waters of LIS proper.

The following list (may pertain to one or several life stages) contains EFH species potentially found within waters of the project site; , *Red Hake, Windowpane Flounder, Winter Flounder, Black Seabass, Bluefish, Atlantic Mackerel, Scup, Summer Flounder, Little Skate, Cobia, Spanish Mackerel, Winter Skate, Sand Tiger Shark, Atlantic Herring, King Mackerel, and Pollock.*

The nearshore and borrow area fisheries surveys conducted 2003–2005 documented the occurrence of several EFH species in varying abundance in the vicinity of the Project Area, as well as the borrow areas. These include windowpane flounder, winter flounder, bluefish, and scup in the nearshore Project Area and Atlantic herring, black sea bass, bluefish, red hake, scup, windowpane, and winter flounder in the vicinity of the offshore borrow areas (USACE-NYD 2005, 2007).

3.12 Socioeconomics

The northwestern half of Asharoken Beach (Reach 1) is backed by the upper limit of Duck Island Harbor and a row of residences located on the southwestern side of Asharoken Avenue. To the northwest of Asharoken Avenue is an eroded dune area fronted by a beach berm sloping seaward towards the Long Island Sound. The southeastern half of the 2.4-mile stretch (Reach 2) consists of a set-back section of Asharoken Avenue with a single row of residential structures, most of which are near a bulkhead line of protection and overlook a low sloping beach about 100–150 ft wide (USACE-NYD, 2002; USACE-NYD, 2013).

Demographics

Detailed studies of future population growth and other projections for the Asharoken study area have not been undertaken. Although modest population growth (less than 1 percent annually) is projected over Suffolk County as a whole for the next 25 years, recent data indicate that the study area is currently experiencing an overall decline in population (USACE-NYD, 2013).

The decrease in population from 1990 to 2000 in Asharoken is assumed by the Village Master Plan to result from several factors: many children of families that moved to the area in the 1980s and 1990s have matured and moved away to college or employment, and, because of the current high cost of property, homes that are currently coming onto the market tend to be purchased by older people whose children no longer live at home. Census data support this explanation, as the

5 to 19 age group showed a significant decrease in the years 1990 to 2000, and the largest increase was found in the 75 to 84 age group. The population of Eaton's Neck has not declined as much over the decade 1990 to 2000, but there has been a decrease in people under 45 and an increase in people of retirement age. In the light of this data and the probable resistance of the local community to significant further development, the study has not used projected future population levels in the analysis and has assumed 0 percent population growth over the project life (Table 17, USACE-NYD, 2013).

Census data indicate that more than 150 residents in the study area have disability status. In the event of evacuation, special treatment for such people may tend to increase evacuation costs. However, due to the lack of precise data regarding the nature of these disabilities and the difficulty in quantifying the cost of special evacuation treatment, these data have not been included in the analysis (USACE-NYD, 2013).

Commuters

In the sense that anyone who travels to a place away from their residence for a particular purpose on a daily or otherwise regular basis can be considered a commuter, commuters may include both those who travel to their place of work and those who travel to a place of education. Because no schools exist on the peninsula, all residents enrolled in school are at risk from being cut off from their homes, hence their inclusion in the commuter data. These assumptions form the basis for estimating the number of residents who may be impacted by a significant storm event. Temporary accommodation may be required if residents are cut off from their home and travel delays would result in economic losses.

According to census data, residents use private and public transport, which is assumed to include railroad and bus services. As the study area is not served by any scheduled public transport links, this study assumes that public transport refers to the majority of the commute to the workplace and does not include journeys, primarily by personal vehicle, to reach transport nodes such as the Long Island Railroad Station in Northport. Since residents must also leave the peninsula for all services and shopping, the number of people affected by blockage or severance of Asharoken Avenue may be assumed to include all of the residents of the peninsula.

Income/Employment

Comparisons with county and state statistics for household income and the value of owner-occupied housing units suggest that the peninsula is a relatively affluent area, with median household incomes in the study area 50 percent higher than in the county as a whole, and median house values 2–3 times greater than the county median. The 2000 census also reported that only eight families were living below the designated poverty level in the study area and that unemployment in the study area was greater than the county average, but lower than the state average.

Environmental Justice

Executive Order 12898 mandates that Federal Actions address Environmental Justice requiring the fair treatment and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. No group of people (including racial, ethnic, or socioeconomic groups) should experience a disproportionate share of negative environmental impacts from any private, state, or federal action, program, or policy. In general Environmental Justice obligates each federal agency to identify and address potential disproportionately high and adverse human health or environmental effects of its activities on minority populations and low income populations.

A cursory analysis was conducted to determine the potential applicability of Environmental Justice issues. The analysis took into account a comparison of minority and low income populations. Comparisons with local (County) and State statistics for household income and the value of owner-occupied housing units suggest that the peninsula is a relatively affluent area, with median household incomes in the study area 50% higher than in the County as a whole, and median house values 2-3 times greater than the County median. The 2000 census also reported that only 8 families in the study area were living below the designated poverty level, and that unemployment in the study area was greater than the County figure but lower than the State average.

3.13 Historic and Cultural Resources

The Area of Potential Effect (APE) for this project includes the project area as identified above (see Figure 2), the near shore area and the proposed borrow area. Although there are no confirmed prehistoric sites within the limits of the shoreline areas of the APE, a total of 17 previously documented prehistoric sites lie within a 1-mile radius of the project corridor (USACE-NYD, 2004). However, due to land use actions and shoreline erosion within the project area, there is a low probability that any remains of the incidental use of the shoreline by Native Americans have been preserved (USACE-NYD, 2004).In 1646, Theophilus Eaton, Governor of New Haven, acquired what is now Eaton's Neck from the Matinnecocks. During the 19th century, a number of sand and gravel mining industries were situated in Eaton's Neck and Asharoken. Mining facilities were located: on the West Beach spit in southwestern Eaton's Neck; on Eaton's Neck Beach, where Asharoken Beach joins the mainland; and near the Coast Guard Station and lighthouse, constructed in 1849. The Coast Guard Station is the oldest such facility in New York State (USACE-NYD, 2002).

There are four sites listed on the National Register of Historic Places for Eaton's Neck and Asharoken Village, just outside APE: the Delameter-Bevin Mansion on Bevin Lane, the New Jersey Felix House on the west side of Asharoken Avenue in Asharoken, the Harry E. Donnell House on Locust Lane, and Eaton's Neck Lighthouse. The latter property is the second oldest lighthouse on Long Island, first lit in 1799 (USACE-NYD, 2002). There are four potential National Register of Historic Places-eligible architectural resources identified within the APE: the Chesebrough House, the Chesebrough Servants House, the Laura S. Stewart House, and the Rube Goldberg House (USACE-NYD, 2003).

A Remote Sensing Survey was conducted along Asharoken Beach in 2003 to determine the presence or absence of submerged or shoreline cultural resources that may be eligible for inclusion in the National Register of Historic Places within the nearshore, and offshore areas that might be affected by the proposed alternatives. Comprehensive magnetic, acoustic, and bathymetric remote

sensing and hydrographic surveys were conducted within the nearshore sand placement area, as well as within two proposed offshore sand borrow areas. The magnetic survey of the tidal zone identified a total of 28 magnetic targets within the study area, seven of which had signatures potentially consistent with a buried shipwreck or shipwreck-related debris. The remote sensing survey of the nearshore area identified one side-scan sonar target, which was evaluated as not being potentially significant. No targets were identified within the offshore survey areas (USACE-NYD, 2004).

3.14 Coastal Zone Management

The proposed project would affect coastal zone resources of the State of New York. Therefore, it is necessary to analyze the project in greater detail with respect to its consistency with the State Coastal Policies of the NYS Coastal Zone Management Plan (CZM) as well as the Long Island Sound Coastal Management Plan (LICMP). The New York State Department of State administers the state's CZM and has established 44 coastal policies which are the basis for determining if an action is consistent with the state's program. Similarly the LICMP contains 13 policies that must be evaluated. Each policy was reviewed in the context of the proposed shore protection plan, and where an interaction occurred, a responsive statement was prepared which evaluated the plan's consistency with that policy. Pursuant to Section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1456 [c], the U.S. Army Corps of Engineers New York District has reviewed all the policies listed in the both the state and the Long Island Sound coastal management programs and is provided in Appendix F.

The primary interaction between the proposed project and coastal resources is the initial and subsequent beach nourishment and excavation of sand from offshore borrow areas.

3.15 Hazardous, Toxic and Radioactive Waste

In 1995 USACE-NYD conducted a Hazardous, Toxic, and Radioactive Waste (HTRW) assessment for the North Shore of Long Island as far west as Little Neck Bay and as far east as Fishers Island, with particular emphasis on the Bayville and Asharoken Beach areas (Appendix H). This assessment consisted of a regulatory agency file review and a site survey. The file review involved Federal and state database searches that included regulated sites located within the project corridor and within a 0.5-mile area from the project corridor. A site survey was conducted to verify the database information and to identify potential sites of concern that were not included in the database report.

The Northport Power Station, owned by National Grid is the largest oil-burning power plant in the northeast. This facility houses various storage tanks for petroleum products and is listed in the Leaking Underground Storage Tanks database. The power station is a small quantity generator Resource Conservation and Recovery Act site, has an active water discharge permit, and has an emission permit under the Clean Air Act. At present, the operation of the Northport Power Station does not directly impact any of the proposed project elements by virtue of the distance of the station from the designated Project Areas, either along the Asharoken Beach shoreline or at the offshore borrow areas within Long Island Sound.

To confirm the absence of any HTRW concerns data bases maintained by the NYSDEC and the US Environmental Protection Agency (EPA) were reviewed. EPA data bases reviewed were National Priorities List (NPL), Resource Conservation and Recovery Information System (RCRIS), Toxic Release Inventory System (TRIS) and Comprehensive, Environmental Response, Compensation and Liability Information System (CERCLIS). Review of these data bases showed no sites in proximity of the project area.

Review of NYSDEC databases for Spills, Brown Fields and State Superfund sites showed no incidents/locations in the proposed project area. It must be mentioned that the National Grid Power Plant is located approximately 1/3rd mile from the project's southern limit. Review of EPA and DEC data bases showed the National Grid power plant is in compliance in water, air and solid waste discharges and management.

3.16 Air Quality

As required by the Clean Air Act of 1970, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants identified by the United States Environmental Protection Agency (USEPA) as being of nationwide concern: carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), particulates (PM), sulfur oxides (SO_x), and lead (Pb). Primary standards are intended to protect public health, while secondary standards are intended to protect public welfare (e.g., physical damage to structures, ecological damage).These standards have also been established as the ambient air quality standards for the State of New York. An air quality conformity analysis was performed in 2005 and 2015 in regard to the Asharoken project site. Data is located in Appendix H.

The Project area is located in the north/central part of Long Island on the Long Island Sound, in Suffolk County, which is part of the New York, Northern New Jersey, Long Island, and Connecticut ozone nonattainment area. Suffolk County has been designated with the following attainment status with respect to the National Ambient Air Quality Standards (NAAQS) for criteria pollutants: marginal nonattainment area for the 2008 8-hour ozone standard and a maintenance area for the 2006 particulate matter less than 2.5 microns ($PM_{2.5}$) standard (40 CFR §81.333). Oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) are precursors for ozone and sulfur dioxide (SO_2) is a precursor pollutant for $PM_{2.5}$. Suffolk County is in attainment of the NAAQS for all other criteria pollutants.

Emissions from the Project are associated with non-road construction equipment working on the site and on-road trucks moving on public roads to and from the Project site. Emissions from these two source categories are primarily generated from their diesel engines, with emissions that include NO_x, VOCs, SO_2, and $PM_{2.5}$. Emissions from Federal Actions, such as the Proposed Project, are regulated under 40 CFR §93 Subpart B General Conformity. Fugitive dust on the worksite can potentially be generated due to trucks and equipment moving on unpaved surfaces, but can be significantly reduced through the use of best management practices relating to site work dust mitigation. Fugitive dust is made up of PM and can contain $PM_{2.5}$.

3.17 Noise

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. It can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g., schools, churches, or hospitals) or broad areas (e.g., nature preserves or designated districts) in which occasional or persistent sensitivity to noise above ambient levels exists.

Existing sound sources in the project area include sounds originating from natural sources such sound from waves, wind, and the movement of vegetation, birds, and other sources. These may have a substantial effect on the existing sound environment but under normal conditions would not be interpreted as noise. Noise would come from and traffic, air traffic, boat usage, residential including power and lawn tools, barking dogs etc. Transportation sounds are also potentially important noise sources. Sensitive sound receptors in the vicinity of the study area include residences and natural receptors, such as osprey and other nearby fauna.

4.0 ENVIRONMENTAL EFFECTS

For each of the sections below, the potential environmental impacts that would be expected under both the FWOP and TSP are discussed.

4.1 Future Without Project

As described in Section 2.2, natural forces in concert with existing shoreline modifications would continue to shape and alter the Asharoken peninsula under the FWOP. Erosive forces would potentially lead to adverse impacts to shoreline residances and wildlife. Continued erosion could lead to the eventual failure of sections of the roadbed of Asharoken Avenue and a temporary closure in Reach 1 between Duck Road and Bevin Road. With the failure of the road, several critical utilities such as water, sewer, and electricity would be severed. The Section 103 revetment structure constructed by the USACE in 1997 was designed for a 15-year lifespan and, with a series of repairs including replacements with larger stones, now has a life span through 2020. This structure would eventually fail if no further substantial modifications are made to the structure and no other erosion protection measures are initiated within the study area (USACE-NYD, 2013).

4.1.1 Land Use/Recreation/Transportation

Under the FWOP, beach and to a lesser extent, upland erosion, would continue in the Project Area. This would result in reduced beach frontage, increased potential for structural damage with the possibility of the loss of homes and municipal civil buildings (i.e. Village Hall and Fire Department) in Asharoken. Under extreme circumstances, extreme erosion and loss of elevation and width of the tombolo might resulting loss of recreational usage, the road and road bed and the suitability for residential existence.

Storms consistent with historic trends, including frequent minor to moderate events, are likely to result in moderate scale adverse impacts to land use and communities, with repeated damage to structures followed by subsequent rebuilding. These impacts, loss of beach front for recreational use, increased traffic due to road maintenance, and loss of emergency access routes, would be expected to be short- to long-term, depending on storm frequency and severity.

4.1.2 Geological / Topography and Soils

Littoral sediments would continue to be transported west along Asharoken Beach at rates similar to those estimated in the 1997–2001 sediment budget. The updrift shoreline to the east of the Northport Power Station, supplied by sediment from the north shore of Long Island to the east, would continue to accrete, and approximately 15,000 cy/yr would be transported into the Northport Basin. Of the sediment transported to the Northport Basin, approximately 5,000 CY would be retained or lost offshore and approximately 10,000 CY would be dredged each year by LILCO and deposited in Reach 2A/2B. Assuming this dredged material continues to be deposited in this location, Reach 2B/2A would continue to erode at approximately 10,000 cy/yr. If this deposition is discontinued, Reach 2B/2A would erode at 20,000 cy/year. Reach 1B would experience minor shoreline erosion at approximately 4,000 cy/yr and Reach 1A would erode at approximately 18,000

cy/yr. These rates of erosion create a risk of structural failure for Asharoken Avenue and residences, particularly in Reach 1A.

During storm events of sufficient strength, littoral sediments in Reach 1A would continue to be transported across Asharoken Avenue to Duck Island Harbor, periodically depositing sand atop the existing salt marsh at the terminus of the Harbor, adjacent to Asharoken Avenue. The frequency and magnitude of these sedimentation events would determine the area of burial/loss of native salt marsh vegetation (i.e., *Spartina* sp.). This sedimentation and increased elevation would likely promote establishment of non-native common reed (*Phragmites australis*) especially in highest elevation zones such as the upland edges of the roadside. These overwash events would also deposit sand on top of Asharoken avenue requiring removal and deposition elsewhere, probably back on the beach.

The FWOP which precludes any beach/dune construction measures, would result in a progression of the erosion threats to the remaining beach dunes and upland areas. Existing dune or back dune habitat that are not protected by hard structures may become shoreline to beachfront in areas that are not yet bulkheaded and still exist in a natural state. Under extreme conditions if enough sediment was eroded away formation of a breach could occur, resulting in a significant change to local hydrological and geological function.

4.1.3 Climate

The extant wind regime, consisting of winds to the east-northeast and the west, is assumed to continue in the FWOP. Under this regime, waves, produced by predominately northerly clockwise to easterly winds, would occur throughout the year driving erosion. Northeasters would commonly occur in this area between October and March, creating large waves and wave setup with the risk of accelerated storm-induced erosion in the study area. The FWOP condition is not expected to affect these regional climate parameters.

Dune, back dune and possibly more upland habitats could be converted to beachfront or other shoreline type habitats both removing or creating micro-climate habitats via creation of shade and wind protection or the removal of such protection and full exposure to the sun and wind etc.

4.1.4 Water Resources

4.1.4.1 Regional Hydrogeology and Groundwater Resources

Under the FWOP alternative, no significant impacts to groundwater from natural forces would be anticipated. Ground water would continue to discharge at the toe of slopes along the beach during low tide, which may be contributing to the potential for slope failure and increased rates of erosion. However, heavy damages to residential, municipal or industrial structures could result in the discharge of any number of household or commercially available products that could contaminate ground or surface waters, if not stored in an appropriate manner.

No changes to the tidal regime are anticipated under the Future Without Project scenario. In the event of a complete breach of Asharoken Avenue, temporary or permanent impacts to the tidal prism, salinity and temperature gradients as well as general water quality of bayside waters may occur as a result of breach and the increased exchange of LIS water this condition would persist

until the breach was closed, either by repair/closure of the breach or through eventual re-distribution of sediments by future storm events so as to close the breach naturally (USACE-NYD, 2013).

4.1.4.2 Sea Level Rise

Relative sea level rise in the Asharoken study area under the FWOP scenario is anticipated to continue at a rate of approximately 2.7 mm/yr, which exceeds the global average of 1.8 mm/yr (IPCC 2007, IPCC 2014). The higher observed average rate of sea level rise in the this area is partially the result of post-glacial rebound, exacerbating the amount of observed wetland/shoreline subsidence attributed to eustatic sea level rise (i.e., that brought about by an increase in the volume of the world's oceans, because of the thermal expansion) alone (Hartig et al. 2002, Needelman et al. 2012). Along with increases in mean sea level, storm intensity/frequency is predicted to increase, and a shift in storm intensity towards Polar regions is anticipated, such that more frequent and damaging storms are expected to occur throughout the north Atlantic (NWF 2011). These processes are complementary, as an increase in mean sea level will exacerbate the surge effects associated with more intense and frequent coastal storms. Should a future climate scenario for the northeastern U.S. coastline include a less predictable and more dynamic weather regime, a greater frequency of coastal storm events could represent a considerable threat to coastal communities in this region over time.

4.1.5 Vegetation

Under the FWOP scenario, further deposition of sand onto the bayside of Asharoken Avenue at Bevin Road during coastal storm/overwash events may further bury existing areas of *Spartina* salt marsh which would likely continue to increase the coverage of the area by common reed (*Phragmites australis*) which has been negatively impacting the wetland for some time. Under an extreme event, such as in Hurricane Sandy, a complete breach of Asharoken Avenue near Bevin Road could re-deposit large volumes of sand in Duck Island Harbor filling in areas of cordgrass and *Spartina* marsh. After a number of filling in events, this area would be converted to a dune plant community which would probably include invasive *Phragmites*. Marsh peat and decomposing vegetation can act as a source of nutrients in newly covered areas and could result in relatively rapid colonization by characteristic plant species, such as American beach grass (USACE-NYD, 2013). While new dune like areas may arise via the redistribution of littoral material during a catastrophic breach, existing dunes and vegetation at or proximal to the site of a breach would be lost, or significantly reduced. Furthermore, maritime woodland coverage may be lost on the northeast portion of Eaton's Neck as the bluff is eroded (USACE-NYD, 2013). . Areas opened up would become intertidal or supratidal habitat. Areas not subject to constant tidal flow may develop into salt marsh if they accrete to the required elevation.

4.1.6 Aquatic Resources

The FWOP may result in changes aquatic habitats associated with the beach and dune complex along Asharoken Avenue. The recurring pattern of change to nearshore habitats caused by ongoing erosion and storm events followed by repair and recovery efforts would continue in the FWOP. Emergency repair, including rebuilding bulkheads and the addition of sand to restore beaches and dunes would be expected in the future, but these efforts would have not be long term and lack

coordination over the full length of the Project Area. As a result, sediment movement would continue across Asharoken avenue as well as pace more winnowed fine particles into the intertidal and nearshore north of Asharoken in LIS.. As a result more bay side wetlands would be lost or degraded and the intertidal and near shore benthic habitat may be degraded and/or changed by accumulation of silts and muds fine particles.

Changes such as these would reduce the amount of wetlands which act has forage areas and nursery areas for many species. These wetlands also provide refuge to many organisms especially early life stages for many fish and invertebrate including EFH species. On the Sound side where the additional fine particles may increase turbidity during periods of higher wind and waves displacing many species of fish. Where quantities of fines settle out it is likely that the benthic community will shift from once that favors course sediments to one that is supported by mud and silt. The latter is generally considered a decrease in environmental quality.

4.1.6.1 **Fish and Invertebrates – Nearshore and Intertidal Communities**

Fish and invertebrates (both macro-crustaceans and benthic in-fauna) that utilize the surf zone and nearshore waters along beaches are adapted to the dynamic nature of these habitats. These organisms are in general capable of moderate short term changes in water quality, turbidity changing water levels, currents, associated with tidal action. The fish and invertebrates reported to be using the existing beaches and nearshore waters can be expected to continue to utilize these habitats in the FWOP. However, if significant changes in accretion patterns, benthic substrate type, turbidity and localized water quality etc. occur during the FWOP the relative abundance and distribution of these species can be expected to change in response to the (long term) changes to aquatic habitat. Accelerated level rise would exacerbate habitat instability as discussed above. The aquatic habitats associated with the wetlands in Duck Island Harbor would likely experience continuing loss when storm events carried sand across Asharoken Avenue.

During a powerful coastal storm existing shallow water habitats within the project site, notably those which currently provide nursery function or a predation refuge may be affected by sedimentation from adjacent littoral sources or impacted by sediments derived from landward erosion. Demersal eggs and larval forms and demersal macroinvertebrate resources may be subject to burial or other deleterious sediment impacts under the FWOP conditions, potentially causing direct loss of the benthic populations and as well as secondary inhibition of foraging success of various predators in the study area. Species that may be affected by such changes/events in the nearshore habitat would (seasonally) include summer flounder (*Paralichthys dentatus*), winter flounder, windowpane flounder, black sea bass (*Centropristis striata*), as well as forage species such as common mummichog, striped killifish, Atlantic silverside and bay anchovy. Macroinvertebrates subject to events/changes to demersal habitat include blue crabs, horseshoe crabs, spider crabs, and possibly juvenile American lobsters.

Violent short term storm events have the capacity to move large volumes of littoral and terrestrial sediments into the near shore that can result in the direct impacts to immobile organisms. Burial can result in mortality while extreme increases in suspended sediments can also cause significant harm to respiratory functions. When turbidity levels are very high, excess silt deposition can suffocate benthic organisms or epifauna. Filter feeders may encounter difficulty locating and capturing food due to increase in suspended non-edible particulates. Deposit feeders may

encounter an increase in non-edible particulates along the surrounding sea floor, following a severe storm event. Long term coastal erosion along Asharoken Beach would encompass such short term events as well as contributing to the conversion of existing beach and dune habitats to submerged intertidal surf zone or shallow marine habitats that would increase open water/benthic habitats supporting marine invertebrates, and finfish.

Under the Future Without Project conditions, nearshore benthic communities would be subject to direct and indirect impacts associated with natural stochastic processes such as major coastal storm events which result in the redistribution of littoral and upland sediments and changes in bathymetric topography. Existing nearshore/intertidal habitats, including natural benthic features, may be altered by extreme storm events. Nearshore benthic communities are susceptible to burial under storm conditions, especially sessile species with little mobility. Loss of these organisms can constitute an indirect impact by decreasing foraging success of fish and other demersal predators in the study area.

4.1.6.2 **Fish and Invertebrates – Borrow Area, Offshore Community**

Under the Future Without Project conditions fish and invertebrate communities would be subject to direct and indirect impacts associated of natural processes such as seasonal changes in temperature and salinity, and occasional short term (regional) changes in water quality related to storm events. Basic existing conditions at the borrow site are expected to remain unchanged. Under the FWOP, both targeted species and "by catch" species with be affected by commercial and recreational fishermen. Predation by birds, seals and fish will continue to occur.

4.1.7 Wildlife

4.1.7.1 **Reptiles and Amphibians**

Under the FWOP, impacts to any marine reptiles in the vicinity of the Project Area would be minimal, relative to natural processes including predation. Adult sea turtles have very few natural predators, except for certain species of large sharks which are not known to inhabit the waters surrounding the Project Area. Any sea turtles within the Project Area vicinity would seek the shelter of deeper water in the event of a storm and avoid any storm related impacts. Sea turtles are known to be susceptible to capture in commercial fishing nets and traps and this could occur in or near the project borrow area, however it would be considered an extremely rare occurrence. Direct impacts to sea turtles during the FWOP are much more likely to occur from accidental contact with any of the fast moving vessels that may utilize the Sound during the widow of sea turtle residence (June – October)

In regard to resident reptiles and the FWOP, locally occurring, common species, are be exposed to vehicle strikes while crossing Asharoken Avenue. This potential impact may increase for female diamond back terrapin which undergoes short upland migrations from the water during late spring early summer nesting season. Coastal storms could impact diamond back terrapin and box turtle nesting areas by flooding them with salt water as well. In general near shore upland habitats such as the maritime forest zones adjacent to the project site are utilized by the terrestrial reptiles and amphibians common to the regions. These habitats may be altered by powerful coastal storms, over wash events, and salt spray under the FWOP. Loss of these areas or portions of them would

constitute loss of habitat to these regional species. All of the reptiles found within the vicinity of the project site would be susceptible to predation pressure from various natural predators including raccoons, foxes and several species of raptors, as well as dogs cats and rats.

4.1.7.2 **Birds**

Under the FWOP, available beach and intertidal foraging, and resting habitats utilized by many species of shorebirds may be reduced as a result of storm-related and long term erosional processes (USACE-NYD, 2013). Beach nesting species may also experience an analogous loss of habitat. However, storms may also increase elevated disturbance areas which are beneficial to species such as least terns and piping plovers. Erosional processes may also increase low lying intertidal beach habitats thus increasing possibly increasing areas of forage. Arboreal bird populations in the vicinity of project site would be exposed to coastal storm events. Impacts from such occurrences would be most significant during nesting season. Nests can be destroyed by wind and rain and habitat features including essential vegetation can be destroyed as well. Long term erosion would also be a source of habitat loss and could act to remove trees and ground cover required by many local avian species for nesting, feeding and roosting.

4.1.7.3 **Mammals**

Under the FWOP, there exists significant potential for vehicle strikes to resident terrestrial mammals (squirrels, raccoon, fox, opossum, deer etc.) due to traffic associated with Asharoken Avenue. The only marine mammals likely to be associated with the general vicinity of the project site would be harbor and grey seals, winter residents of the Project Area. These animals would move offshore or seek sheltered areas during storm events. Storm related and long term erosion of the shore line might reduce the amount of beach usable as “haul out areas” for these species. However, low lying areas created by overwash and/or loss of elevation may form new areas of beach suitable for hauling out as well. Long term erosional processes that decreased the area of maritime forest would likely be detrimental to abundance and diversity of those mammal species that presently reside in and around the Project Area.

4.1.7.4 **Threatened and Endangered Species**

Federal Species

Within and around the project site Atlantic sturgeon would have several sources of potential direct impacts during the FWOP. Since the nearshore areas of the LIS including the western portions are heavily used by recreational boaters, vessel strikes may pose a threat to sturgeon. However, since the Atlantic sturgeon is generally considered a highly dermersal species, its frequency at or near the surface is probably very limited, therefore the threat of a boat strike is probably relatively unlikely. Under the FWOP by-catch captures of Atlantic sturgeon by commercial and recreational fishermen is probably the most common (human caused) direct impact to Atlantic sturgeon, with the potential to cause serious injury or death to this species. Predation on this species especially on juveniles and sub adults will continue to occur during the FWOP. The frequency of direct impacts due to fishing by catch and natural predation are expected to remain the same for all project alternatives

Under the FWOP, conditions suitable for foraging/nesting activity by federally listed bird species, principally the piping plover, are expected to persist in the absence of project implementation. Existing sandy habitat on the bayside of Eaton's Neck is potentially suitable as a foraging area for adult plovers if future sediment transport processes continue to form a spit within Duck Island Harbor. However, if beachfront habitat in other areas continues to erode, nesting habitat for piping plovers will be continue to be limited and may decrease (USACE-NYD, 2013). In addition, if the beachfront was diminished, there would be an increased potential for overlap among plover nesting areas and recreational beach areas. Without implementation of project motivated management measures, such as restricting beach use by the local community during nesting and brood rearing periods, this increased overlap has the potential to cause significant disturbance to nesting habitat for these two federally protected bird species (USACE-NYD 2013). Project site usage by the red knot is unknown. However, it can be anticipated that horseshoe crabs do utilize the beach to some degree for spawning and thus it is likely that this foraging resource is available at some level.

Another additional species that was recently listed and which may occur in the study area (Suffolk County, New York) include the northern long-eared bat. Maintenance of long-eared bat populations in the vicinity of Asharoken Beach would depend on the integrity of suitable upland (forested) nesting habitat. Should suitable habitat decline over time as a result of coastal (storm-induced) erosion, local long-eared bat populations may be impacted. Simultaneously, long-eared bat populations throughout the northeastern United States are suffering from a widespread fungal disease ("white nose syndrome"), which could potentially threaten/eradicate the local population under either the FWOP or project implementation scenario.

The recently listed northern long-eared bat (*Myotis septentrionalis*) potentially occurs in Suffolk County; however no recent sightings of this species have been reported in the vicinity of Asharoken Beach/Eaton's Neck. Should any species suitable habitat decline over time during the FWOP (as a result of coastal erosion) this would represent a secondary impact to the bats even if none were residing there.

Federally listed sea turtle species, including green sea turtle, loggerhead sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, are not expected to be significantly impacted in the vicinity of Asharoken Beach under the FWOP. Changes in beach morphology, including net loss of beach habitat over time as a result of storm-induced erosion will not directly affect sea turtles in or near the study area. The potential for strikes with commercial or recreational vessels will continue to exist.

Finback and humpback whales are listed as potentially occurring in the waters of Long Island Sound, however their occurrence in this area of LIS is considered extremely unlikely and impacts to those species would remain unchanged under the FWOP.

As there have been no recent sightings of the northeastern beach tiger beetle in the vicinity of Asharoken Beach/Eaton's Neck; conditions would not change under the FWOP.

Federally listed plant species which may potentially occur in the Project Area include Sandplain Gerardia and seabeach amaranth. Both species are adapted to the dynamic beach/dune environment, therefore under the FWOP, these species, if present would likely persist, although

their patterns of spatial distribution may shift as a result of beach and dune erosion and re-establishment over time.

State Species

The Atlantic sturgeon is also listed as a state species. The potential effects under the FWOP were addressed in Section 4.1.7.4.1

Under the FWOP, several bird and marine reptile species listed as endangered or threatened by the state New York may experience impacts of varying degrees including continuing erosion of habitat associated with coastal storms, as well as the existing potential for impacts related to human activity such as vehicle contact, recreational disturbance, and predation or disturbance via domestic animals (pets). During the FWOP predation may also occur from native species which could include fox, raccoon and opossum. State species potentially affected during the FWOP could include least and common terns, which are listed as endangered and threatened, respectively, piping plover and osprey (listed as threatened in New York State). A potential benefit associated with further landward erosion during the FWOP is that beachfront converted to intertidal or shallow marine habitat over time, may increase the available feeding for shorebirds.

Sea turtles including the green, loggerhead and Kemp's ridley are also listed by the State of New York but they are not expected to be significantly affected by natural events under the FWOP scenario. The potential for strikes by commercial or recreational vessels or entanglement /entrainment in fishing gear will continue to exist.

The northern diamondback terrapin, recently removed from the list of Special Concern Species, is documented to breed and nest in the protected waters and embayments of the study area, including Duck Island Harbor and the surrounding salt marshes and mud/sand flats. Under the FWOP, terrapins would be subjected to existing levels of nest disturbance and predation on eggs/juveniles by small mammals such as raccoons/feral cats and rats. In addition, terrapins will continue to be subject to vehicle strikes along Asharoken Avenue, especially females during migrations associated with breeding/nesting season.

4.1.8 Essential Fish Habitat

EFH and its designated species within the Project Area will continue to experience long term beach erosion and the effects of storm events as it has for many years. In the long term under the FWOP, the physical aquatic habitat (intertidal and nearshore littoral) on the Sound foreshore would expand as a result of beach erosion and sea level rise, however, intertidal and nearshore areas of the back bay may decrease due to overwash of sand across Asharoken Avenue and deposition into the bay.

It is likely that some of the erosion of beach habitat would be counteracted by short term action to restore beaches to protect upland areas. Powerful storm events (short term) will move large amounts of sediment and are likely to bury and possibly cause some mortality to various benthic invertebrates utilized EFH species. This would represent a direct impact to EFH and a secondary impact to EFH species. Events like this would be expected to occur on an infrequent but regular basis and not have any significant impact on the fisheries. During storm events EFH species would seek deep water refuge from areas where wave activity was an issue.

Other impacts to EFH and species during the FWOP would include commercial and recreational fishing effects to habitat as well as targeted EFH species including summer and winter flounder, tautog, and bluefish. Under the FWOP, impacts to EFH from "natural events" will be insignificant. On the other hand commercial and recreational fishing will continue to be the greatest concern to fishery populations and habitats.

4.1.9 Socioeconomics

The FWOP alternative increases threats to both critical infrastructure which includes Asharoken Avenue, Coast Guard Station, Fire House, as well as to the residential structures in Reach 2. As the only link to Eaton's Neck, Asharoken Avenue is expected to be maintained by the Village of Asharoken in the future regardless of Federal actions. If no comprehensive erosion protection measures are implemented, it is expected that the Village would continue to spend resources in repairing the road and clearing it following overwash events. In the past, the Village and utility companies have expended anywhere from $10,000 to $60,000 annually (in 1988 dollars) on repairing utility lines and dunes, and clearing as well as repairing the road (USACE-NYD, 2013).

The potential consequences of continued erosion in the absence of Federal project implementation could range from likely events (with the highest probability) to extreme events (with the lowest probability) as listed below (USACE-NYD, 2013):

- Loss of beach for recreation (Reaches 1 and 2).
- Failure of bulkheads and damage to structures west of the power plant due to wave impacts (Reach 2).
- Overwash and temporary closure of Asharoken Avenue, including buried and overhead utility line damage and road closures isolating Eaton's Neck (Reach 1).
- A severe undermining of Asharoken Avenue anywhere between Duck Island Lane and Bevin Road, isolating Eaton's Neck (Reach 1). Additional damage to structures in Reach 2.
- A complete breach of Asharoken Avenue anywhere between Bevin Road and Duck Island Lane (Reach 1), isolating Eaton's Neck. Severe damage to structures in Reach 2.

Each of the types of storm damage has a certain risk or probability, expected cost of repairs, and impacts on Asharoken Avenue. All the impacts, except a breach, have been experienced by people in the Village of Asharoken. However, with worsening beachfront conditions, a breach of Asharoken Avenue could be a reality. Under the most severe damage mechanisms, closure of Asharoken Avenue may require the relocation of the population of Eaton's Neck to temporary housing. A temporary closure of Asharoken Avenue would result in the stranding of 1,600 to 1,700 people and the severance of normal emergency services and vital utilities (USACE-NYD, 2013).

There would also be increased emergency costs incurred by the Village of Asharoken and the Town of Huntington. A major storm event would necessitate calling in all available police officers for emergency duty. This emergency duty would be performed by officers being paid overtime and would greatly increase the emergency budget for the Village. Increased emergency costs would result from borrowing extra equipment from other municipalities to respond to fires or other emergencies and for extra resources to be put in place. Special vehicles to transport residents

would have to be leased from outside the Village of Asharoken to access Eaton's Neck if Asharoken Avenue is damaged but still passable. If Asharoken Avenue were impassible, any evacuation of Eaton's Neck would have to be done by boat or helicopter, and such an evacuation would be difficult until storm conditions subside. A closure of Asharoken Avenue would isolate the population of Eaton's Neck from most emergency services and other utilities such as water and electricity (USACE-NYD, 2013).

The continued threat of damage to structures abutting Northport Bay and Long Island Sound would also increase over time. The increase would be the result of the expected rise in sea level and the reduced protection from diminishing beach berms that are eroding over time. As the beachfront is depleted for the impacted 2.4 miles of shoreline, wave impact damages to the bulkheads, road, and structures would increase in severity and frequency (USACE-NYD, 2013).

Environmental Justice

No Environmental Justice issues are anticipated as a result of the FWOP alternative.

4.1.10 Historic and Cultural Resources

Under the FWOP scenario the four sites currently listed, as well as the four additional sites potentially eligible for inclusion in the National Register of Historic Places for Eaton's Neck and Asharoken Village are at risk for structural failure as erosion of Asharoken Beach continues in the absence of Federal project implementation.

4.1.11 Coastal Zone Management

The FWOP would not conflict with Coastal Zone Policies.

4.1.12 Hazardous, Toxic and Radioactive Waste

Under the FWOP condition there exists the possibility of a coastal storm damaging and possibly destroying any number of residences that lie along Asharoken Avenue. Should such an event take place, hazardous materials such as heating oil, gasoline, pesticides, solvents etc. could be released into the surrounding ecosystem which include LIS and tidal marsh.

4.1.13 Air Quality

Suffolk County is located in the New York-New Jersey-Long Island Air Quality Control Region. Similar to most urban industrial areas, emissions from automobiles, manufacturing processes, utility plants, and refineries have impacted air quality in the Project Area. Based on the National Ambient Air Quality Standards (NAAQS) six primary pollutants, *Suffolk County is designated as a non-attainment area for ozone and carbon monoxide and an attainment area for sulfur dioxide, respirable particulate matter (PM10), lead and nitrogen oxide*.

In the Asharoken study area, ambient concentrations of CO, O_3, and Pb are predominantly influenced by vehicle emissions; NO_x and particulates are emitted from both motor vehicle and stationary sources (i.e., power generation), and emissions of SO_x and sulfates are mainly from

stationary sources. The location of the study area next to Northport Power Plant, the largest oil-burning power plant in the northeast, may result in abnormally high levels of criteria pollutants produced by fossil fuel combustion, such as CO, NO_x, PM, and SO_2. However, the coastal location of the study area, with prevailing northeasterly winds, may reduce the direct impact of emissions from the Northport Power Plant. Under the FWOP air quality conditions/issues are expected to continue as they presently exist.

4.1.14 Noise

Under the FWOP, ambient noise sources may include various types of vehicle on Asharoken Avenue, occasional noise from infrastructure repair along the road, residential noise from lawnmowers and power tools etc., flyovers from commercial or private aircraft and engine noise from boats and personal watercraft. Primary receptors at the beach along Asharoken Avenue and within the general vicinity of the project include residents of Asharoken/Eaton's Neck, visitors to the area, and terrestrial birds and mammals.

4.2 Tentatively Selected Plan

Description

As described in Section 2.1, the Tentative, Federally Supported Plan (TSP) would involve the deposition of beachfill, and periodic beach nourishment. The source of the initial sand for the beachfill will be borrow area A (Figure 6).

The TSP will increase the width of Asharoken Beach and provide a line of protection landward of the berm. The project offers a combination of "hard" and "soft" engineering techniques. The proposed plan for Asharoken Beach includes the dredging and placement of approximately 600,000 cy of fill material to rebuild 12,400 ' of beach and berm and dune. Periodic renourishment is anticipated at a frequency of 60,000 CY every 3 years with the renourishment sand trucked in from an upland source. Additional post storm nourishment is estimated at 25,000 CY every 5 years. Another re-nourishment source will be sand dredged from the LILCO power station inlet to the east and "by passed" to the project site.

Initial fill will cover approximately 75 acres of intertidal and littoral nearshore benthic habitat seaward of mean high tide limit. Sand will be dredged from a nearby offshore borrow area (Area "A") and will require dredging an area of about 55 acres to a depth estimated to be 10' below the ambient benthic surface. Average depth of the dredge foot print will be increased from about 35 to 45 feet (MLW).

Adverse environmental impacts from the initial implementation of the TSP will be localized short-term, direct and indirect impacts. They will be associated with beachfill (berms), and dredging of sand for beachfill. Impacts will consist of direct and indirect impacts to benthic infauna, demersal fish and macroinvertebrate species at the construction and placement sites.

4.2.1 Land Use/Recreation/Transportation

The TSP would result in the widening of the berm to the landscape/seascape. There will be a resulting change in beach/berm elevation. There will be a change in the view-shed from both

landward and seaward of the directions. The berm may partially obstruct the water view from some residences and Asharoken Avenue Implementation of the project will result in both temporary and permanent land use.

Implementation of the project will cause temporary disruption of traffic patterns on Asharoken Avenue due to the delivery of stone and other Project materials and equipment. These impacts would be minor and limited to the construction period and renourishment periods. Project activities may affect boat traffic in the vicinity of the Project Area. No long-term impacts on transportation resources in the Project Area are anticipated.

As part of the TSP, public access crossovers will be built requiring former private property to be utilized by the public. Additionally more parking spaces will be required such that public parking is available. These two aspects of the TSP which represent minor land use changes are required by law, however, they will not constitute a significant change to Land Use of the property site or its vicinity.

No significant or long-term adverse impacts to recreational resources in the Project Area are anticipated as a result of the proposed project. Temporary disruption of recreational activities along the beach may occur in the Project Area as a result of construction activities. These impacts would be minor and would be limited to the duration of construction activities in the Project Area. Placement activities will require a safety buffer that will make areas of the beach off limits. This buffer zone will progress down the beach along with project construction. Potential long-term benefits to recreational resources in the Project Area include the expanded beach area including additional access.

4.2.2 Geological/Topography and Soils

Beachfill will directly impact beach topography and the topography of the area to be dredged. Soils will be disturbed and redistributed through excavation, placement and re-grading. Excavation and dredging for beach nourishment sand offshore, and placement of sand on the beach constitute the project direct impacts to soil and geology. The grain size of sand placed on the beach will be similar to the grain size of the pre-construction beach. This will be the case for any re-nourishment as well. The project is not expected to involve any clearing of maritime forest where soil development is most advanced. Most of the physical disturbance associated with the project (grading and bulldozing of sand) will be located along the shoreline and upper beach and dune areas where some upland soils may have accumulated. Erosion as a result of routine wind and wave forces, as well as future storm events, will continue to take place across the entire Project Area.

Future direct impacts associated with the TSP on soils will consist of the five-year periodic nourishments of 80,000 CY of sand sourced from upland sites. To reduce the costs of transporting the sand to the site, the sand will be sourced on Long Island where sand mines are generally located within forested areas and occasionally within the Central Pine Barrens.

Direct impacts to soil and geology include dredging actions resulting in changes in bottom bathymetry and the sediment characteristics of the offshore borrow area. The bathymetry of borrow area A will be altered but as most of the sand removed is coming from a ridge of sand of

higher elevation a significant depression is not expected to occur. The expected result of the dredging operation is the reduction of the size of the sand ridge. Dredging will re-suspend sediments in the water column. Most of the suspended sediment load will consist of medium to coarse sand and gravel which will settle back to the bottom almost immediately. A small amount (by volume) of suspended sediments will be finer particles which will remain in the water column longer and is likely to form a localized area of higher turbidity. These finer particles may settle out farther afield. This localized area of higher suspended sediments will exist throughout the duration of dredging. As the sediment is pumped onto the beach, a second area of localized higher turbidity will be created at the placement site. This situation will be present as long as placement operations are active. The zone of localized suspended sediment will migrate along the beach along with the filling operations.

In general the TSP will have a direct impact on the topography of Asharoken Beach by providing a wider beach of greater elevation. In addition, at the borrow area there will be direct impacts associated with altered bathymetry and potential alterations of surface sediment type. However, because no significant depression is expected as a result of the dredging, long term infilling with fine materials should not occur and the surface sediments should remain similar to the existing surface sediments.

4.2.3 Climate

Implementation of the TFSP will have negligible impacts on climate on large scale local, (project wide), or regional scope. Micro-climate within the project site may be affected both long and short term, depending on location, project action and project feature longer term affects such as shading from planted vegetation will exist as long as these features endure. The berm and vegetation will also affect impacts to due to wind as they will act as barriers. The significantly enlarged beach and berm can also act as heat source as it absorbs and radiates the suns energy.

4.2.4 Water Resources

In general, the TSP will not have significant impacts on water resources. Localized increases in turbidity at the dredge and placement sites are to be anticipated for the duration of the placement activities. No changes to dissolved oxygen (DO) are anticipated. Decreases to DO are linked to the re-suspension of organics and nutrients into the water column acceleration microbial activity and removing oxygen from the water. Because the sediments being dredged are over 90% sand, detrimental increases in microbial respiration due to increased organics is not anticipated. Another factor that will lower the likelihood of decreases in DO will be the cooling water temperatures and increased mixing accompanying the fall season.

The Asharoken project will not place any effluents into the Long Island Sound. The only materials placed in contact with the water (permanently) will be sand and stone. However, as with any marine construction project, there is a threat of direct impacts to water quality in the event of an oil, fuel or hydraulic fluid spill from the graders, dredges, barges or support vessels etc... These impacts, in most cases, can be prevented to a large extent via implementation of precautionary and responsive protocols outlined in a project-specific Environmental Protection Plan. A 404(b) Evaluation has been completed and the District is submitting a Water Quality Certification (401) application to the State.

4.2.4.1 **Regional Hydrogeology and Groundwater Resources**

Implementation of the TSP is not anticipated to have any direct negative impacts on ground water supplies within the general or immediate Project Areas. Best Management Practices will be implemented to prevent/minimize any potential for a spill that might affect ground water.

4.2.4.2 **Surface Water**

No changes to the tidal regime are anticipated under the TSP, either along Asharoken Beach or in the back-barrier waters of Duck Harbor. A catastrophic breach of Asharoken Avenue will be less likely as a result of implementing the TSP, minimizing the potential for influx of higher salinity, waters to Duck Harbor.

During dredging and placement, turbidity at the action sites is likely to increase. However, due to the nature of the sediments (medium to coarse sands), the areas of high turbidity will remain very localized (on a scale of 100s of meters) in relationship to the action area. This condition will exist for the duration of the dredging/placement operation.

4.2.4.3 **Sea Level Rise**

Relative sea level rise in the study area under the TSP is assumed to continue at a rate of 0.8 ft per 100 years. In-water activities associated with dredging sand at the borrow area and construction activities associated with building the beach, berm and dune will not have an impact on sea level rise. The TSP will not change the rate of SLR in the Project Area.

4.2.5 Vegetation

Implementation of the TSP will cause direct impacts to upland vegetation within staging areas, use of the required equipment, and within the placement footprint. Any losses will be limited to the loss of common dune vegetation (where it exists) this may include beach grass and seaside goldenrod in the temporary bulkhead and dune area (Reach 1A) (USACE-NYD 2002). No significant clearing of maritime woodlands or the understory would occur. Ultimately, implementation of the TSP will increase suitable habitat for beach grass and other dune stabilizing plants along Asharoken Beach. All dune areas will be replanted with native species.

Historically eelgrass, (*Zostera marina*) and widgeongrass (*Ruppia maritima*) may have occurred in this area of Long Island Sound. However, the former species was largely extirpated during the mid-20th century as a result of "eelgrass wasting disease." Recent surveys (USACE and other) did not indicate the presence of eelgrass or widgeongrass beds offshore of Asharoken Beach. (USACE-NYD 2005, 2007). Because of the relatively poor light transmission in the LIS, only sparse submerged vegetation (SAV) is expected to exist, if at all, at the borrow area. Therefore significant loss of SAV is not expected to occur as a result of dredging.

Storm-induced migration of sand across Asharoken Avenue at Bevin Road (into Duck Harbor) is expected to decrease; however, it is unlikely that this will alter the distribution of invasive common reed, which has already taken hold in the area, encroaching the upper limits of the saltmarsh cordgrass in this area.

4.2.6 Aquatic Resources

Direct effects associated with implementation of the TSP will occur in the intertidal, adjacent nearshore habitats, and the borrow area. In regard to the intertidal and near shore areas and as discussed in Section 4.1.6, many species associated with beaches and adjacent habitats have evolved physical and behavioral adaptations to cope with the extremely dynamic environment of the shoreline. Typical adaptations include movement with the tide, high reproductive potential, and only spending a portion of their life cycle in the intertidal or nearshore littoral zone. Although placement of sand onto the intertidal and the near shore zones will cause significant mortality to those animals incapable of avoiding burial, it is anticipated that recovery of the preconstruction populations will be rapid due to the highly dynamic nature of the habitat and the organisms that occupy it.

The TSP will have direct and indirect impacts to habitat and communities of the borrow area. These include removal and burial of organisms as well as temporary and long term changes to the habitats affected. Water quality will experience minor adverse effects through temporary localized elevated turbidity for the duration of the in water construction activities. Benthic feeding fish species (e.g., winter flounder) as well as other fish species may experience temporary spatial displacement from the dredging and construction areas. The (temporary) loss of benthos at the borrow area would also represent an indirect (foraging) impact to fin-fish or other benthic feeders. If a hopper dredge is utilized there may be direct mortality to highly demersal species such as flounders, skates and various types of none swimming crabs. In general most of local species present at the time of construction will move away from disturbance areas to feed in the surrounding areas and, therefore, would be unaffected by the temporary localized reduction in available benthic food sources. Benthic communities will naturally begin to re-establish shortly after construction is completed, forming a similar community, generally within about a one to two year period

4.2.6.1 **Finfish**

Under the TSP, finfish can be impacted by dredging at the borrow area and at the beach. Potential impacts of beach nourishment activity on fish communities, at the dredge site include potential entrainment, however adults of most species have the mobility to escape the dredge. Juveniles, larvae and eggs are most susceptible to entrainment or other injuries via the dredging process especially if a hopper dredge is employed. However, if a hopper is used it must be equipped with a deflector device which greatly reduces the likelihood of entrainment by pushing surface sand off to the side of the draghead. These same life stages are also more likely to be vulnerable along the beach placement site as a result of burial or physiological impairment of respiratory function. The scales of these potential impacts to mobile forms should be minor, given the observed responses of beach nourishment projects elsewhere in the northeast Atlantic region (Wilber et al. 2003, Able et al. 2010), where fishes such as bluefish were demonstrated to be able to avoid turbidity plumes and other species were actually attracted to plumes because of feeding opportunities.

The timing of beach nourishment activities is a primary determinant of the magnitude of anticipated impacts to fish and macro-invertebrate resources. Early spring through summer coincides with spawning and the critical period of early life-stage development for many inshore fish and macroinvertebrate species. The young-of year of many of these species rely on shallow,

nearshore habitats throughout the late summer and early fall as nursery and feeding areas and as a refuge from predation. Because of the declining population of winter flounder The NYSDEC has established a no dredging window from January through May. The State of New York has also stated concerns regarding the potential effects of project dredging on multiple species of finfish and mega-invertebrates who's spawning and early life history stages occur during the late summer, and implemented and additional no dredge window through September (January-September). The District reviewed the reproductive life histories of these regional species of concern and determined that there were a dozen species that had a moderate to high potential for impacts to early life stages from a hopper dredging and possibly sand placement. These species included Atlantic Herring, Clearnose Skate, Fourspot Flounder, Goosefish, Hogchoker, Northern Sea Robin, Red Hake, Winter Skate, Summer Flounder, Long Fin Squid and Blue Claw Crab. Of these 12, summer flounder, long fin squid and blue claw crab have the highest potential for entrainment or contact injury due to hopper dredging.

Thus late fall to mid-winter would be the most advantageous time to conduct the sand dredging to avoid impacting the majority of fish and macro-invertebrate species likely to occur in the nearshore and offshore habitats associated with Asharoken Beach. It should also be noted that by November many species will have already started to migrate to deeper overwintering habitats and be out of harm's way. Also the most effective method of dredging sand from an offshore site and placing on the beach at Asharoken will be by the use of a cutterhead pipeline dredge not a hopper, however at this time there has not been a final determination in regard to the method of dredging to be utilized. Because of the seasonal no dredging window, the likely use of a cutterhead dredge, and /or best management practices including the use of a deflector if a hopper is used, the District does not anticipate any significant adverse impacts to fin fish or mega invertebrate species from implementation of this project. Table 18 displays potential project impacts to EFH and mitigation strategies.

4.2.6.2 **Benthic Invertebrates**

4.2.6.2.1 **Nearshore Benthic Invertebrates**

Common benthic invertebrate species occupying the lower intertidal and shallow subtidal portions of beaches along the LI Sound shore line include annelid and nematode and other marine worms, amphipods and dedcapods (crabs and shrimp) and copepod crustaceans, bivalve mollusks, snails and other forms. Asharoken beach produced similar species during monitoring and as with the borrow area, nearshore observations revealed annelid and nematode worms were the dominant, most abundant forms.

Many of the marine invertebrate species will potentially be impacted by placement of fill material on intertidal or subtidal portions of Asharoken Beach. In general, the types of invertebrates found in or above the sediment surface are able to persist in the dynamic beach environment because they have adapted to conditions such as high wind and wave energy and periodic burial. The ability of most benthic invertebrates to survive a fill event depends on their ability to burrow up into the newly deposited substrate. Substrate composition and depth of the newly deposited layer are the major factors determining survival rates and vertical migration capabilities of beach invertebrates subjected to instantaneous burial (Culter and Mahadevan 1982, Nelson 1985). Alternate means of beach invertebrate re-colonization include recruitment of juveniles and adults from adjacent areas,

and deposition of invertebrates onto the beach by dredged material pipelines during sand placement (Van Dolah et al. 1994). Near shore benthic invertebrate communities both intertidal and littoral have been shown to recover very rapidly due to the nature of their adaptations as previously discussed. Generally speaking this can be within 6 months to a year depending on the construction season. Placement of offshore sand onto the beach via a slurry, introduces an abundance of small prey items into the nearshore water column. Some may recolonize but many become prey for a variety of predators. This feeding opportunity is localized and moves along with the process of beach building. Once the initial abundance is depleted the newly filled intertidal and subtidal area will take time to fully reestablish. During this interim, the area will not offer an abundance of forage. Under this condition the recovery period represents a secondary impact to any organisms that might ordinarily find and abundance of prey at the project site.

Of concern in Long Island Sound is the potential for impacts to horseshoe crab populations. Beaches represent important spawning habitat for horseshoe crabs and juveniles are typically concentrated in shallow nearshore habitats. Nourished beaches can potentially create additional spawning habitat for horseshoe crabs, which lay eggs in shallow burrows along the beach; sand placement on the intertidal beach can potentially smother/suffocate horseshoe crab eggs and the female crabs may encounter difficulty constructing burrows or depositing eggs in sand that differs from native substrate. Best management plans would place the fill outside of the spawning season and match grain size of the donor sites with that of the beach site.

4.2.6.2.2 **Offshore Benthic Invertebrates**

Nematodes, and annelid marine worms were the numerically dominant organisms at the borrow area. Crustaceans including the tube-dwelling amphipod, *Ampelisca abdita*, and bivalve and gastropod mollusks were also consistently present in moderate abundances during initial pre-construction surveys. The presence of the copepod *Temora longicornis*, was an artifact of capture methods, they being planktonic and microscopic and not functionally members of the benthos. These types of invertebrates are the least likely to be affected by any project actions. Unavoidable impacts to the benthic community at the designated borrow area(s) offshore of Asharoken Beach are anticipated with implementation of the TSP. Benthic invertebrates will be removed when surface sediments are excavated. Large scale mortality will occur especially to infauna (marine worms, bivalves etc.) removed with the sediment and are buried by successive loads of sediment as it is delivered to Asharoken Beach. However, many of these smaller forms will wash out of the placed sediment and be returned to the near shore. Larger organisms that fail to escape the dredge will be destroyed as they are passed through the dredge pump or are cast up on and buried in the new beach. Certain crustacean species which area highly mobile and wary such as blue claw and lady crabs have a good chance of avoiding the dredge. As discussed previously, the dredge plan and accompanying BMP's will ensure that the altered bathymetry will not cause significant water quality issues or density stratification (via temperature or salinity) thus preventing potential low dissolved oxygen conditions.

Dredging is likely to increase bottom turbidity levels on a much localized scale. When turbidity levels are very high, excess silt deposition can suffocate benthic organisms or epifauna. Filter feeders may encounter difficulty locating and capturing food due to increase in suspended non-edible particulates. Deposit feeders may encounter an increase in non-edible particulates along the surrounding sea floor. Typically, elevated turbidity is limited in duration to the time of actual

dredging and impacts on benthic fauna are generally confined to the immediate vicinity of dredging operations (USACE 2014). Furthermore, as the dredge moves on to new areas the increased turbidity move along with it, thus this increase in turbidity affects any given area on a very temporary basis. The low silt content of fill sediments involved in this project would greatly limit the probability of turbidity-related impacts on any fish or macroinvertebrates.

Abundance and diversity of the affected benthos is expected to return to pre-dredging levels within 6 to 12 months, depending on the time of year construction occurs and, the type of benthic organism being monitored. Should the designated borrow area experience changes in sediment texture (e.g., reduced average grain size) a longer time to recovery may result. It should be noted that the relatively shallow open-water of the borrow area promotes advantageous water circulation within the dredged area such that water quality impacts would be very improbable.

Because the total extent of the delineated borrow area is much larger than the area required for dredging, it is possible that any known sensitive areas can be avoided. Prior to the construction phase of the project the District will be conducting a pre-construction benthic community mapping survey in order to avoid any especially important /sensitive bottom habitats. The District will also be conducting a post construction borrow area survey to analyze short and long term impacts that may result from construction of the project. The District respectfully requests any geo-referenced information describing the location of any areas known to be of particular ecological/recreational interest, or sensitivity, to be sent to the New York District Office in care

By minimizing any potential effects to the project site ecosystem the District anticipates only minor, temporary disturbance impacts to occur to finfish. Recreational fishing may be temporarily affected in those areas proximal to construction activity. Fish are expected to move to adjacent areas when disturbed. However, some species may be attracted to the disturbance and the prey items disbursed into the water column at both dredging and placement sites. Most benthic invertebrates within the dredging and placement footprints will be temporarily eliminated by entrainment or burial, but are expected to recover within 6 months to 2 years, depending on location, season of construction and the type of benthic community previously established.

4.2.7 Wildlife

4.2.7.1 **Reptiles and Amphibians**

Sea turtles may be directly impacted by beach nourishment activities via entrainment (hopper dredge) or other direct contact injuries (all dredges). Sea turtles may experience displacement due to turbidity, noise or visual cues. Sea turtles may also experience indirect impacts associated with implementation of the TSP through loss of prey, or the ability to locate prey. In general, cutterhead dredges and clamshell type dredges are regarded as having the least likelihood of directly impacting sea turtles. Hopper dredges on the other hand, are known to pose significant threats to sea turtles, in regions where marine turtles are relatively abundant and display seasonal behaviors which cause them to congregate and/or also causes them to bury in the sediment. For the Asharoken project the risk of entraining, injuring or killing sea turtles with a hopper dredge will be minimized by installation of sea turtle deflectors on the dragheads. Also part of the BMP's required for this project qualified turtle and sturgeon observers will be placed on board a hopper

dredge should one be utilized. Because project dredging is proposed for the fall (October) the likelihood for any direct impact to sea turtles by any type of dredge will be further decreased because by this time sea turtles will have begun to move east out of the western sound beginning their migration back to the south east Atlantic and Caribbean.

Northern diamondback terrapins are present in the tidal marsh west and south of Asharoken Beach, and although the planned construction is not expected to have any direct impacts on these marsh areas, terrapin do on occasion move overland and cross roadways. Movement of traffic and construction equipment associated with implementing the TSP may put turtles directly at risk of injury or death. During nesting season, the threat of vehicle impacts would be much greater, however, terrapin nesting generally takes place in the spring and early summer, not in the fall.

Other common reptiles and amphibians such as garter snakes, box turtles and toads may be present in the marshes and within the areas of maritime forest. These organisms would also be susceptible to vehicle/equipment impacts during construction activities.

However, most reptiles and amphibians commonly found on Long Island are rarely associated with beach habitats such as the project site. The TSP is not expected to have any significant direct or indirect impact on amphibian populations during the initial phase of the replenishment of Asharoken Beach due to the scarcity of standing fresh water in the area. One possible exception is the potential impact of the TSP on American toads or Fowler's toads, which are known to frequent the uppermost portion of intertidal beaches in the study area, primarily at night, foraging for insects. Should project implementation result in an increased area of high intertidal beach face with accompanying rack, this species may ultimately benefit from project implementation, although the initial construction activity, including movement of vehicles and equipment, would likely represent a disturbance or worse and would be considered as adverse impacts to these species.

4.2.7.2 **Birds**

Bird species that use beaches and nearshore habitats for nesting, foraging or overwintering are more likely to experience impacts from beach nourishment activities than those bird species for whom the beach and shoreline habitats are not essential. Species that could be impacted at Asharoken project site include the common tern (*Sterna hirundo*), least tern, roseate tern, oyster catcher, and black skimmer. However, by October, all of these species will have migrated out of the region. Significant direct adverse impacts to most bird shorebird species within and around the project site is expected to be minimal provided project construction is implemented outside of the nesting season which is the planned construction schedule. Overwintering birds such as gulls and sea ducks, etc., are unlikely to be significantly impacted as they will move away from any undue disturbances, to forage, roost etc. elsewhere. During fill operations an abundance of small invertebrates are cast up on the beach and exposed as the slurry water washes them out of the sand as it runs down to the surf zone. Generally speaking there is feeding frenzy of shore bird that are present, most likely to be gulls. This would be a beneficial indirect impact for those species available to take advantage of it.

Of greatest concern is the piping plover, a federal and state listed species that build its nests in sparsely vegetated sandy areas above the intertidal zone. This species is known to nest within the

project site and will be discussed in Section 4.2.8 Threatened and Endangered Species, which follows.

Implementation of the TSP construction activities are scheduled during the fall and winter. This will avoid critical nesting seasons of listed and non-listed species. No significant direct or indirect impact to birds are anticipated during the initial phase of construction, the completed project or from follow re-nourishment cycles.

4.2.7.3 **Mammals**

Project related direct impacts to marine mammals (including seals, dolphins and whales) are a potential concern with regard to proposed dredging activity at the borrow area. However, the nature of the Project Area, including its location, make it unlikely that any species of whale or dolphin would at any season be in the vicinity of the project. Most cetaceans (whales, dolphins and porpoises) are usually found in the eastern Sound. None the less, contact with a vessel or dredging the western Sound would be possible. Due to the moderate possibility that turtles or sturgeon may be in or near the project site, observers/monitors will be required onboard the dredges. Environmental duties would include observations of any large marine mammals in the vicinity, thus vessel personal would be made aware of their presence. Most large marine mammal incidents occur during transit when vessels/dredges are traveling at speeds greater than 10 knots. As there will be no transiting of a hopper or laden barges for pump out, it is unlikely that such collisions would occur at the project site if any whales were present. A working hopper dredge moves relatively slowly (3-4 knots) and cutterhead and clamshell dredges remain almost stationary.

The species most like to be in the Asharoken Beach Project Area are overwintering grey and harbor seals. There is a possibility of direct contact impacts to either of these species, however both are extremely agile, powerful swimmers and can easily avoid any of the typical vessels and equipment used for beach nourishment projects. A more likely and much less harmful direct impact would be disturbances to seals from equipment noise or movement. Overwintering seals are known to haul out on the beaches of the Sound. Project construction has the potential to prevent seals from utilizing areas of the project site beaches during construction.

In addition to the possibility of minor direct impacts to marine mammals, indirect impacts associated with the Asharoken project may include disruption of the prey base i.e., fish and macro-invertebrates, displaced or removed from the area as result of construction activity and/or decreased feeding success due to turbidity issues. Of potential benefit to seals is the exposure of macro-invertebrates which may become more readily available prey during dredging and placement. Small fish may be attracted to the abundance of prey churned up by dredging and placement action and seals may be able to take advantage of this scenario as well.

Impacts to terrestrial mammals will be very limited. Most of the mammals likely to be within or close to the project site are small species, such as squirrels, mice, shrews, chipmunks and rabbits etc. Other mammals may include foxes and raccoons and white tailed deer. In general most of the direct impacts anticipated would be those of disturbance/displacement related to noise and the movement of equipment. It is also possible that mortality could occur from impacts related to vehicle movement, excavation and grading etc. This is expected to be minor. The frequency of

vehicle mortality may increase if there is a project related increase in traffic. Also, once the project is completed the higher elevation of the berm may act as a visual barrier tending to keep animals on the road for longer periods of time thus increasing the possibility of vehicle contact.

4.2.8 Threatened and Endangered Species

4.2.8.1 Federal Species

Although Atlantic sturgeon are not expected to be found in the surf zone or very shallow near shore their presence within the "action area" of the placement operation is possible. Direct impacts such as physical injury are highly unlikely. Physical injury due to the various components of construction is unlikely because the majority of the construction activities takes place on land or in very shallow surf or swash zone areas, and the equipment moves very slowly. Disturbance/avoidance due to increases in turbidity due to placement sediment dispersion is also possible, although sturgeon are known to be tolerant of relatively high levels of turbidity.

Within and around the borrow area Atlantic sturgeon may be present year round, including individuals from any of the east coast sturgeon populations. Numbers of Atlantic sturgeon may increase during the fall and spring correlated to the migratory periods with the river and estuary known to occur in spawning rivers such as the Hudson. Sturgeon from the NY Bight disperse south throughout the Mid-Atlantic Bight during the winter.

Direct impacts including entrainment or other contact injury would have the potential to occur during periods when dredges and associated vessels were working at the borrow area. This potential for direct impact may increase during seasonal periods when adult and sub-adult sturgeon are congregating or actively migrating to or from the Hudson estuary. Direct impacts from entrainment (and other contact) appear to be rare occurrences when using a cutter head dredge Sturgeon entrainment rates derived from USACE screening of dredged material from hopper dredging operations which have a greater impact potential than a cutter head dredge (Atlantic coast, Virginia, New York and New England between 1990 and 2005) still only resulted in an observed take of 0.6 sturgeon per year (USACE-NYD 2006, as cited by ASSRT 2007).

Vessel strikes also appear to be rare and the few that have been noted have occurred in situations where there was minimum depth in relation to draft of the vessel. Sturgeon are highly demersal and dredging will be occurring in unconfined open water, not a narrow channel. Impacts to sturgeon in the upper reaches of the water column due to vessel strikes appear unlikely. General disturbance resulting in avoidance behavior may occur.

No significant impacts to water quality are expected from the actions of a dredge. There may be a minor, localized increase in total suspended sediment along the path that the dredge takes as it obtains sediment. However, as the target material is 90% sand or better, any turbidity will localized to the immediate vicinity of the drag or cutter head. At most this might cause an avoidance reaction from a sturgeon which is a minor effect.

Direct impacts to sturgeon resulting from construction actions of the proposed project are not expected to significantly affect or jeopardize any Atlantic sturgeon population.

Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al. 1997, Haley 1998). These benthic species will be lost along with the sand during dredging. The borrow area utilized for the beach fill of the proposed project will be lost as a foraging area to sturgeon until it can recover which is expected to occur relatively rapidly. However, the areas adjacent to the borrow area are regional in size and offer similar types of prey. Sturgeon will be able to find prey outside the borrow area therefore this temporary loss of forage is not a significant indirect impact to regional sturgeon.

Three species of sea turtles may seasonally occur in the vicinity of the project site (loggerhead, Kemps Ridley and green). Potential impacts to these marine turtles were previously discussed in Section 4.2.6.1. If a hopper dredge is utilized dredging impacts will be minimized by utilizing hopper dredge best management practices including use of the turtle deflector head and on board lookouts and monitors. The NMFS completed their Asharoken consultation under section in a letter dated 18 November 2015 (see Appendix C) in which they concurred with the District's determination that the project may affect, but is not likely to adversely affect, any (NMFS') species listed as threatened or endangered (Kemps ridley, Green, Loggerhead turtles and Atlantic sturgeon.) under the ESA of 1973, as amended. The piping plover, which is federally listed as threatened and state-listed as endangered utilizes the project site beach for nesting and foraging. From 2008 – 2015 nests have been identified within the Project Area (Figure 12 and Table 14). Stabilization of coastal habitats using either "hard" or "soft" coastal engineering techniques can have adverse effects on plovers by eliminating natural disturbances, such as overwash events, which are optimal habits for plover foraging and nesting habitats. However, the Asharoken beach, the residential areas and its various erosion shore protection elements have been repaired and re-nourished constantly effectively preventing overwash for many years. Further prevention of this phenomenon would not represent a significant adverse impact to the plovers which nest there. On the other hand, the significant increase in berm width should increase the potential habitat available for the piping plover nesting and may act as and attractant to this species. This has been the case on many nourished beaches along the south shore of Long Island.

Additional (public) access points are a project construction feature that has the potential to manifest in a post construction disturbance factor to plover nesting or brood rearing at Asharoken. Within the 2.5 mile project reach Individuals (residents and non-residents) when utilizing the access points have the potential disturb plovers nesting or brood rearing in the vicinity of these public access corridors. To minimize any potential adverse impacts of the public access ways, a plover management/monitoring program will be developed with the town and local state, and federal resource agencies to prevent or minimize these potential impacts. Such a plan would be developed within the next project phase.

As it is anticipated that construction will take place between October and April 1, it is unlikely that the rufa red knot would be present at or near the project site. Thus it is unlikely that any construction activities will significantly affect the red knot. However, the additional sand resulting from the fill process may off a more compatible horseshoe crab spawning substrate than the rock and cobble that is presently in the intertidal.

As previously discussed sea beach amaranth and sea beach knotweed are federally listed plants that may occur in the region. Frequent federal construction work including environmental assessments has not yielded observations of these plants on site and there are not records that show

that they once existed there. Preconstruction surveys will again take stock of what is on site but the presence of these species is not anticipated.

4.2.8.2 **State Species**

Several New York state listed species may be present at or near the project site during various seasons of the year. These would include piping plovers and the sea turtles discussed above in the Federal section. NY State avian species include common loons which overwinter in the sound including in the vicinity of Asharoken beach, ospreys, (spring through fall) which have been accommodated along Asharoken Beach with nesting platforms, and common terns (spring through fall). Because of the fall/winter construction schedule (Ospreys and terns will have finished nesting and migrated from the area) loons may be the only species impacted by the noise and disturbance caused by the offshore sand dredging and placement activities. Additionally, turbidity associated with placement activities may impede visibility when loons dive and hunt for fish. This would constitute an insignificant impact as these birds will easily find other areas in which to fish.

Common terns may directly benefit from the TSP in that areas of sparsely vegetated sand would increase, increasing viable nesting habitat. It should be noted that the increase in available nesting habitat to both terns and plovers will likely be concurrent with greater use of the beach as a recreational area.

4.2.9 Essential Fish Habitat (EFH)

The proposed actions under the TSP are not expected to have significant or long-term impacts on the "spawning, breeding, feeding, or growth to maturity" of the designated EFH species that occupy the nearshore or borrow zones. However, proposed activities may have short-term, direct and indirect impacts on EFH designated fish species and life history stages that occur in the immediate vicinity of project action areas. Changes to EFH habitat may be long term and include changes in depth and bathymetry and sediment composition or heterogeneity.

Species spawning during or just prior to construction especially ones with demersal eggs larvae or juveniles are at greatest risk during project implementation from entrainment or potentially adverse effects of increased concentrations suspended particulates. There are no known areas of contamination within the borrow area therefore significant exposure to any HTRW is not anticipated in relationship to dredging or placement of sand.

By implementing the proposed TSP long term shoreline erosion rates will be decreased and a more stable shoreline will be present. The project will protect the Duck Island Harbor wetlands, from further infilling which will benefit early life stages of many EFH species that utilize such protected back waters as protection and foraging areas. These same marsh areas also produce many of the forage species that adult EFH species prey on.

During dredging operations at the borrow area, most EFH species would avoid the immediate area of dredge activity, but would continue to use the borrow area as they have in the past once dredging is completed. There would be no long term effects on EFH or the designated species for this project. Localized areas of increased turbidity on expected to occur in the vicinity of the draghead or cutterhead of the dredge. This may impact visual acuity and impede feeding. However, fish

will be able to move into areas where this is not a problem and forage there. Highly demersal fish such as winter flounder and skates would be the most susceptible to direct (contact) impacts from suction and mechanical dredges. Hopper dredges would be the greatest threat to these bottom dwelling species but the sturgeon/turtle deflector will greatly reduce the potential of contact or entrainment. The greatest indirect impact will be the loss of benthic prey within the dredging footprint. EFH species dependent on these organisms will be forced to forage in the surrounding waters. This is not expected to represent and significant impact. Re-colonization is expected to occur rapidly within 1 to two years. Because an elevated ridge of sand is the source for the initial beach fill, none of the potential secondary effects of an excavated area of the bottom, such as long term infilling with finer particles, density stratification or decreases in dissolved oxygen are anticipated.

Placement of large amounts of dredged sand will temporarily increase turbidity in the intertidal and nearshore zones, localized to within hundreds of meters form the outfall. This disturbance zone will move down the beach as the fill template is constructed. In comparison a moderate storm increases the turbidity orders of magnitude greater than placement operations, and this occurs over entire regional areas. (NJ BMP 2001) This increase in turbidity is not expected to cause significant impacts due to its localized nature and the mobility of species and that near shore environments are often very turbid because of storms or wind events. Species that utilize these areas have the ability to survive such events. Impacts to dissolved oxygen are also not expected to be of concern because of the naturally low organic content of the placement sand and the shallow nature of the LIS nearshore which is well oxygenated from wind mixing and wave action.

Beach restoration at the Asharoken shoreline would result in the placement of large quantities of sand on the beach causing intertidal and subtidal benthic zones and their associated communities to be largely buried, leaving little biological baseline other than those organisms carried along with but not buried by the fill sand. Re-colonization is expected to be rapid but duration of recovery will be dependent on the time of placement. Diversity and abundance is expected to be similar to, but probably not identical to preconstruction conditions at least initially.

Beach nourishment will have a temporary indirect effect on EFH by burying infaunal and epifaunal prey organisms underneath new sand in the intertidal and the nearshore subtidal zone. Mortality and/or burial of benthic prey organisms is not expected to have a significant impact on the feeding success of EFH species since they will re-locate to nearby undisturbed areas. Placing sand can also have beneficial impacts to nearshore EFH species as many species of fish will feed on benthic invertebrates that are being delivered into the water during pumping and re-grading operations.

Benthic communities in the construction site will recover, probably within 1-2 years' time, depending on the type of community and the season of construction completion. If beach nourishment occurs prior to the spring recruitment of benthic organisms to intertidal and adjacent sub-tidal habitats, recovery would be quicker. Species composition may change in accordance with physical characterization of the new sand. An alteration in benthic community structure is not likely to significantly affect the quality of EFH in the LIS nearshore zone since common bottom-feeding species like winter flounder, summer flounder, windowpane, and scup are opportunistic predators and will switch from less abundant to more abundant species. Pelagic-feeding species will not be affected.

In addition, due to the increased slope of the new beach front, the intertidal zone will become significantly narrower until the new intertidal profile equalizes with time. This is not likely to affect bottom-feeding EFH species since they feed on a wide variety of intertidal and sub-tidal prey species and the amount of area changed by the project is only a fraction of the available forage habitat adjacent to the filled beach. Eventually, this slope will level out under the influence of tidal action, waves and storms. Impacts to early life stages will be minimized by constructing the project between the prime winter and summer spawning seasons.

Impacts related to any re-nourishment cycles will be similar to those resulting from the initial fill but will occur to lesser degree in terms of both changes in diversity and scale. Sand will be trucked in so there will be no dredging impacts. Asharoken beach re-nourishment cycles will consists of a significantly smaller volumes of fill than the initial fill, thus a smaller zone of the intertidal and littoral benthos will be affected. The EFH and analysis of impacts can be found in Appendix E.

4.2.10 Socioeconomics

The TSP will have immediate positive benefits for the local community of Asharoken Village in that the project will provide stability of Asharoken Avenue assuring continued access to Eaton's Neck by first responders and vehicles in the event of a medical or weather emergency that may necessitate evacuation. Additionally, the property values of those homes situated closest to the beach, as well as on Eaton's Neck will likely remain stable after the initial replenishment (Hoagland et al. 2012). Although the cost of the TSP is significant, the value of the homes directly affected by potential storm damage along Asharoken Avenue is approximately three times the cost of the project.

No significant adverse impacts to demographics, income, or employment are anticipated as a result of project implementation. Some economic benefits may be realized through local purchases made by project workman (gas meals etc.) for the duration of project construction. Traffic patterns are likely to be disrupted along Asharoken Avenue during construction but these too will last only as long as the construction period.

Likewise no significant socioeconomic impacts have been realized in association with the planned five year with renourishment cycles of the project. All sand and mining activities will occur at a previously permitted facility, no significant adverse impacts to the environment or to socio-economic resources are anticipated. Minor local (project site) impacts analogous to those discussed above will occur. However, there will be a significant increase in heavy vehicle traffic along Asharoken Avenue due to trucks arriving and leaving the Project Area. This may accelerate wear and tear on the road as well as increase disruption of traffic patterns. Re-nourishment activities will also increase noise levels for the duration of construction. All of Long Island is a non-attainment area, therefore no significant impacts to air quality are expected.

4.2.11 Historic and Cultural Resources

The four listed sites and the four potentially eligible sites for the National Register of Historic Places for Eaton's Neck and Asharoken Village and within the APE would not be affected by implementation of the TSP. Placement of beach fill would provide an additional measure of protection to these sites.

No potential historical or cultural sites or target were identified within the limits of Borrow Area a. The seven magnetic targets identified within the nearshore sand placement area would not be affected by the placement sand. These targets are located at the central section and eastern end of the APE.

Use of the borrow area has the potential to disturb submerged archaeological sites, such as prehistoric sites. It is recommended that controlled, periodic monitoring of the beach fill surface be conducted immediately following sand placement to look for archaeological materials that may have been disturbed by dredging. Because additional sand will be deposited on the shoreline and tidal zone of the survey area, buried pre-historic land surfaces and associated cultural resources, if these exist, would receive additional protection as a result of the proposed project action. (USACE-NYD, 2004).

4.2.12 Coastal Zone Management

Coastal Zone Management policies would be adhered to during the construction and maintenance of the TSP. Appropriate coastal permits/authorization would be obtained from the NYSDEC. The proposed action would be consistent with CZM (Appendix G).

4.2.13 Hazardous, Toxic and Radioactive Waste

Implementation of the TSP will involve operation of multiple vehicles, pumps, excavators, and other heavy motorized equipment on the beach and adjacent staging areas and local roadways. At the borrow areas, dredges and support vessels/barges will operate on-station for extended time intervals. As with any project of this nature, there is a threat of direct impacts to water and habitat quality in the event of an oil or hydraulic fluid spill, which calls for the outlining of precautionary and responsive tactics. An Environmental Protection Plan will be developed and implemented for the Asharoken project. The presence of the completed project does not have any potential for impacting any source of HTRW materials. On the contrary, the storm damage protection plan will help protect against the potential release of common hazardous residential materials.

4.2.14 Air Quality

The Tentatively Selected Plan will produce temporarily localized emission increases from the diesel powered construction equipment working onsite. The localized emission increases from the diesel powered equipment will last only during the project's construction period and then end when the project is over, thus any potential impacts will be temporary in nature.

As stated in Section 3.16, Suffolk County has been designated with the following attainment status with respect to the National Ambient Air Quality Standards (NAAQS) for criteria pollutants: marginal nonattainment area for the 2008 8-hour ozone standard and a maintenance area for the 2006 particulate matter less than 2.5 microns ($PM_{2.5}$) standard. The county is part of the Ozone Transport Region. Ozone is controlled through the regulation of its precursor emissions, which include oxides of nitrogen (NO_x) and volatile organic compounds (VOCs). VOCs are emitted at a fractional rate compared to NOx emissions. Sulfur dioxide (SO_2) is a precursor for $PM_{2.5}$. Because of these designations and since the project is a Federal Action taken by the USACE, this

project triggers a General Conformity Review under 40 CFR §93.154. General Conformity ensures that Federal Actions do not have a negative impact on State Implementation Plans (SIPs).

The emissions associated with the project are estimated as part of the General Conformity Review and are summarized below, by calendar year (detailed estimates are provided in Appendix H).

Year	Months	tons NOx
2017	3	1.94
2018	11	7.11
	14	9.1

As per the annual de minimis trigger levels for General Conformity review (40 CFR §93.153 (b)) the Tentatively Selected Plan's General Conformity-related emissions are significantly below the de minimis levels for NO_x (100 tons in any year), VOC (50 tons in any year), $PM_{2.5}$ (100 tons in any year), and SO_2 (100 tons in any year). Therefore by rule, the Tentatively Selected Plan is considered de minimis and will have only a temporary impact around the construction activities with no significant impacts. A record of non-applicability is located in Appendix H.

The primary greenhouse gas (GHG) emitted by diesel fueled engines is CO_2. The project is estimated to generate a total of 492 tons of CO_2, which is equivalent to 104 passenger vehicles annual CO_2 emissions[1]. The GHG emissions associated with the project are temporary and insignificant compared to over 1.1 million registered passenger vehicles in Suffolk County.[2]

4.2.15 Noise

Construction noise impacts would occur for the duration of the construction of the TSP. Sound sources include increased truck and commercial vehicle traffic along Asharoken Avenue in support of beach nourishment. Operation of heavy machinery on the beach during sand placement, and operation of dredges and support vessels during dredging of the offshore borrow area will also occur. Increased traffic noise and construction noise will occur during the initial fill activity as well as every 3 years during re-nourishment cycles. However, the duration and level of noise associated with the periodic re-nourishment cycles is expected to be significantly less due to the small volume of material to be placed.

Primary receptors at the beach and adjacent Asharoken Avenue include residents of Asharoken/Eaton's Neck, visitors to the area, and terrestrial birds, shorebird and waterfowl and possibly terrestrial mammals, and seals (grey and Harbor seals). Primary receptors of noise impacts at the offshore borrow areas include a variety of finfish, including EFH-designated species, shorebirds and waterfowl, potentially grey seals and harbor seals. Operational measures to minimize potential noise impacts to these human and animal receptors include proper safety

[1] EPA Greenhouse Gas Equivalent Calculator, *www2.epa.gov/energy/greenhouse-gas-equivalencies-calculator*, accessed October 7, 2015

[2] NYS Department of Motor Vehicles, NYS Vehicle Registrations on File – 2014, *dmv.ny.gov/statistic/2014ReginForce-Web.pdf*, accessed October 7, 2015

procedures to protect workers, signage where appropriate, proper maintenance of equipment including upkeep of noise reducing systems such as mufflers and sound barriers when applicable.

The noise associated with the beach dredging and placement may also pose a direct disturbance impact to fish and other aquatic organisms at the proposed borrow area and the nearshore placement zone. Several noise-producing activities are associated with active dredging, such as collection sounds produced by the rotating cutterhead, a suction draghead running along the bottom, or the dropping of a clamshell dredge, all coming in contact with the sediment bed. Other dredging related noise may include the pumping/movement of slurry through pipes to holds aboard the vessel, and transport of the slurry to shoreline pump substations and the beach... Other offshore noise would include various ship operations including any mechanical operations as well as engine noise and anchoring (Reine et al. 2012).

It is likely that the only affect construction noise will have will be temporary displacement.

4.2.16 Environmental Justice

Under Executive Order 12898, Federal agencies are required to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations. Completion of this project will provide local coastal storm damage reduction. In addition, the project will provide benefits to the village of Asharoken and adjacent communities. Likewise, no significant Environmental Justice issues are anticipated during the planned five year with re-nourishment cycles of the project. The project will not have disproportionate negative impact (demographics, income, or employment) on minority or low-income groups in the community. Traffic patterns are likely to be disrupted along Asharoken Avenue during construction but these too will last only as long as the construction period.

The project area is confined within the existing storm damage control project and is not anticipated to result in adverse impacts on the surrounding area. Beneficial impacts are expected, as the community will be less at risk from flooding once emergency repairs is complete. Recent demographic trends include a 28.4% increase over the age of 64 and 2010 Census data Census data indicates that more than 150 residents have disability status. In light of this data, storm damage reduction measures that lower the probability of an evacuation and thus the need for special treatment would be beneficial to the community as a whole as well as those seniors requiring special care.

5.0 CUMULATIVE IMPACTS

No significant cumulative impacts are expected as a result of implementing the proposed action. There are no other Federal or State projects being constructed in the project region at the same time or within the near future or the recent past. The nearest proposed Federal project is the Bayville, N.Y. Storm and Flood Protection Project, which if implemented, is 10.5 miles to the west and would be unlikely to add any measurable cumulative impacts to the Asharoken analysis if Bayville is built.

Since 1997 when it was built, the NY District Section 103 erosion/shore protection project has been severely damaged and repaired multiple times. The project is relatively small and initially consisted of rock revetment and beach nourishment from an upland source. The area covered by rock has changed from a sandy intertidal to that of a rocky intertidal. Since the initial construction coastal storms repeated repairs has kept the 103 site in a state of relative disturbance. Since the 103 activities have been ongoing for almost 20 years they are part of the existing conditions and do not represent a significant cumulative impact additional to the TSP. The same can be said for all of the "protection" measures (bulkheads, rubble walls, cement blocks etc.) that have been implemented on private property by the residents for many decades.

Before, during and after project construction annual dredging at the power plant channel along with the by passing of approximately 15,000 CY is expected to occur. This sand will be placed along the eastern portion of the project area as it has been for many years. Sand covering the intertidal may cause some organisms to perish do to burial. Depending on the depth of the sand placed, May organisms can move up to occupy their natural depth in the sand. Natural re-colonization would be expected within a year. Placement of the power plant sand may represent a minor adverse cumulative impact in regard to certain benthic invertebrates. On the other hand additional sand may be a benefit to other benthic invertebrates including the horseshoe crab. Addition sand may also be a benefit to seasonally resident beach nesting birds.

6.0 COORDINATION

USACE-NYD will continue to coordinate with New York State Department of Environmental Conservation (NYSDEC) to obtain a Section 401 Water Quality Certificate, and the New York State Office of Coastal Zone Management to obtain a consistency determination for the Project. In addition USACE-NYD will continue to coordinate with U.S. Fish and Wildlife Service (USFWS) pursuant to Section 2(b) of the Fish and Wildlife Coordination Act. Coordination with the USFWS is ongoing pursuant to completing consultations in compliance with Section 7 of the Endangered Species Act (ESA). USACE-NYD is consulting with the National Marine Fisheries Service in accordance with Section 7 of the ESA and Section 305(b) (2) of the MSFCMA.

In addition, this DEA will be distributed to appropriate Federal, State, and local agencies and interested parties. All applicable Federal, State, and local policies will be complied with during review and implementation of the Project. A record of pertinent correspondence is located in Appendix K.

Summary of Primary Laws and Regulations Applicable to the Proposed Project

Legislative Title	U.S. Code/Other	Compliance
Clean Air Act	42 U.S.C. §§ 7401-7671g	An air quality analysis has been completed for the project. Based upon the analysis, the emissions from the project are considered to have an insignificant impact on the regional air quality, and according to 40 CFR 93.153 (f) and (g) the proposed project is presumed to

		conform to the SIP. A Record of Non-Applicability is located in Appendix I.
Clean Water Act	33 U.S.C. §§ 1251 et seq.	The Corps is awaiting a water quality permit from NYSDEC to fulfill the requirements of Section 401 of this act. A Federal 404(b) Evaluation is located in Appendix K.
Coastal Zone Management Act of 1972	16 U.S.C. §§ 1451-1464 N.J.A.C. 7:7 and N.J.A.C. 7:7E	A Coastal Zone Consistency Statement is included in Appendix G. The Corps is awaiting Coastal Zone Consistency Determination from the NYDOS.
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	Section 7 Consultation was initiated with the U.S. Fish and Wildlife Service and NMFS. Coordination with the USFWS has indicated that Section 7 will be concluded informally with an NLAA determination from FWS. Informal consultation was concluded with NMFS concluded with a NLAA (see Appdx K)
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	The Corps has coordinated with the U.S. Fish and Wildlife Service received a draft FWCAR. Appendix D
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347	The circulation of this Draft Environmental Assessment fulfills requirements of this act.
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The Corps is in coordination with the State Historic Preservation Office to fulfill requirements of this act.
Executive Order 11990, Protection of Wetlands	May 24, 1977	Circulation of this report for public and agency review fulfills the requirements of this order.
Magnuson Stevens Act	16 United States Code §1801-1883, 1966	The Corps has submitted a EFH (Appendix E) evaluation and is awaiting a determination from NOAA-Fisheries

7.0 CONCLUSIONS

Given the existing and expected without-project shoreline conditions, it is clear that the primary storm damage mechanisms including wave attack and over topping of dunes and bulkheads will continue to result in short and long term erosion and shoreline recession. The TSP would reduce the risk of damages from wind and wave forces emanating from Long Island Sound. The implementation of the proposed Project will have significant overall beneficial impacts to the environment and surrounding communities, including benefits to aquatic habitats and species, an increase in the availability of suitable habitat for Federal and state-listed species and a diversity of shorebird communities, protection of the wetlands south of the roadway, improved shoreline stabilization and flood protection, and recreational opportunity.

Impacts to environmental resources in the proposed Project Area are expected to be minor and temporary. There will be some short-term adverse impacts to, terrestrial and aquatic habitats and the species that utilize the habitats. These impacts would be limited to a localized area and temporary in nature coinciding with periods of construction and nourishment activities. There will be project life duration impacts in terms of changes to habitat once the project is completed. Such impacts include the changes to profile of the beach, berm and nearshore and the new topography created at the borrow area. Direct adverse impacts during construction are expected to be minor because most affected mobile species will move off and utilize other suitable habitat nearby. Sessile and those living within the sediments species will be lost, but are expected to rapidly re-colonize once the disturbance has ended, returning to pre-project levels of abundance and diversity within two years.

The use of Best Management Practices (BMP) during construction will be implemented through all phases of construction and include measures to be implemented prior to, during and after completion of the project.

- To minimize depth related impacts to water quality such as the potential for low oxygen, excavation will be conducted along the side of a ridge which is expected to all but eliminate typical impacts related to creating a deep pit with steep side slopes and avoid the creation of deep steep sided pits.

- To minimize impacts to sensitive early life stages of important aquatic organisms dredging will be conducted during specific seasonal window (October to mid-January) as regulated by the NYSDEC.

- Use of a cutterhead pipeline dredge is the expected method of dredging to be used for this project. Other than the direct impact to sediment born organisms and a temporary localized no other significant impacts to water quality or biota are anticipated. If used hopper dredges would be equipped with state of the art turtle and sturgeon deflectors to decrease the probability of impacting or taking either species.

- Qualified individuals will be placed on board all dredges to monitor for the presence of any ESA species in the vicinity of the dredge as well as monitor for ESA takes due to entrainment.

- Plover monitors will be made available to provide protection and guidelines if this species arrive at the project site in March.

- All construction activities will be guided by USFWS and NMFS recommendations.

- The dredging contractor will submit a QA/QC plan including a HASP plan that will include all contingencies of environmental protection including HTRW issues and noise.

- A pre and post construction benthic characterization program as requested by the NYSDEC will be implemented to assess the any impacts to the project site habitats.

- A piping plover management/protection plan to prevent/minimize impacts to plovers will be implemented during construction in coordination with local state and federal resources agencies. An analogues post construction management/protection plan will be developed in cooperation with the Town of Asharoken together with the aforementioned agencies. Monitoring will serve to collect information on plover utilization of the project site, and implement appropriate protection measures as needed under the recommendation of the resource agencies. This will include any measures related to utilization of the public access sites.

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TABLES

Table 2 TSP Figure Beach Profile Characteristics

Reach No.	General Location	Approx. Length (ft)	Dune Elevation (ft NGVD)	Berm Elevation (ft NGVD)	Dry Beach Width to MHHW (ft)	Foreshore Slope (x V on y H)	Offshore Slope (x V on y H)
1a (2006)	Bevin Road (0+00) to Rock Groin (9+00)	900	12.5 (Bulkhead)	+6	0 to 20	1 on 8	1 on 100
1b (2001)	Rock Groin (9+00) to Duck Island Lane (62+00)	5,300	15.5	+4 to +12	80	1 on 8	1 on 100
2a (2001)	Duck Island Lane (62+00) to 1,200' West of West Jetty (112+00)	5,000	+14 (Bulkhead) +15 (Dune app.1,000 ft)	+4 to +12	0 to 120	1 on 8	1 on 100
2b (2001)	1,200' West of West Jetty (112+00) to West Jetty (124+00)	1,200	+17	+8	40 to 60	1 on 8	1 on 100

Land Side

Reach No.	General Location	Approx. Length (ft)	Structure	Average Dune Crest Widths (ft)	Avg. Elevaton At Crest of Dune/Str. (ft NGVD)	Avg. Elevation Behind Dune/Str. (ft NGVD)
1a	Bevin Road (0+00) to Rock Groin (9+00)	900	Dune fronted with Bulkhead	15	+12.5	+9
1b	Rock Groin (9+00) to Duck Island Lane (62+00)	5,300	Dunes	0-5	+15.5	+12
2a	Duck Island Lane (62+00) to 1,200' West of West Jetty (112+00)	5,000	Bulkhead/Dune (approx. 1,000')	0-5	0.93	13
2b	1,200' West of West Jetty (112+00) to West Jetty (124+00)	1,200	High Dunes	0-5	17	14

Table 3. Historical Storms Impacting the Long Island, NY Area

Hurricane		Northeaster	
Date	Name	Date	Name
14 Sep 1904	-	03 Mar 1931	-
08 Sep 1934	-	17 Nov 1935	-
21 Sep 1938	-	25 Nov 1950	-
14 Sep 1944	-	06 Nov 1953	-
31 Aug 1954	Carol	11 Oct 1955	
02 Sep 1954	Edna	25 Sep 1956	
05 Oct 1954	Hazel	06 Mar 1962	
03 Aug 1955	Connie	05 Nov 1977	
12 Sep 1960	Donna	17 Jan 1978	
10 Sep 1961	Esther	06 Feb 1978	
20 Aug 1971	Doria	22 Jan 1979	
14 Jun 1972	Agnes	22 Oct 1980	
06 Aug 1976	Belle	28 Mar 1984	
27 Sep 1985	Gloria	09 Feb 1985	
19 Aug 1991	Bob	30 Oct 1991	
08 Oct 1996	Josephine	01 Jan 1992	
07 Sep 1999	Floyd	11 Dec 1992	
01 Sep 2006	Ernesto	02 Mar 1993	
28 Aug 2011	Irene	12 Mar 1993	
20 Oct 2012	Sandy	28 Feb 1994	
		21 Dec 1994	
		05 Jan 1996	
		06 Oct 1996	
		02 Feb 1998	
		14 Apr 2007	
		15 Nov 2009	Nor'Ida
		13 Mar 2010	
		17 Apr 2011	

1. Northeasters have no assigned names;
2. Hurricane Sandy affected the Project Area in late October, 2012;
3. This table lists only significant storms affecting the Project Area.

Table 4. Astronomical Tide Elevations, Asharoken, New York

Datum	Elevation (ft NGVD)
Highest Observed (6 February 1978)	+9.1
Mean Higher High Water	+3.9
Mean Tide Level	+0.4
Mean Lower Low Water	-3.2
Mean Tide Range (ft)	7.1
Spring Tide Range (ft)	8.2
Lowest Observed (10 January 1978)	-6.6

Note: Highest and lowest observed elevations recorded at Port Jefferson (USACE-NYD, 2013)

Table 5. Design Wave Condition

Return Period (years)	Offshore (deep water) waves		Nearshore (shallow water) Waves (ft)		
	Hs (ft)	Tp (sec)	0 ft NGVD	-10 ft NGVD	-20 ft NGVD
2	8.4	5.9	2.5	10.2	16.8
5	10.5	6.4	6.1	13.6	20.3
10	12.4	6.9	7.2	14.7	21.5
25	14.8	7.3	8.3	15.8	22.7
50	16.4	7.7	9.1	16.6	23.6
100	18.0	7.9	10.0	17.5	24.5

Table 6. Estimated Relative Sea Level Change from 2016 to 2116 - Asharoken									
Based on NOAA Tide Gage 8514560, Port Jefferson, NY NOAA's Published Rate: 0.00801 feet/yr									
All values are expressed in feet relative to NAVD88									
	NOAA	USACE	NOAA	USACE	NOAA	USACE	NOAA		
	Low	**Low**	**Int Low**	**Int**		**Int High**	**High**	**High**	
2016	0	0	0	0	0	0	0		
2020	0.03	0.03	0.05	0.05	0.09	0.11	0.14		
2025	0.07	0.07	0.12	0.12	0.22	0.26	0.33		
2030	0.11	0.11	0.19	0.19	0.36	0.43	0.56		
2035	0.15	0.15	0.27	0.27	0.52	0.62	0.8		
2040	0.19	0.19	0.35	0.35	0.69	0.83	1.07		
2045	0.23	0.23	0.43	0.43	0.87	1.06	1.37		
2050	0.27	0.27	0.52	0.52	1.07	1.31	1.7		
2055	0.31	0.31	0.61	0.61	1.28	1.57	2.05		
2060	0.35	0.35	0.71	0.71	1.51	1.85	2.42		
2065	0.39	0.39	0.81	0.81	1.75	2.15	2.82		
2070	0.43	0.43	0.92	0.92	2.01	2.47	3.25		
2075	0.47	0.47	1.03	1.03	2.28	2.81	3.7		
2080	0.51	0.51	1.15	1.15	2.56	3.17	4.17		
2085	0.55	0.55	1.27	1.27	2.86	3.55	4.68		
2090	0.59	0.59	1.4	1.4	3.17	3.94	5.2		
2095	0.63	0.63	1.52	1.52	3.5	4.35	5.76		
2100	0.67	0.67	1.66	1.66	3.84	4.78	6.34		
2105	0.71	0.71	1.8	1.8	4.2	5.23	6.94		
2110	0.75	0.75	1.94	1.94	4.57	5.7	7.57		
2115	0.79	0.79	2.09	2.09	4.95	6.19	8.23		
2116	0.8	0.8	2.12	2.12	5.03	6.29	8.36		

Table 7. Asharoken Beach and Frontal Dune Plant Community

Common Name	Scientific Name	Reach of Main Study Area							
		1A			1B/2A		2B		
		FD	BD	UPL*	FD	BD	FD	BD	UPL
Norway maple	Acer platanoides								x
Ragweed	Ambrosia artemisiifolia					x		x	x
American beach grass	Ammophila breviligulata	x	x		x	x	x	x	
Dusty miller	Artemisia stellariana		x						
Mugwort	Artemisia vulgaris							x	
Asters	Aster spp.					x			
Halberd-leaved orach	Atriplex patula				x		x		
Sea rocket	Cakile edentula	x			x		x		
Seaside spurge	Chamaesyce polygonifolia				x		x		
Autumn eleagnus	Elaegnus umbellate							x	
Sea chickweed	Honckenya peploides	x							
Beach heather	Hudsonia tomentosa								x
Red cedar	Juniperus virginiana								x
Beach pea	Lathyrus japonicus	x	x				x		
Field pepperweed	Lepidium campestre					x		x	
Northern bayberry	Myrica pensylvanica								x
Prickly pear	Opuntia drummondii					x			
Virginia creeper	Parthenocissus quinquefolia					x			
Common reed	Phragmites australis		x					x	
Pitch pine	Pinus rigida					x			
Japanese knotweed	Polygonum cuspidatum					x			
Large-toothed aspen	Populus grandidentata								x
Pin oak	Quercus palustris								x
Staghorn sumac	Rhus hirta								x
Poison ivy	Rhus radicans		x						
Water dock	Rumex orbiculatus					x			
Common saltwort	Salsola kali				x		x		
Seaside goldenrod	Solidago sempervirens	x	x		x	x	x	x	x
Woolly mullein	Verbascum thapsus					x			
Common cocklebur	Xanthium strumarium					x			
Yucca	Yucca aloifolia					x			

Key: * = Plant species unspecified, see text for details.
FD: Foredune
BD: Backdune

Table 8. Rank Order Abundance and Percentage of Total Fish Collections, Asharoken Nearshore Investigation (2003-2004), all seasons combined.

Common Name	Scientific Name	Abundance	Percentage of Total
Atlantic silverside	*Menidia menidia*	2,940	45.89
Atlantic menhaden	*Brevoortia tyrannus*	2,480	38.71
Bluefish	Pomatomus saltatrix	262	4.09
Bay anchovy	*Anchoa mitchilli*	158	2.47
Weakfish	*Cynoscion regalis*	156	2.44
Blueback herring	*Alosa aestivalis*	108	1.71
Striped killifish	*Fundulus majalis*	105	1.64
American sand lance	*Ammodytes americanus*	65	1.02
Mummichog	*Fundulus heteroclitus*	64	1.0
Winter flounder	*leuronectes americanus*	30	0.47
Northern pipefish	*Syngnathus fuscus*	15	0.24
Atlantic tomcod	*Microgadus tomcod*	8	0.13
Cunner	Tautogolabrus adspersus	7	0.11
Sheepshead minnow	*Cyprinodon variegatus*	3	0.05
Striped mullet	*Mugil cephalus*	1	0.02
Northern sea robin	*Prionotus carolinus*	1	0.02
Striped bass	*Morone saxatilis*	1	0.02
Windowpane flounder	*Scophthalmus aquosus*	1	0.02
Tautog	*Tautoga onitis*	1	0.02
Scup	Stenotomus chrysops	1	0.02

Table 9. Rank Order Abundance and Percentage of Total Fish and Macroinvertebrate Collections, Asharoken Borrow Area Investigation (2003-2004), all seasons combined.

Common Name	Scientific Name	Abundance	Percentage of Total
Bay anchovy	*Anchoa mitchilli*	48,409	N/A*
Scup	*Stenotomus chrysops*	3,250	60.7
Winter flounder	*Pleuronectes americanus*	523	9.8
Spider crab	*Libinia dubia*	511	9.5
Weakfish	*Cynoscion regalis*	226	4.2
Long-finned squid	*Loligo pealei*	123	2.3
Atlantic butterfish	*Peprilus triacanthus*	109	2.0
Grubby	Myoxocephalus aenaeus	96	1.8
Red hake	*Urophycis chuss*	86	1.6
Windowpane flounder	*Scophthalmus aquosus*	76	1.4
Blueback herring	*Alosa aestivalis*	61	1.1
Cunner	Tautogolabrus adspersus	52	1.0
Atlantic horseshoe crab	*Limulus polyphemus*	45	0.8
Asteriid sea star	*Asterias forbesi*	39	0.7
Rock crab	*Cancer irroratus*	30	0.6
Clearnose skate	*Raja eglanteria*	19	0.4
Bluefish	Pomatomus saltatrix	16	0.3
Summer flounder	*Paralichthys dentatus*	13	0.2
Smallmouth flounder	*Etropus microstomus*	11	0.2
Atlantic herring	*Clupea harengus*	9	0.2
Spotted hake	*Urophycis regia*	8	0.2
Tautog	*Tautoga onitis*	8	0.2
Rock gunnel	*Pholis gunnellus*	5	0.1
Lady crab	*Ovalipes ocellatus*	5	0.1
Atlantic tomcod	*Microgadus tomcod*	5	0.1
Silver hake	*Merluccius bilinearis*	4	0.1
Mantis shrimp	*Squilla empusa*	3	0.1
Black sea bass	*Centropristis striata*	3	0.1
Channeled welk	*Busycon canaliculatum*	2	<0.1

Common Name	Scientific Name	Abundance	Percentage of Total
Alewife	Alosa pseudoharengus	2	<0.1
American lobster	*Homarus americanus*	2	<0.1
Stone crab	*Menippe mercenaria*	2	<0.1
Hogchoker	*Trinectes maculatus*	2	<0.1
Banded gunnel	*Pholis fasciata*	1	<0.1
Feather blenny	*Hypsoblennius hentz*	1	<0.1
Northern sea robin	*Prionotus carolinus*	1	<0.1
Lookdown	*Selene vomer*	1	<0.1
Northern puffer	*Sphoeroides maculatus*	1	<0.1
Oyster toadfish	*Opsanus tau*	1	<0.1
Striped searobin	*Prionotus evolans*	1	<0.1
Round herring	*Etrumeus teres*	1	<0.1
Atlantic silverside	*Menidia menidia*	1	<0.1
Atlantic menhaden	*Brevoortia tyrannus*	1	<0.1
*Bay anchovies were excluded from Percent of Total calculations.			

Table 10. Benthic Infaunal Invertebrates Collected at Asharoken Borrow Areas A and B, Fall 2003

Taxa	Borrow Area A		Borrow Area B	
	Abundance	% Composition	Abundance	% Composition
Nematoda (LPIL)	7,995	49.9	5,863	70.5
Annelida: Oligochaeta (LPIL)	2,133	13.3	781	9.4
Annelida: Polychaeta				
Ampharete (LPIL)	187	1.2	134	1.6
Ampharete lindstroemi	158	1.0	132	1.6
Cossura longocirrata	388	2.4	102	1.2
Cirratulidae (LPIL)	2,131	13.3	710	8.5
Tharyx (LPIL)	243	1.5	- -	- -
Nephtys (LPIL)	149	0.9	124	1.5
Nephtys incisa	134	0.8	- -	- -
Aricidae (LPIL)	117	0.7	- -	- -
Cistenides hyperborea	298	1.9	- -	- -
Scalibregma inflatum	101	0.6	109	1.3
Polydora cornuta	854	5.3	155	1.9
Streblospio benedicti	176	1.1	- -	- -
Mollusca: Gastropoda				
Crepidula fornicata	112	0.7	- -	- -
Turbonilla (LPIL)	116	0.7	- -	- -
Mollusca: Pelecypoda (LPIL)	194	1.2	- -	- -
Tellina agilis	144	0.9	- -	- -
Thracia (LPIL)	197	1.2	- -	- -
Nucula proxima	212	1.3	- -	- -
Arthropoda: Amphipoda				
Ampelisca abdita	- -	- -	212	2.5
Total	16,039	100.0%	8,322	100.0%

LPIL – Lowest Possible Identification Level.
Totals only include samples where over 100 individuals were collected.

Table 11. Benthic Infaunal Invertebrates Collected at Asharoken Borrow Areas A and B, Spring 2004.

Taxa	Borrow Area A		Borrow Area B	
	Abundance	% Composition	Abundance	% Composition
Nematoda (LPIL)	8,250	50.9	5,100	62.5
Annelida: Oligochaeta (LPIL)	1,241	7.7	505	6.2
Annelida: Polychaeta				
Ampharete finmarchica	659	4.1	312	3.8
Streblospio benedicti	582	3.6	448	5.5
Clymenella torquata	441	2.7	- -	- -
Nephtys picta	341	2.1	106	1.3
Ampharete acutifrons	327	2.0	156	1.9
Cirriformia grandis	313	1.9	- -	- -
Drilonereis longa	247	1.5	- -	- -
Spionids spp. (LPIL)	231	1.4	135	1.7
Capitella capitata	228	1.4	452	5.5
Glycera dibranchiata	205	1.3	- -	- -
Polydora spp. (LPIL)	204	1.3	- -	- -
Tharyx acutus	196	1.2	170	2.1
Polydora ligni	148	0.9	198	2.4
Leitoscoloplos fragilis	138	0.9	- -	- -
Nephtys bucea	133	0.8	- -	- -
Asychis elongata	132	0.8	- -	- -
Eteone lactea	123	0.8	- -	- -
polytroch larvae	111	0.7	- -	- -
Glycera spp. (LPIL)	111	0.7	104	1.3
Scolecolepides viridis	- -	- -	117	1.4
Mollusca: Gastropoda				
Crepidula fornicata	156	1.0	- -	- -
Mollusca: Pelecypoda				
Nucula proxima	156	1.0	- -	- -
Pitar morrhuanus	130	0.8	- -	- -
Arthropoda: Copepoda				

Taxa	Borrow Area A		Borrow Area B	
	Abundance	**% Composition**	**Abundance**	**% Composition**
Temora longicornis	706	4.4	164	2.0
Arthropoda: Amphipoda				
Ampelisca abdita	539	3.3	187	2.3
Leptocheirus pinguis	157	1.0	- -	- -
Total	16,205	100.0	8,154	100.0
LPIL – Lowest Possible Identification Level. Total species of all samples only include samples where over 100 individuals				

Table 12. . Birds Observed at Asharoken, NY, 2000-2005 (NYSDEC, 2008).

Common name	Scientific name	NY Legal Status
Red-winged Blackbird	Agelaius phoeniceus	Protected
Mallard	Anas platyrhynchos	Game Species
Tufted Titmouse	Baeolophus bicolor	Protected
Cedar Waxwing	Bombycilla cedrorum	Protected
Canada Goose	Branta canadensis	Game Species
Great Horned Owl	Bubo virginianus	Protected
Red-tailed Hawk	Buteo jamaicensis	Protected
Northern Cardinal	Cardinalis cardinalis	Protected
House Finch	Carpodacus mexicanus	Protected
Piping Plover	Charadrius melodus	Endangered
Killdeer	Charadrius vociferus	Protected
Yellow-billed Cuckoo	Coccyzus americanus	Protected
Black-billed Cuckoo	Coccyzus erythropthalmus	Protected
Northern Flicker	Colaptes auratus	Protected
Northern Bobwhite	Colinus virginianus	Game Species
Rock Pigeon	Columba livia	Unprotected
Eastern Wood-Pewee	Contopus virens	Protected
American Crow	Corvus brachyrhynchos	Game Species
Fish Crow	Corvus ossifragus	Protected
Blue Jay	Cyanocitta cristata	Protected
Mute Swan	Cygnus olor	Protected
Prairie Warbler	Dendroica discolor	Protected
Yellow Warbler	Dendroica petechia	Protected
Gray Catbird	Dumetella carolinensis	Protected
Willow Flycatcher	Empidonax traillii	Protected
Common Yellowthroat	Geothlypis trichas	Protected
Barn Swallow	Hirundo rustica	Protected
Wood Thrush	Hylocichla mustelina	Protected
Baltimore Oriole	Icterus galbula	Protected
Orchard Oriole	Icterus spurius	Protected
Eastern Screech-Owl	Megascops asio	Protected
Red-bellied Woodpecker	Melanerpes carolinus	Protected
Song Sparrow	Melospiza melodia	Protected

Common name	Scientific name	NY Legal Status
Northern Mockingbird	Mimus polyglottos	Protected
Brown-headed Cowbird	Molothrus ater	Protected
Great Crested Flycatcher	Myiarchus crinitus	Protected
Osprey	Pandion haliaetus	Protected-Special Concern
House Sparrow	Passer domesticus	Unprotected
Indigo Bunting	Passerina cyanea	Protected
Downy Woodpecker	Picoides pubescens	Protected
Hairy Woodpecker	Picoides villosus	Protected
Eastern Towhee	Pipilo erythrophthalmus	Protected
Scarlet Tanager	Piranga olivacea	Protected
Black-capped Chickadee	Poecile atricapillus	Protected
Common Grackle	Quiscalus quiscula	Protected
Bank Swallow	Riparia riparia	Protected
American Redstart	Setophaga ruticilla	Protected
White-breasted Nuthatch	Sitta carolinensis	Protected
American Goldfinch	Spinus tristis	Protected
Northern Rough-winged Swallow	Stelgidopteryx serripennis	Protected
Least Tern	Sternula antillarum	Threatened
European Starling	Sturnus vulgaris	Unprotected
Carolina Wren	Thryothorus ludovicianus	Protected
Brown Thrasher	Toxostoma rufum	Protected
House Wren	Troglodytes aedon	Protected
American Robin	Turdus migratorius	Protected
Eastern Kingbird	Tyrannus tyrannus	Protected
Warbling Vireo	Vireo gilvus	Protected
Red-eyed Vireo	Vireo olivaceus	Protected
Mourning Dove	Zenaida macroura	Protected

Table 13. Federal Threatened and Endangered Plant and Animal Species known or have the potential to occur in or proximal to the Asharoken Project Area. (USFWS).

Status	Common Name	Scientific Name
E	Sandplain gerardia	Agalinus acuta
T	Seabeach amaranth	Amaranthus pumilus
T	Piping plover	*Charadrius melodus*
T	Green sea turtle	*Chelonia mydas*
	Loggerhead turtle	*Carretta carretta*
E	Sea turtle, Kemp's ridley	*Lepidochelys kempii*
E	Tern, roseate NE (U.S. nesting pop.)	*Sterna dougallii dougallii*
E	Whale, finback	*Balaenoptera physalus*
E	Whale, humpback	*Megaptera novaeangliae*
T	Tiger beetle, Northeastern beach	*Cicindela dorsalis dorsalis*

Table 14. 2006-14 Long Island Colonial Waterbird & Piping Plover Survey Results

			Piping Plover				
			WINDOW	PRODUCTIVITY			
YEAR	**Site Name**	**Town/Borough**	**PAIRS**	**Pairs**	**Fledges**	**PRO.**	**Rate**
2006	Asharoken Beach (Private)	HUNTINGTON	4	4	2	0.50	C
2007	Asharoken Beach (Private)	HUNTINGTON	4	NS	NS	NS	NS
2008	Asharoken Beach (Private)	HUNTINGTON	4	3	7	2.33	A
2009	Asharoken Beach (Private)	HUNTINGTON	4	5	4	0.80	A
2010	Asharoken Beach (Private)	HUNTINGTON	4	4	3	0.75	A
2011	Asharoken Beach (Private)	HUNTINGTON	4	4	7	1.75	A
2012	Asharoken Beach (Private)	HUNTINGTON	5	4	2	0.50	A
2013	Asharoken Beach (Private)	HUNTINGTON	3	4	7	1.75	A
2014	Asharoken Beach (Private)	HUNTINGTON	3	4	2	0.50	A
		Averages	3.9	4.0	4	1.23	
2006	Asharoken Beach (LIPA)	HUNTINGTON	4	4	1	0.25	C
2007	Asharoken Beach (LIPA)	HUNTINGTON	2	2	1	0.50	B
2008	Asharoken Beach (LIPA)	HUNTINGTON	3	3	0	0.00	C
2009	Asharoken Beach (LIPA)	HUNTINGTON	1	1	0	0.00	B
2010	Asharoken Beach (LIPA)	HUNTINGTON	1	1	0	0.00	A
2011	Asharoken Beach (LIPA)	HUNTINGTON	0	1	0	0.00	A
2012	Asharoken Beach (LIPA)	HUNTINGTON	1	1	2	2.00	A
2013	Asharoken Beach (LIPA)	HUNTINGTON	1	1	2	2.00	A
2014	Asharoken Beach (LIPA)	HUNTINGTON	1	2	4	2.00	A
		Averages	2	2	1	0.75	

Table 15. EFH Species and Life History Stages Likely To Be Present in Project Area.

Species	Presence in Project Area and Season				Comments
	E	L	J	A	
Atlantic sea herring			No	Possible but unlikely	Project Area depths too shallow for both; Project Area salinity values too low for juveniles
Atlantic mackerel			No	Possible	More common offshore
Atlantic Salmon	No	No	No	No	Project Area lacking freshwater run
Black sea bass			Yes SF	Possible with structure	Juveniles more common than adults
Bluefish			Possible	Possible	
Cobia			No	No	
Pollock			Possible	No	Generally rare in LIS, predominantly caught in July-August; Project Area is at the lower end of preferred salinities
Red hake	No	No	Yes	No	Present at the borrow area in Spring
Scup	No	Yes S	Yes SpSF	Yes SpSF	YOY juveniles more likely in nearshore zone in the fall.
Spanish mackerel	No	No	No	No	
King mackerel	No	No	No	No	
Summer flounder			Yes Sp,S,F	Yes Sp, S	
Windowpane	Yes SpSF	Yes SpSF	Yes All	Yes All	
Winter flounder	Yes W	Yes WSp	Yes SpSF	Yes All	
Sandtiger shark			Yes	Yes	
Little skate			Yes	Yes	
Winter skate			Yes	Yes	
Species	**Presence in Project Area and Season**				**Comments**
	E	**L**	**J**	**A**	
Atlantic sea herring			No	Possible but unlikely	Project Area depths too shallow for both; Project Area salinity values too low for juveniles
Atlantic mackerel			No	Possible	More common offshore
Atlantic Salmon	No	No	No	No	Project Area lacking freshwater run

Black sea bass			Yes SF	Possible with structure	Juveniles more common than adults
Bluefish			Possible	Possible	
Cobia			No	No	
Pollock			Possible	No	Generally rare in LIS, predominantly caught in July-August; Project Area is at the lower end of preferred salinities
Red hake	No	No	Yes	No	Present at the borrow area in Spring
Scup	No	Yes S	Yes SpSF	Yes SpSF	YOY juveniles more likely in nearshore zone in the fall.
Spanish mackerel	No	No	No	No	
King mackerel	No	No	No	No	
Summer flounder			Yes Sp,S,F	Yes Sp, S	
Windowpane	Yes SpSF	Yes SpSF	Yes All	Yes All	
Winter flounder	Yes W	Yes WSp	Yes SpSF	Yes All	
Sandtiger shark			Yes	Yes	
Little skate			Yes	Yes	
Winter skate			Yes	Yes	

[1] Shading = life history stage not designated

E = eggs
L = larvae
J = juveniles
A = adults

W = winter
Sp = spring
S = summer
F = fall

Table 16. Prey Species for EFH-Designated Fish Species and Life History Stages Likely To Occupy the Northport Bay Project Area.

Species	Life History Stage	Principal Prey
Bottom Feeders		
Winter flounder	Larvae, Juveniles and adults	Mostly nauplii, invertebrate eggs, polychaetes and amphipods (*e.g.*, *Ampelisca abdita*), also *Crangon*, sand dollars, and bivalves.
Windowpane	Juveniles and adults	Small crustaceans (*e.g.*, mysids and decapod shrimp) and fish larvae (hake, tomcod, other flounder, silversides).
Sandbar shark	Adults	Small bottom and pelagic fish with some mollusks and crustaceans.
Little skate	Juveniles and Adults	Primarily decapod crustaceans and amphipods
Bottom and Pelagic Feeders		
Black sea bass	Juveniles	Small benthic crustaceans and small fish.
Black sea bass	Adults	Crabs, mysids, polychaetes, caridean shrimp, and small fish.
Summer flounder	Adults	Crustaceans (*e.g.*, crabs), bivalves, marine worms, sand dollars, and a variety of fish species (other flounders, silversides, mummichog).
Scup	Juveniles	Polychaetes, amphipods, other small crustacea (copepods, mysids), small mollusks, and fish eggs and larvae.
Scup	Adults	Benthic and near bottom invertebrates, small fish.
Winter skate	Juveniles and Adults	Polychaetes, amphipods, fish
Pollock	Juveniles	Primarily crustaceans, fish, mollusks
Red hake	Juveniles	benthic, pelagic crustaceans, amphipod, fish, squid
Sand tiger shark	Juveniles and Adults	fish, crabs, squid
Pelagic Feeders		
Bluefish	Juveniles	Polychaetes, crustaceans (sand and grass shrimp), but mostly fish (bay anchovy, striped killifish, silversides).
Bluefish	Adults	Wide variety of fish species.
Scup	Larvae	zooplankton

Table 17. Key Socioeconomic Data								
Socioeconomic Criteria	**Asharoken**		**Northern Asharoken***		**Eaton's Neck**		**Peninsula***	
	2000	2010	2000	2010	2000	2010	2000	2010
Total Population	625	684	269		1,388	1,406	1,657	
Under 5 years	33		14		96		110	
5-19 years	87	122	37		251	336	288	
20-64 years	392	380	169		837	783	1,006	
Over 64 years	113	144	49		204	262	253	
Number of households	254	255	109		512	519	621	
Number of families	185		80		420		500	
Families with children <18	58		22		170		195	
Housing Occupancy								
Total housing units	307	302	132		554	575	686	
Owner occupied	222	227	95		488	488	583	
Renter occupied	32	28	14		24	31	38	
Seasonal/occasional	45		19		32		51	
Vacant	8	47	3		10	56	13	
Household size (Owner Occ.)	2.5	587	2.5		2.7	1344	2.7	
Household size (Renter Occ.)	1.9	67	1.9		2.4	62	2.2	
Pet Ownership (cats & dogs)	333		143		671		814	
Employment								
Population over16 years	561		241		1,050		1,291	
In labor force	367		158		664		822	
Employed	364		157		626		783	
Unemployed	3		1		38		39	
Unemployed, %	0.8		0.8		5.7		5.8	
Total Commuters	337	267	144		598	651	742	
Motor vehicle (driver)	267		115		473		588	
Motor vehicle (passenger)	15		6		62		68	
Public transport	47		20		46		66	
Pedestrian	8		3		17		20	
Mean travel time (minutes)	42.7				47.9			

Table 17. Key Socioeconomic Data								
Socioeconomic Criteria	**Asharoken**		**Northern Asharoken***		**Eaton's Neck**		**Peninsula***	
	2000	2010	2000	2010	2000	2010	2000	2010
School enrollment Total	135		58		340		398	
Preschool/kindergarten	9		4		59		63	
Elementary school	43		18		173		191	
High school	30		13		61		74	
College/graduate school	53		23		47		70	
Disability Status Total	71		30		123		153	
5-20 years	10		4		7		11	
21-64 years	31		13		83		96	
Over 64 years	30		13		33		46	
"go-outside-home" disability	22		9		16		25	
Median Household Income	$103,262				$100,663			
Median Family Income	$118,128				$104,111			
Median House Value	$586,600				$355,200			

*Peninsula: the study area, covering Eaton's Neck and Northern Asharoken (assuming 43 percent of residences in Asharoken Village are in Northern Asharoken, hence located on the peninsula).
(Sources: Census 2000, 2010, U.S. Census Bureau, U.S. Department of Commerce; 2002 Master Plan, Planning Board, Incorporated Village of Asharoken; The Humane Society of the U.S. – www.hsus.org)

Table 18. Potential Impacts and Mitigation Strategies for EFH-Designated Species (Asharoken)

Species	Life History Stage	Potential Impacts	Direct or Indirect Impact	Mitigation
Atlantic Salmon	Juveniles	Not expected to be present at the project site	N/A	
	Adults	Not expected to be present at the project site	N/A	
Pollack	Juveniles	Possible entrainment, displacement	Direct	
	Adults			
Winter flounder	Eggs	Burial/mortality of eggs in intertidal zone	Direct	Avoid spawning season (Feb-May)
	Juveniles	Burial of some fish and their prey (polychaetes, amphipods)	Direct/Indirect	Avoid early larval settlement period
	Adults	Displacement to undisturbed areas, temporary loss of infaunal food items and offshore displacement (no loss) of spawning habitat; long-term improvement of spawning habitat.	Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community, allow for recovery of spawning habitat
Windowpane	Juveniles	Burial of some fish and their prey	Direct/Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community, pump sand at low tide
	Adults	Temporary loss of infaunal food items, displacement to undisturbed areas	Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community
Summer flounder	Juveniles, Adults	Temporary loss of infaunal food items; displacement to undisturbed areas	Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community
Bluefish	Juveniles, Adults	Temporary displacement of fish and their prey (crustaceans, other fish)	Indirect	NA
Scup	Juveniles	Temporary displacement of fish, burial of some prey organisms	Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community
King Mackerel	All	Temporary displacement		
Atlantic and Spanish mackerel	Juveniles	Temporary displacement of fish and their prey (other fish)	Indirect	NA
Black sea bass	Juveniles	Burial of some prey organisms (small crustaceans), temporary displacement of fish	Indirect	Beach nourishment in the late summer or fall to speed recovery of benthic community

Atlantic herring	Juveniles	No impact	NA	NA
Red Hake	Eggs, Larvae Juveniles	Entrainment, displacement, loss, gain of prey		
Sandtiger shark	larvae	No impact	NA	NA
Cobia	Juveniles	No impact	NA	NA
Winter Skate	Juveniles	Displacement/ loss of prey	Direct/Indirect	Nourishment in fall to speed recovery
Little Skate	Juveniles	Displacement/ loss of prey	Direct/Indirect	Nourishment in fall to speed recovery