# Draft
# ENVIRONMENTAL ASSESSMENT
# NATIONAL REGIONAL SEDIMENT MANAGEMENT (RSM) PROGRAM
# WRDA 2016 SECTION 1122
# BENEFICIAL USE PILOT PROJECT

## Oyster Creek Channel
## Barnegat Inlet Federal Navigation Project
## Ocean County, New Jersey

Prepared by:
U.S. Army Corps of Engineers
Philadelphia District
100 Penn Square East
Philadelphia, PA 19107

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US Army Corps of Engineers®
Philadelphia District

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**National Regional Sediment Management (RSM) Program**
**WRDA 2016 Section 1122 Beneficial Use Pilot Project**
**Oyster Creek Channel, Barnegat Inlet Federal Navigation Project**
**Ocean County, New Jersey**

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| | |
|---|---|
| APE | Area of Potential Effects |
| BBP | Barnegat Bay Partnership |
| CDF | Confined Disposal Facility |
| DO | Dissolved Oxygen |
| EA | Environmental Assessment |
| EFH | Essential Fish Habitat |
| ERDC | Engineer Research and Development Center |
| ESA | Endangered Species Act |
| EWN | Engineering with Nature |
| FWCA | Fish and Wildlife Coordination Act |
| GHG | Greenhouse Gases |
| HAB | Harmful Algal Blooms |
| HAPC | Habitat Area of Particular Concern |
| HD | House Document |
| HTRW | Hazardous, Toxic, and Radioactive Waste |
| IBSP | Island Beach State Park |
| MBTA | Migratory Bird Treaty Act |
| MLLW | Mean Lower Low Water |
| MMPA | Marine Mammal Protection Act |
| MSA | Magnuson Stevens Fishery Conservation and Management Act |
| MSC | Major Subordinate Commands |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NGVD | National Geodetic Vertical Datum |
| NHPA | National Historic Preservation Act |
| NJDEP | New Jersey Department of Environmental Protection |
| NJDOT/OMR | New Jersey Department of Transportation/Office of Marine Resources |

| | |
|---|---|
| NJESA | New Jersey Endangered Species Act |
| NJIWW | New Jersey Intracoastal Waterway |
| NMFS | National Marine Fisheries Service |
| NNBF | Natural and Nature-based Features |
| NOAA | National Oceanographic and Atmospheric Administration |
| NOx | Nitrogen Oxides |
| NRHP | National Register of Historic Places |
| RSM | Regional Management Program |
| SAV | Submerged Aquatic Vegetation |
| TNC | The Nature Conservancy |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | Volatile Organic Compound |
| WRDA | Water Resources Development Act |

## 1.0 Introduction and Project Authority

Section 1122 of the Water Resources Development Act (WRDA) 2016 authorizes the U.S. Army Corps of Engineers (USACE) to establish a pilot program to carry out 10 projects for the beneficial use of dredged material from federal and non-federal navigation channels consistent with all applicable environmental laws. The ten selected pilot projects must meet the Section 1122 statutory language for the following purposes to produce public economic or environmental benefits:

- reducing storm damage to property and infrastructure;
- promoting public safety;
- protecting, restoring, and creating aquatic ecosystem habitats;
- stabilizing stream systems and enhancing shorelines;
- promoting recreation;
- supporting risk management adaptation strategies; and
- reducing the costs of dredging and dredged material placement or disposal, such as for projects that use dredged material as construction or fill or other civic improvement objectives.

Of 95 proposals evaluated based on Section 1122 criteria, the 10 selected by the USACE Headquarters evaluation board were deemed to have a high likelihood of environmental, economic and social benefits, and exhibiting geographic diversity. One of the 10 pilot projects selected is located in USACE's Philadelphia District and is the subject of this Environmental Assessment: Beneficial Use Pilot Project Barnegat Inlet Federal Navigation Project, Oyster Creek Channel, New Jersey (the Oyster Creek project or project).

Under the Section 1122 program, transportation of the material beyond the Federal Standard will be at a 100% federal cost. Implementation Guidance for Section 1122 was signed by the Acting Assistant Secretary of the Army (Civil Works) on January 3, 2018. Draft Guidance for Major Subordinate Commands (MSC) and District Commands was provided by the USACE Director of Civil Works in January 2019. The New Jersey Department of Environmental Protection's (NJDEP) Bureau of Coastal Engineering will serve as the non-federal sponsor. The NJDEP's Division of Fish and Wildlife and the New Jersey Department of Transportation's Office of Maritime Resources (NJDOT/OMR) also have significant interest in the Barnegat Inlet project and innovative techniques of dredging and dredged material placement. The Section 1122 program aligns with the NJDEP's Barnegat Bay Restoration, Enhancement, and Protection Strategy (BB REP Strategy) Ten-Point Plan to improve the ecological health of the watershed.

The WRDA Section 1122 program accomplishes the proposed goals of benefitting both federal and state navigation channels by using dredged material beneficially to support coastlines as well as innovatively creating natural and nature-based features and restoring degraded marsh habitat. Additionally, this project uses Regional Sediment Management (RSM) and Engineering with Nature (EWN) principles to look at nature-based approaches to manage and keep sediment out of channels, thereby reduce maintenance dredging needs and costs.

In fulfillment of the National Environmental Policy Act (NEPA) of 1969, this Environmental Assessment (EA) provides a comprehensive alternatives evaluation for decision-makers and the concerned public of the physical, biological, and social effects of human activities on the environment.

The Barnegat Inlet Federal Navigation Project was adopted in House Document (HD) 73-19 in 1935, modified in HD 74-85 in 1937 and HD 79-358 in 1946 and again as a result of the Supplemental Appropriation Act of 1985. Originally constructed in 1940, the navigation project consists of a dual jetty system with an inlet channel that is 300 feet wide to an authorized depth of 10 feet Mean Low Water (MLW). The inlet channel extends from the outer bar in the Atlantic Ocean to the north end of the sand dike in Barnegat Bay. The federal project channel then extends in a northwesterly direction from the gorge in the inlet to Oyster Creek channel to provide access to deep water in the bay and a connection to the New Jersey Intracoastal Waterway (NJIWW) federal channel. An additional portion of the project includes a channel which is 8 feet deep and 200 feet wide connecting Barnegat Light Harbor with the main inlet channel. Although originally completed in 1940, the Supplemental Appropriation Act of 1985 contained language stating that the existing project had not worked as projected and, in fact, created a hazard to navigation. This Act provided funds to implement a number of improvements, including a new south jetty 4,270 feet long, generally parallel to the north jetty, extending from the Barnegat Lighthouse to the top of the “old” south jetty, a navigation channel 300 feet wide by 10 feet deep MLLW from the outer bar in the Atlantic Ocean to the north end of the sand dike in Barnegat Bay, and jetty sport fishing facilities on the new jetty.

## 2.0 Purpose and Objectives

The purpose of this project is to maintain the Barnegat Inlet Federal Navigation Project by dredging the channels to authorized depth and utilizing the dredged material for economic and environmental benefits (Figure 1). Under the Section 1122 program, the Philadelphia District USACE seeks to develop innovative approaches for the beneficial use of maintenance material for shoreline protection and habitat creation/restoration in Barnegat Bay that will inform and support beneficial use projects in the future and keep sediments in the natural system. There is considerable opportunity within the sediment-rich Barnegat Inlet complex to use dredged sediments from state and federal channels for beneficial use through placement on adjacent beaches, for marsh enhancement, and island creation. Such projects would improve overall coastal system resilience within the Barnegat Inlet region and other regions of New Jersey.

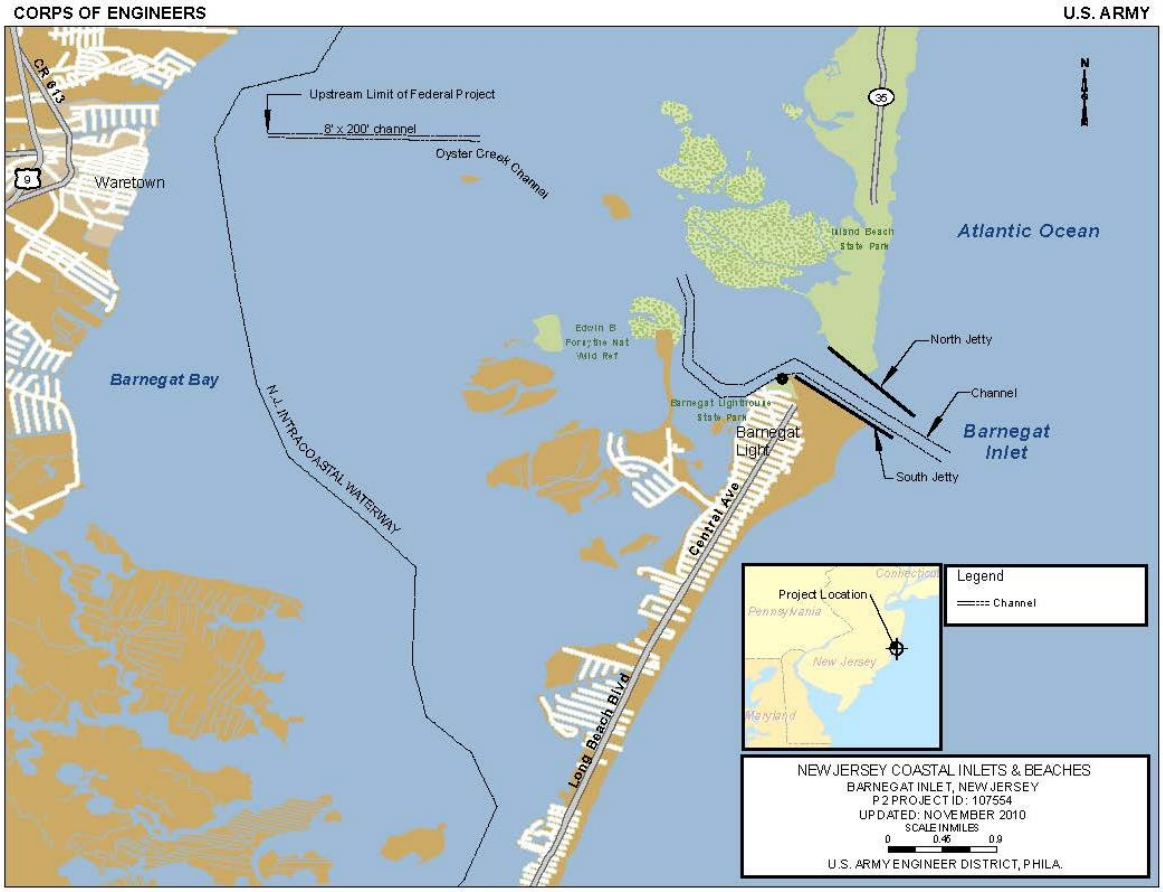


**Figure 1: Barnegat Inlet Federal Navigation Project.**

One of the USACE's missions is to ensure safe navigation in federally-authorized channels. The present and future objective is to continue to seek opportunities to utilize high quality dredged material as a resource to provide social, economic, and environmental benefits and reduce the need for upland confined disposal facilities (CDFs). The Section 1122 pilot project team utilizes lessons learned from other successful efforts and from partnerships with local knowledgeable organizations in coastal New Jersey. The proposed plan was developed through collaboration with the USACE's Engineering Research and Development Center (ERDC) to construct new islands and restore marsh and submerged aquatic vegetation (SAV) in the Barnegat Bay region behind Island Beach State Park (IBSP). These actions serve to retain sediment within the system while enhancing natural habitat. Ongoing collaborative efforts with ERDC through their Engineering with Nature and Regional Sediment Management Programs as well as the Barnegat Bay Partnership (BBP) have also contributed to the development of innovative natural and nature-based features (NNBF) using Barnegat Inlet channel sediments.

Specific project objectives include:

- Promote public safety by dredging the navigation channels to the authorized depths in

support of safe navigation for commercial and recreational boating use while providing clean dredge material for beneficial use.

- Use a Regional Sediment Management (RSM) approach in order to keep dredged sediment in the natural system most effectively and strategically in support of natural habitats for wildlife and coastal resilience.
- Establish cooperative working relationships with stakeholder groups/natural resource agencies to collaboratively support improved sediment management practices and coastal resiliency.
- Work collaboratively with the NJDEP and NJDOT/OMR for navigational safety.
- Use monitoring results to understand design, techniques, processes, and benefits associated with island creation and other innovative sediment management practices for application to future backbay projects.

The Section 1122 pilot program is being implemented as two distinct efforts in two locations within the Barnegat Inlet Federal Navigation Project channel system. Phase 1 of the pilot program entails maintenance dredging of the channel within Barnegat Inlet between the north and south jetties and beneficial placement of the material along a 1-mile length of Atlantic Ocean beachfront at Harvey Cedars with subsequent year placements along eroded areas from Barnegat Light south to Harvey Cedars on Long Beach Island, Ocean County, New Jersey (**Figure 2:**). An Environmental Assessment (EA) for Phase 1 was completed 10 July 2020 (USACE, July 2020). Phase 2 of the pilot program is the subject of the current EA. This report will address maintenance dredging needs and evaluate potential beneficial uses of dredged material removed from the Oyster Creek Channel portion of the authorized Federal navigation channel in Barnegat Bay and innovatively create natural and nature-based features, support shoreline protection efforts and/or habitat restoration with the maintenance material within Barnegat Bay.

## 3.0 Project Location

The study area is a complex and dynamic coastal system on the New Jersey Atlantic Ocean Coast. Barnegat Bay is separated from the Atlantic Ocean by the long Barnegat Peninsula (barrier island), the southern end of IBSP and the north end of Long Beach Island. Barnegat Bay connects with the ocean through Barnegat Inlet. The watershed is a valuable yet vulnerable resource for the state of New Jersey. It has a total area of 660 square miles. Nearly all 33 municipalities in Ocean County lie within the Barnegat Bay watershed, as well as four municipalities in Monmouth County. Nearly 600,000 people populate the area year-round, while the number doubles during summer months (NJDEP, 2017). The Oyster Creek channel is located in Barnegat Bay west of IBSP and connects Barnegat Inlet with the NJIWW (see Figure 1). The shallow marine environment contains numerous sand shoals and islands vegetated with salt marsh grasses and in some areas SAV.

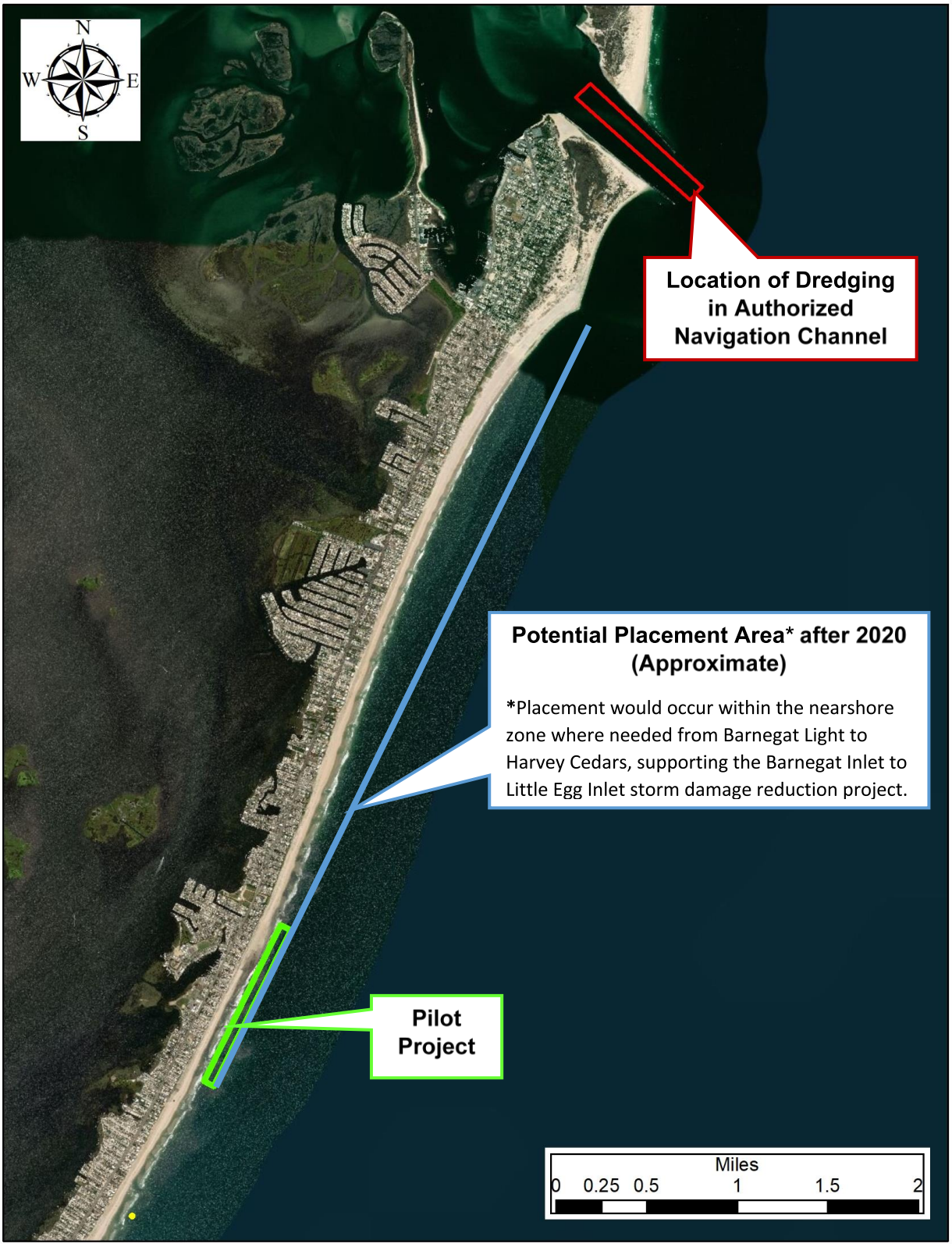


**Figure 2: Barnegat Inlet Study Area, Phase 1 of the Section 1122 Pilot Program.**

## 4.0 Alternatives

### 4.1 No Action – No Dredging

Under the No Action Alternative maintenance dredging within Oyster Creek channel would not occur. The No Action Alternative would allow the sedimentation of the channel within Barnegat Bay to progress and the channel would eventually become unnavigable. This alternative does not meet the project objective to maintain the authorized navigation channel for commercial and recreational watercraft, for Coast Guard missions, nor would this alternative fulfill the Section 1122 program objective to utilize the dredged material beneficially to create or restore natural habitat within Barnegat Bay.

### 4.2 Past and Current Practices

Oyster Creek channel is dredged as needed when shoals develop that impede navigation and when funding becomes available to maintain the channel. Over a period of 36 years from 1981 to 2017, records indicate that Oyster Creek channel has been dredged 16 times. The dredged material has historically been placed nearby in designated open water placement sites known as Site 26A and 26B (Figure 3). Over time, these placement actions resulted in the development of two islands. Site 26B was last used by USACE in 2017 for material dredged from the Oyster Creek Channel using a hydraulic pipeline dredge. The island is approximately 12 acres in size and has approximately 5 acres of wetlands. Thick beds of SAV have since established as a fringe around the island as placement of the dredged material created shallow depths suitable for the plants to thrive. Combined the island's uplands and SAV beds comprise approximately 60 acres.

Records show that placement of dredged material on Site 26A has not occurred since prior to 2008. Creation of the island resulted in a heron rookery naturally establishing on the island and no placements have occurred since. In the absence of these overboard placement sites in Barnegat Bay, material would need to be pumped 5 miles away to an upland disposal site on the mainland, removing sediment from the natural system.

Both islands are state-owned and had been historically used for dredged material placement by NJDEP as well. Site 26B has not been used for placement of material dredged by the state of New Jersey (from Double Creek Buoy Channel and High Bar Harbor entrance channel) since 1990.

### 4.3 Future Beneficial Use of Dredged Material

Beneficial use of dredged material can play a vital role in a variety of applications including marsh enhancement, beach nourishment, shoreline stabilization, and island creation/restoration. USACE, Philadelphia District has partnered with ERDC to move forward with the Engineering with Nature program in the Philadelphia District, becoming the third EWN Proving Ground in 2016. These EWN applications have gained recognition and favorability with natural resource regulatory agencies (https://www.fisheries.noaa.gov/feature-story/thinking-big-picture-engineering-nature), stakeholders and the general public with the continued need for dredging to maintain navigable depths in authorized channels If maintenance dredging is required, the historical alternative was to dispose of the dredged material, typically in an upland confined containment facility (CDF), thereby removing it from

the aquatic system where it no longer provides a sediment source benefit to the environment. Present and future RSM and EWN strategies are seeking to utilize dredged material as a resource by taking actions to keep sediment in the system. Natural forces dictate how the material is distributed. These programs foster coordination and partnering between USACE and other Federal agencies (*e.g*. NMFS, USFWS) and state agencies (NJDEP, NJDOT) to collaborate on dredging and placement needs. These projects are also encouraged and supported by local communities and non-governmental organizations (NGOs) such as The Nature Conservancy (TNC) and The Wetlands Institute (TWI).

Beneficial uses can increase shoreline habitat and community resilience while dramatically reducing the financial costs of dredged material placement and coastal restoration projects. The beneficial use objective requires dredging and restoration projects to be aligned in space and time. Maintenance dredging is conducted when there is a need to ensure navigational access and safety. The beneficial use of the dredged material needs to occur concurrently with the channel maintenance operation.

For the current project, USACE and NJDEP study team members created a Section 1122 Project evaluation team by hosting meetings and inviting representatives from several natural resource agencies, local organizations and stakeholders to share expertise on the various proposed locations that would benefit from an influx of clean dredged material in the vicinity of the Oyster Creek channel. USACE sought area expertise and innovative ideas on various locations for dredged material placement to benefit the natural environment. Table 1 lists the organizations that participated in the evaluation team meetings.

**Table 1: Barnegat Bay Beneficial Use of Dredged Material Evaluation Team**

| |
|---|
| US Army Corps of Engineers |
| NJDEP Division of Land Resource Protection |
| NJDEP Watershed & Land Management |
| NJDEP Division of Coastal Engineering |
| NJDEP Parks & Forestry |
| NJDEP Bureau of Shellfisheries |
| NJDEP Marine Fisheries Administration |
| NJDEP Fish & Wildlife Bureau of Land Management |
| NJDOT Maritime Resources |
| Barnegat Bay Partnership's (BBP) Scientific and Technical Advisory Committee including members from below: |
| Stockton University |
| Jacques Cousteau National Estuarine Research Reserve |
| NOAA National Marine Fisheries Service |
| US Fish and Wildlife Service |
| USFWS Edwin B. Forsythe National Wildlife Refuge |
| Long Beach Township |

The following alternative locations were proposed by USACE and NJDEP for consideration and discussion by the evaluation team for dredged material placement (Figure 3):

**Site 1** is located on the western side of the bay, a long shoreline area fronting both eroding wetlands and a lagoon community. New Jersey's Marine Fisheries Administration (MFA) noted that a portion of the area was mapped for SAV in 2003 and 2009 and recommends that the site's boundaries be delineated to avoid SAV areas if selected. The site was eliminated from further consideration under the Section 1122 pilot program due to its distance from the Oyster Creek channel.

**Site 2** is located on the eastern side of the bay near the Island Beach State Park (IBSP) kayak launch. The area has long been identified as productive SAV habitat and mapped five times from 1979 to 2012. A "speed bump" approach to material placement would be preferred over creation of an emerging island to minimize impacts to SAV. The site was not recommended under the Section 1122 pilot program for construction in 2020 due to its considerable natural resources (*e.g*. SAV, shellfish) that required further evaluation and studies.

**Site 3** is located approximately mid-bay and west of IBSP. The site and surrounding area have been mapped for SAV in 2003 and 2009). As with Site 2, this site was not recommended further by the evaluation team due to potential impacts to its SAV and shellfish resources. One proposed plan that may be viable for possible future applications: building a mound or berm to the north and west of the current site to provide a wave break and reduce depths that would be more conducive for natural SAV recruitment. Site 3 was not carried forward for further considering for the Section 1122 pilot program.

**Site 4** is the Sedge Island Natural Resource Education Center east site. The evaluation team supports expanding the island or the elevation of parts of the house site, however ebb currents on the south side of the island are strong and further hydrodynamic data collection and potential numerical modeling are recommended. Part of the site has been mapped for SAV (2003) and a site investigation would be needed to delineate current boundaries of SAV to fine-tune potential placement locations. The site was not recommended for further evaluation since further investigation is needed to determine if placed sediments would be stable with the prescence of strong currents on the south side.

**Site 5** is located on the other end of the creek by the Sedge Island Natural Resource Education Center. Part of the proposed site was mapped for SAV in 2003 and 2009. The evaluation group expressed less interest in this site for the Section 1122 beneficial use program due to the aforementioned reasons for Site 4. The site is confounded by user conflicts potentially interfering with ongoing DOT mitigation and research activities. The site was not recommended for further evaluation under the Section 1122 program.

**Site 6** is located west of Site 26B in deeper water. There is strong support for island creation at this site as the depths are believed to be in excess of SAV to proliferate. Both Sites 26A and 26B islands were aquatic placement sites that resulted in the eventual creation of islands in the near vicinity and provide significant natural resource value. The creation of an island at Site 26A has resulted in the establishment of a heron rookery. Site 26B has afforded shallow water habitat where fringing SAV has developed naturally over approximately 50 acres. Based on experiences in the methodology utilized for development of Sites 26A and 26B, the successive placements of dredged material at Site 6 is expected to provide comparable habitat benefits.

**Site 7** is south of 26A. The site appears to be a highly dynamic area of sand bars and the evaluation team did not express significant interest in using the site for a beneficial use

project. Part of the site was mapped for SAV in 2003 and 2009 and will necessitate a site investigation to ascertain the presence, if any, of any current SAV in the area. The material is not expected to remain stable in this location under storm conditions. As with Site 5, this site is also confounded by user conflicts, potentially interfering with ongoing DOT mitigation and research activities. Therefore, the site was not recommended for further review for the Section 1122 program.

**Site 8** is south of 26B. The site was mapped for SAV in 2003 and 2009. The evaluation team expressed concern for the site for placement operations as it is nearly surrounded by SAV. There is also uncertainty regarding the direction and extent of sand movement which could potentially smother and degrade existing SAV beds. The site was not recommended further for the Section 1122 pilot program.

**Site 9** is located south and east of the Edwin B. Forsythe National Wildlife Refuge (EBFNWR) property adjoining Long Beach Township. The site is very shallow and was identified as a shallow intertidal mudflat thought to be heavily used by migratory shorebirds. For this reason, the evaluation team did not recommend this site for the Section 1122 beneficial use program due to expected adverse impacts to shorebirds.

**Site 10** is the EBFNWR site on the western side of the bay. The evaluation team felt that this aquatic site was a good location as a direct or nearshore placement area. The objective is to keep the high quality sediment in the natural system at this site, supporting shoreline protection in an area where erosion is a concern to the Refuge managers. Use of this location for placement may require pre-placement SAV and shellfish evaluations to be completed to fine-tune strategic placement to avoid adversely impacting these resources. The site will be carried forward for further, more in-depth review as a potential future placement site outside of the scope of the Section 1122 pilot program.

**Site 11** is Lighthouse Camp. Like Site 10, it is also located on the western side of the bay just south of Site 10. The land is NJDEP-owned and currently leased to a non-governmental organization (NGO). The evaluation team felt that the site has potential for supporting shoreline protection by providing a supplemental sand source to promote improved shoreline resiliency and promote marsh restoration. The site also houses an SAV “grow-out” facility used to support SAV mitigation/restoration. As noted for Site 10, use of this site may require pre-placement SAV and shellfish evaluations to avoid impacting these resources. The marsh and shoreline have suffered extensive degradation, predominantly from historic mosquito-management, farming, chronic boat wake erosion, severe storms and sea level rise. The Lighthouse Center for Natural Resource Education is located nearby and marsh and shoreline degradation have made the Lighthouse Center’s facilities more vulnerable to coastal flooding. TNC has proposed a hybrid living shoreline project in this area to alleviate erosion. A sediment supplement using dredged material from the Oyster Creek channel and placed in the nearshore zone may complement future shoreline restoration efforts. The site will be carried forward for further, more in-depth review as a potential future placement site outside of the scope of the Section 1122 pilot program.

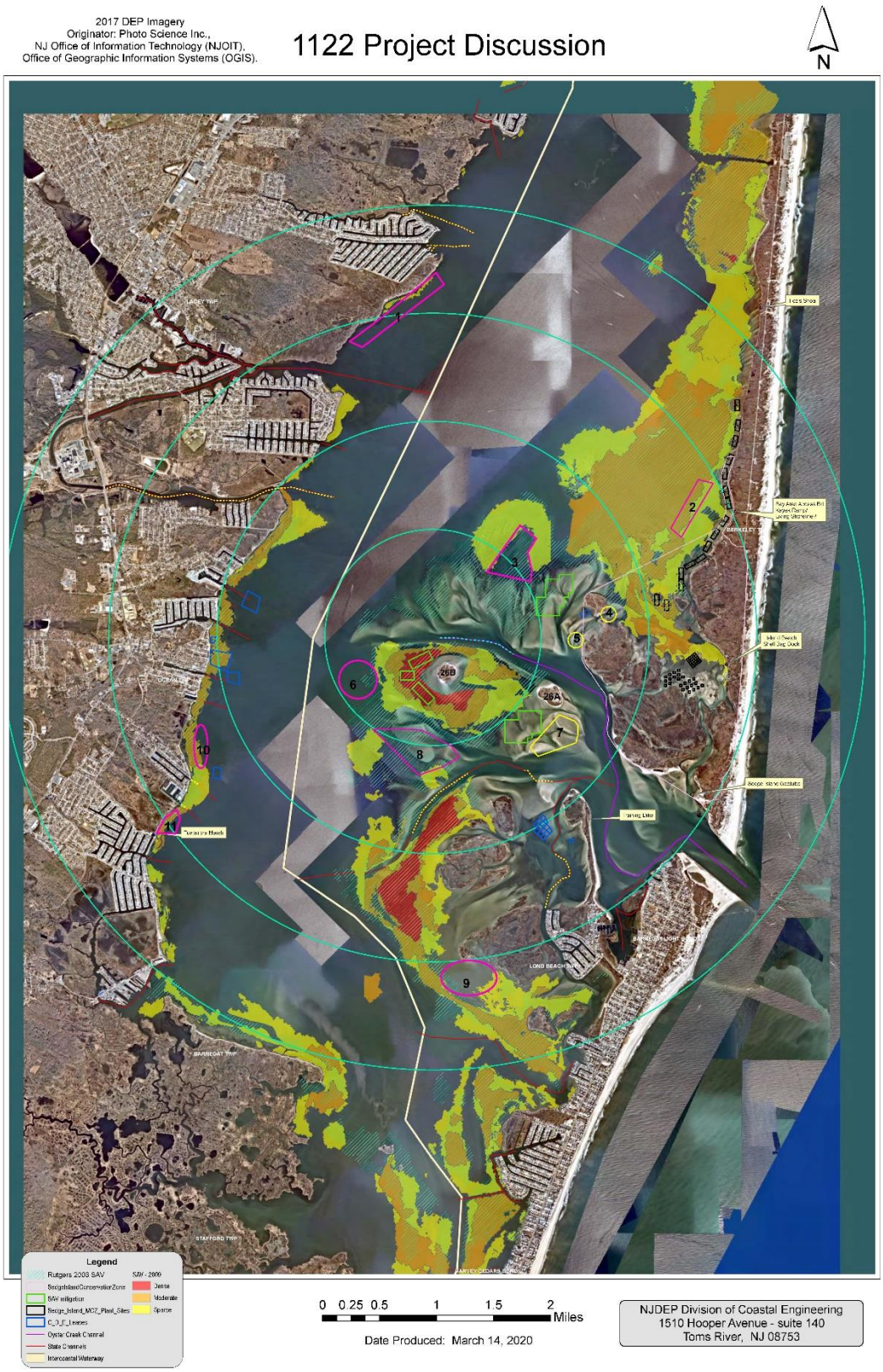


**Figure 3: Barnegat Bay Alternative Beneficial Use Placement Sites.**

## Section 4.4. The Selected Plan

Oyster Creek is a component of and the upstream limit of the authorized Barnegat Inlet navigation channel that has been maintained by the Philadelphia District U.S. Army Corps of Engineers (USACE) since 1940. The channel at Oyster Creek is 200 feet wide by 8 feet deep (MLLW). The western portion of the channel shoals frequently and is typically dredged every 3 years based on when funding is appropriated. Under the Section 1122 Program, the Philadelphia District USACE, in collaboration with the project stakeholders and natural resource agencies identified in Section 4.3, selected Site #6 as the preferred placement location for maintenance material (Figure 4). The objective will be to conduct successive placements over years within this site, as maintenance dredging of the Oyster Creek channel is needed. Successive placements will eventually and intentionally develop an island with benefits similar to thehighly successful islands created at Sites 26A and 26B.

The Oyster Creek channel will be dredged to the authorized depth of 8 feet MLLW with one foot of overdepth, approximately 25,000 cy of material. A 12 to 14-foot long hydraulic pipeline (cutterhead) dredge, the Dredge Fullerton, owned and operated by Barnegat Bay Dredging Inc. will be utilized to conduct the initial placement and channel maintenance dredging (Figure 5). As an approximation, starting in water depths of 7 to 8 ft MLLW, this quantity of dredged sand will create a lift of about 1 to 2 feet resulting in a submerged mound within an area about 11 acres in size. Bathymetry of the placed site is expected to vary dependent upon conditions during placement. The operation will be monitored to inform and fine-tune future placements.

Material will be dredged and placed using a diffuser beginning in the center and at the bottom of Site 6. Material will be placed unconfined to allow the sand to naturally drop and create the first lift of a submerged island, similar to the method used for creation of Sites 26A and 26B. The first lift of the island will be monitored through RSMand 1122 program efforts and continuing under the Operations and Maintenance of the navigation project. Monitoring before, during and after placement will inform future placement operationsthat will meet the objectives of island creation. The target objectives are to increase suitable SAV habitat around the island and potential future nesting bird habitat for the emergent part of the island and document project development and management for future EWN applications. Since natural infrastructure changes over time, the target objectives and habitats may also need to be adaptively managed as the project progresses.

The two other sites proposed for future placements of maintenance dredged material from the Oyster Creek channel are Sites 10 and 11 (see Figure 4). Following the Section 1122 pilot program placement scheduled to occur in November/December 2020, future maintenance dredging operations may also consider placements at Sites 10 and 11 utilizing the government-owned small split-hull hopper dredge Currituck (Figure 6). The proposed placements at Sites 10 and 11 will be in a region approximately 1000 feet long and 500 feet wide and located in depths of approximately the 7-8 ft MLLW. The hopper dredge will approach bow-first and open the hopper to release the sand. The hopper will contain approximately 250 cubic yards each load and the loads can be placed over a grid pattern within the 1000 ft zone, allowing for small amounts of sediment to be placed with minimal impact. The maintenance dredging operation may occur annually, pending availability of funding and the government hopper dredge and take approximately 3 days to complete.

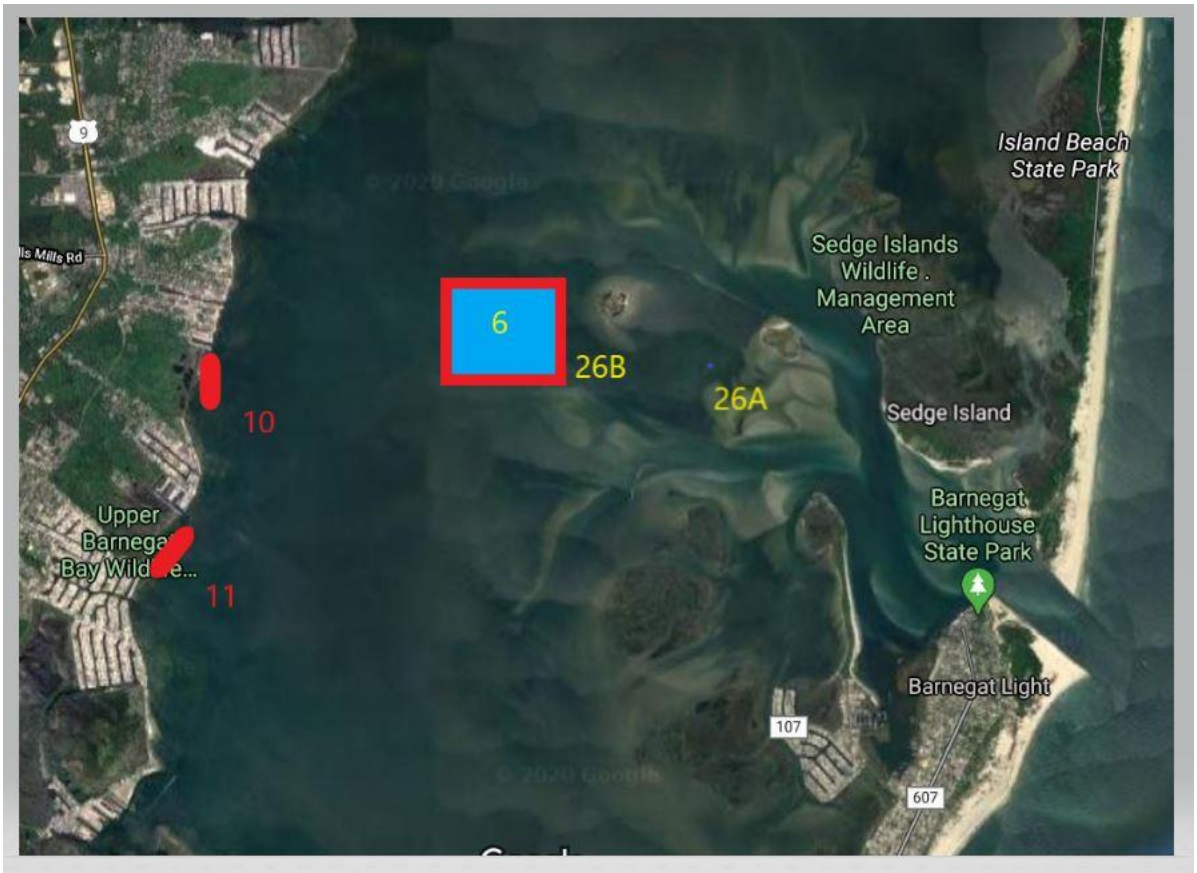


**Figure 4: Proposed Section 1122 placement location (Site 6) and potential future maintenance dredging placement locations (Sites 10 and 11).**

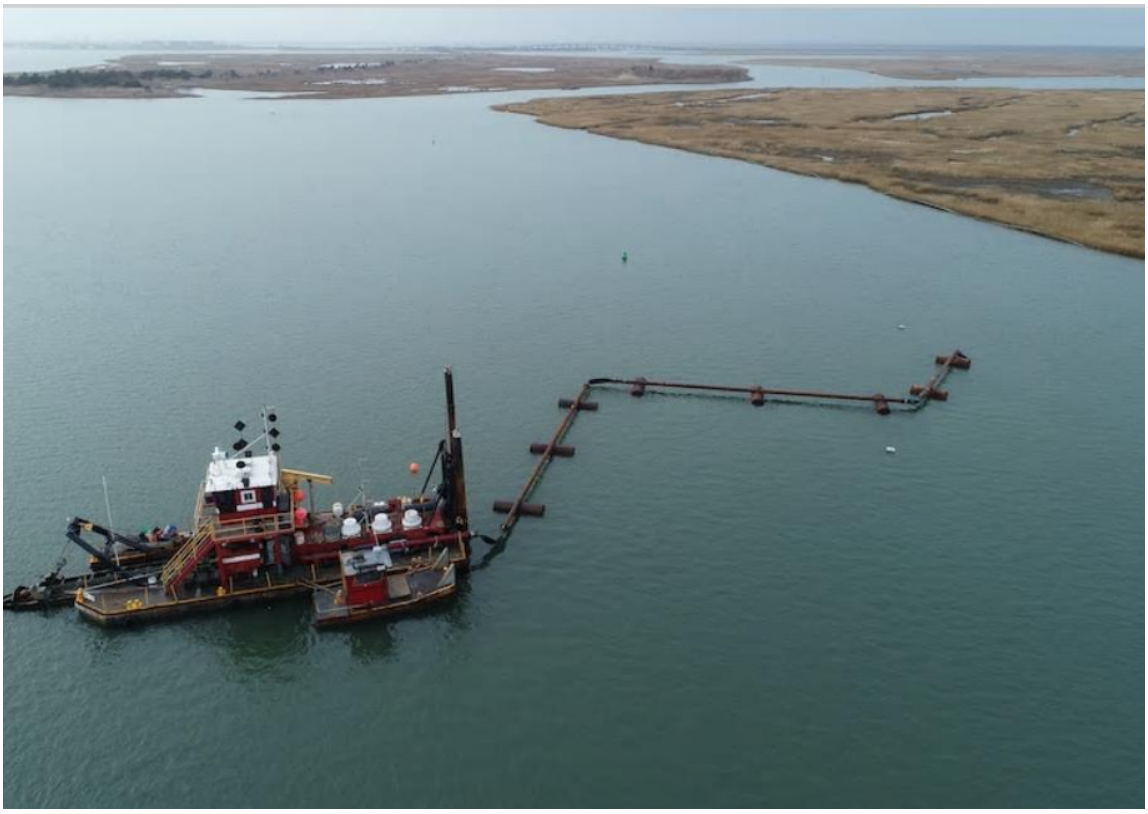

**Figure 5: Cutterhead suction dredge Fullerton (Barnegat Bay Dredging Co., Inc.)**

**Figure 6: Government-owned small split-hull hopper Dredge Currituck.**

## 5.0 Existing Environment

This section describes the existing and projected future conditions for each of the resources that occur in the project area and may be affected by the project. Existing and projected future condition descriptions include physical, chemical, biological and sociological conditions. These conditions are described without implementation of the alternative actions (No Action: no channel dredging and continued navigation use until shoaling results in insufficient channel depths for continued navigational use) as well as Current Practice (*i.e*. periodic maintenance dredging and either placement at Site 26B or upland CDF disposal, with continued navigational use as at present), and finally, channel maintenance dredging with beneficial use of the dredged material.

### 5.1 Geology and Physiography

The study area is situated along the New Jersey coast, which is located within the New Jersey section of the Coastal Plain Physiographic Province of Eastern North America. In New Jersey, the Coastal Plain Province extends from the southern terminus of the Piedmont Physiographic Province southeastward for approximately 155 miles to the edge of the Continental Shelf. The Coastal Plain Province is part of the Atlantic Coastal Plain that extends along the entire eastern Atlantic Ocean coastline from Newfoundland to Florida. The Coastal Plain is the largest physiographic province in the state and covers approximately sixty percent of the surface area of New Jersey. More than half of the land area in the Coastal Plain is below an elevation of 50 feet above sea level (NGVD). The Atlantic Coastal Plain has been further differentiated into the Inner and Outer Coastal Plain regions. The Inner Coastal Plain consists of lowlands and rolling hills underlain by Cretaceous deposits and is border to the north by the Piedmont Province. The Outer Coastal Plain is a region of low altitude where low-relief terraces are bounded by subtle erosional scarps, and consists of the unconsolidated Tertiary deposits of sand, silt and gravels. The eastern boundary of the Coastal Plain includes many barrier bars, bays, estuaries, marshes and meadowlands along the Atlantic coast extending from Sandy Hook in the north to Cape May Point at the southern tip of New Jersey.

In the Coastal lowlands of the New Jersey shore, the sea meets the barrier islands and mainland. The barrier islands extend from Bay Head, down the coast for approximately 90 miles, to just north of Cape May Inlet and are generally continuous, except for the interruption by 10 inlets. These barrier islands occur in the study area and are susceptible to comparatively rapid changes. The geologic processes that supply Barnegat Bay with sediments are: (1) stream sedimentation, which contributes a small amount of upland material; (2) waves washing over the barrier islands during storms; (3) direct wind action blowing beach and dune sand into the lagoon; and (4) the work of tidal currents, which normally bring in more sediments.

### 5.2 Air Quality

The Clean Air Act requires that all areas of the country be evaluated and then classified as attainment or non-attainment areas for each of the National Ambient Air Quality Standards. Areas can also be found to be “unclassifiable” under certain circumstances. The 1990 amendments to the act required that areas be further classified based on the severity of non-attainment. The classifications range from “Marginal” to “Extreme” and are based on “design values”. The design value is the value that actually determines whether an area meets the

standard. For the 8-hour ozone standard for example, the design value is the average of the fourth highest daily maximum 8-hour average concentration recorded each year for three years. Ground-level ozone is created when nitrogen oxides (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. NOx is primarily emitted by motor vehicles, power plants, and other sources of combustion. VOCs are emitted from sources such as motor vehicles, chemical plants, factories, consumer and commercial products, and even natural sources such as trees. Ozone and the pollutants that form ozone (precursor pollutants) can also be transported into an area from sources hundreds of miles upwind. The study area falls within the Philadelphia-Wilmington Atlantic City, PA-NJ-MD-DE Area. The entire state of New Jersey is in non-attainment and the project site is located in an area classified as being "Marginal." A "Marginal" classification is applied when an area has a design value of 0.085 ppm up to but not including 0.092 ppm (NJDEP 2012 Ozone Summary as cited in USACE 2014).

Greenhouse gases (GHG) trap heat in the atmosphere. Carbon dioxide is the most abundant GHG and enters the atmosphere through burning fossil fuels (*i.e.* coal, natural gas and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (*e.g*. manufacture of cement). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane is emitted during the production and transport of coal, natural gas and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substance (*e.g*., chlorofluorocarbons, hydrochlorofluorocarbons, and halons) (USEPA, 2016). The largest source of GHG emissions from human activities in the United States is from burning fossil fuels for electricity, heat and transportation. The USEPA tracks total U.S. emissions and reports the total national GHG emissions and removals associated with human activities.

Ambient air quality is monitored by the NJDEP Division of Air Quality and is compared to the National Ambient Air Quality Standards (NAAQS) throughout the state, pursuant to the Clean Air Act (CWA) of 1970. Six principal "criteria" pollutants are part of this monitoring program, which include ozone ($O^3$), carbon monoxide (CO), sulfur dioxide ($SO^2$), nitrogen dioxide ($NO^2$), particulate matter (PM10 and PM 2.5), and lead (Pb). Sources of air pollution are broken into stationary and mobile categories. Stationary sources include power plants that burn fossil fuels, factories, boilers, furnaces, manufacturing plants, gasoline dispensing facilities, and other industrial facilities. Mobile sources include vehicles such as cars, trucks, boats, and aircraft. New Jersey air quality data from air monitoring sites can be accessed from www.njaqinow.net/. New Jersey air quality has improved significantly over the past 40 years, but exceeds the current standards for ozone throughout the state and for fine particles in urban areas. With the exception of Warren County, outside of the project study area, New Jersey has attained the sulfur dioxide, lead and nitrogen dioxide standards.

## 5.3 Water Quality

Water quality is a primary determinant of habitat quality for fish and wildlife, and also affects recreational opportunities in regional water bodies and overall aesthetics of a water body. Parameters such as temperature, salinity, turbidity, dissolved oxygen (DO), nutrients,

pH, and heavy metals are important influences on the survival of aquatic life. Water quality is generally indicated by measuring levels of the following: nutrients (nitrogen/phosphorus), pathogens, floatable wastes, and toxins. Rainfall is an important parameter for assessing water quality; runoff leads to non-point source pollution and fresh water (rainfall, ground water seepage, runoff, and river discharge) can ultimately affect hydrodynamic circulation. The primary cause of non-point source pollution is related to development on land and/or the activities that result from land development. Sources might include run-off of petroleum products, fertilizers and animal wastes from roadways and lawns. When it is generated on land, such non-point source pollution is carried by rainwater, which can drain to surface or ground water and ultimately reach the ocean (USACE, 2014).

Physical water quality parameters such as temperature, salinity and turbidity are influenced by natural processes, and can be used to establish baseline water quality conditions. Other parameters that are influenced directly by human activities can be used to indicate the extent of impairment of the aquatic ecosystem. DO, for example, is important to the survival of fish and other aquatic life and can be affected by human influenced nutrient loading. In addition, fecal coliform bacteria are an indicator of bacterial pollution often associated with sewage effluent that can affect habitat quality. Nitrates and other nutrients are indicators of the degree of eutrophication of the estuary, while heavy metals and other contaminants may directly affect habitat quality.

According to New Jersey regulations (N.J.A.C. 7:9B-1.12), the surface waters in the study area have a NJDEP classification of SE-1 (estuarine). Tidal water bodies classified as SE-1 are estuarine waters with the designated uses of:

- Shellfish harvesting in accordance with N.J.A.C. 7:12
- Maintenance, migration and propagation of natural and established biota;
- Primary and secondary contact recreation; and any other reasonable uses.

Water quality within the coastal waters of the New Jersey Atlantic Coast was comparable to that of similar coastal water bodies along the New York Bight and was indicative of similar coastal tidal river and estuary complexes along the Mid-Atlantic coast (USFWS, 1997). NJDEP (2017) summarizes that the coastal waters and estuaries of New Jersey were generally good for recreation and shellfish harvesting. However, there remain some areas where dissolved oxygen does not meet water quality criteria, which is a concern relative to aquatic life support particularly in Barnegat Bay.

## 5.4 Sediment Quality and Hazardous, Toxic, and Radioactive Waste

Previous testing and maintenance dredging efforts indicate that sediment in the inlet is predominantly coarse grained sand and a small amount of fines and free of chemical contamination by New Jersey's Dredging Technical Manual on the Management and Regulation of Dredging Activities and Dredged Material Disposal in New Jersey's Tidal Waters (NJDEP, 1997). Oyster Creek channels are predominantly fine-grained sands and were tested for both grain size and chemical contamination with no exceedances. Due to a larger mean grain size and smaller fines content, the sand dredged from Oyster Creek channel is more stable and produces less turbidity than fine-grained silty sediments typical of freshwater environments. No facilities with potential HTRW impacts are known to occur near the Study Area.

## 5.5 Biological Resources

### 5.5.1 Aquatic and Terrestrial Habitats

The Study Area within Barnegat Bay is comprised predominantly of shallow waters, deeper waters within the channel, but also possesses intertidal sandflats, saltmarshes and eroded peat and mudbanks, and upland areas along the shoreline and on islands (Figure 7). Barnegat Bay has a mean tidal range of 0.66 – 6.9 feet, with the widest range occurring at inlets with ocean/estuary exchange. It is relatively shallow (mean depth of 5.2 feet and relatively narrow (0.62 – 3.7 miles wide) (www.nj.gov/dep/barnegatbay/modeling.html).

**Figure 7: Barnegat Bay habitats**

Intertidal low marsh wetlands dominated by saltmarsh cordgrass (*Spartina alterniflora)* are present throughout much of the study area and are the dominant vegetation feature. Intertidal mudflats or sand flats often border saltmarsh habitats, pocket beaches along developed shorelines, or locations where either erosion or marsh dieback has removed vegetation or depositional shoals have formed in areas that were previously subtidal. These habitats are often rich in benthic food sources available to wading birds and shorebirds that forage at low tide. Mudflats and sandflats are common special aquatic sites in the Barnegat Bay, and are important areas for algal growth, as producers of fish and wildlife organisms, and as nursery areas for many species of fish, mollusks, and other organisms. High saltmarsh habitats are generally found near the mean high tide level and are generally dominated by saltmarsh hay (*Spartina patens*), seashore saltgrass (*Distichlis spicata*), and glasswort (*Salicornia spp.)*. High saltmarsh provides habitat for many of the same species found in the low tidal marsh areas.

Open-sandy (unvegetated) upland areas on spits and islands in the Barnegat Bay study area provide important habitat for colonial nesting birds. Scrub/shrub habitats occur at the transition from high marsh to uplands. Common vegetation includes switchgrass (*Panicum virgatum*), groundsel tree (*Baccharis halimifolia*), bayberry (*Myrica spp*.), eastern red cedar (*Juniperus virginiana*), hightide bush (*Iva frutescens*), seaside rose (*Rosa rugosa*) and poison ivy (*Toxicodendron radicans*). Common reed competes with these species for dominance in these areas. Scrub/Shrub communities are an important component of the open water/tidal marsh/upland transition, providing habitat for numerous species of birds and mammals that utilize these areas.

More protected upland areas along back side of barrier islands and the mainland bordering high marsh habitats possess suitable conditions for scrub shrub thickets composed mainly of beach heather (*Hudsonia tomentosa*), bayberry (*Myrica pennsylvanica*), wax myrtle (*M. cerifera*), beach plum (*Prunus maritima*) and poison ivy (*Toxicodendron radicans*). Inland maritime forests of Barnegat Bay area occur support black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*), red cedar (*Juniperus virginiana*), serviceberry (*Amelanchier canadensis*) and American holly (*Ilex opaca*). These habitats are important for millions of neo-tropical migratory songbirds.

### 5.5.2 Plankton

In the waters of Barnegat Bay, plankton are the primary producers in the marine ecosystem. Plankton (*i.e.* phytoplankton and zooplankton) are collectively a group of interacting minute organisms adrift in the water column. They both form the base of the food web and are assimiliated by higher organisms in the food chain. Phytoplankton production is dependent on light penetration, available nutrients, temperature and wind stress. A two-year baseline survey in Barnegat Bay and Little Egg Harbor reported that the most common phytoplankton species belonged to five major groups: diatoms (Bacillariophyceae), dinoflagellates (Dinophyceae), cryptophytes (Cryptophyceae), chlorophytes (Chlorophyceae), and chrysophytes (Chrysophyceae). Of these groups, diatoms made up approximately 50% of the total number of taxa, followed by dinoflagellates (Ren, 2015). Zooplankton typical have seasonal peaks that usually occur in the spring and fall (Howson, 2016). Common zooplankton species include *Acartia tonsa, Centropages humatus, C. furatus, Temora longicornis, Tortanus discaudatus, Eucalanus pileatus, Mysidopsis bigelowi* (mysid shrimp), and *Crangon septemspinosa* (sand shrimp).

Excessive phytoplankton blooms occur in Barnegat Bay and are attributed to eutrophication of the waters stemming from excessive nutrients and poor flushing in some areas. Excessive growth of some phytoplankton species can generate harmful algal blooms (HABs), characterized based on their pigments as brown, yellow, and red tides. HABs can cause numerous ecological and/or human health problems due to the toxins produced by certain species and/or their potential bioaccumulation in the food web or may cause hypoxia in the water column due to their decay and degradation (Gastrich, 2000). Toxic forms that are particularly dangerous to numerous organisms include macroalgae, shellfish, finfish, and humans. HAB species that have been recorded in the Barnegat Bay include *Aureococcus anophagefferens, Dinophysis* spp., *Gymnodinium* (*Karlodinium*) spp., *Heterosigma* sp., *Pseudo- nitzschia* sp. and *Prorocentrum* spp. (BBP, 2016).

Each summer, the New Jersey DEP Bureau of Marine Water Monitoring monitors for concentrations of chlorophyll '*a*' (an indicator to determine the amount of algal biomass

present) in New Jersey's coastal waters. A station network of over 45 sites in New Jersey's backbays are monitored for chlorophyll '*a*' multiple times throughout the year. In addition, these samples are closely evaluated to determine if the concentration of any toxic algal species is present and at an unsafe level (retrieved from https://www.nj.gov/dep/bmw/phytoplankton.htm#/. Several years of monitoring demonstrates that overall chlorophyll '*a*' concentrations are highest in the Barnegat Bay segment (generally from Barnegat Inlet in the south to the Metedeconk River in the north), but the blooms were generally localized (BBP, 2016).

### 5.5.3 Macroalgae and Submerged Aquatic Vegetation

Several species of macroalgae can be found within the study area. The productivity is primarily seasonal with the densest population occurring in June through August. Distribution and abundance of algae is closely related to seasonal temperature, salinity variations and nutrient levels coming from tributary streams. The predominant benthic algae is Rhodophyta (red algae) while Chlorophyta (green algae) comprise the largest number of intertidal algae species. Phaeophyta (brown algae) such as rockweed (*Fucus* spp.) may be found attached or floating free around rock jetties and pilings or washed onto the shore to make up part of the wrack line. Other common algae species include sea lettuce (*Ulva lactuca*), spaghetti grass (*Codium fragile*) and *Gracilaria* sp., a red algae that grows unattached among seagrass beds (Good *et al*., 1978). Eutrophication can influence the abundance of some macroalgae where excessive growth of sea lettuce, and the Rhodophytes: *Agardhiella subulata, Ceramium* spp., and *Gracilaria tikvahiae* can form extensive organic mats that can be detrimental to essential estuarine habitats such as seagrass beds (Kennish *et al*., 2010).

Submerged aquatic vegetation (SAV) and/or "seagrass" beds exist in localized areas of Barnegat Bay, and are an essential food for a number of waterfowl species, habitat for finfish, shellfish and a number of other invertebrates, and provide sediment stabilization. SAV are rooted vascular flowering plants that exist within the photic zone of shallow bays, ponds, and rivers. The Barnegat Bay – Little Egg Harbor Estuary have the most extensive beds and account for nearly 75% of the beds in New Jersey (Kennish *et al*., 2010). The most important species of SAV in New Jersey is eelgrass (*Zostera marina*), which is also the most common SAV that can form extensive beds important for fish, shellfish and other wildlife species. Other species of submerged vegetation found in the more brackish waters of the estuary that are also of ecological importance include widgeon grass (*Ruppia maritima*) and other more freshwater and slightly brackish species of pondweeds (*Zanichellia palustris* and *Potomogeton* spp.) and wild celery (*Vallisneria americana*).

SAV beds provide an important direct food source via the grazing chain, indirect food source via the detritus chain, a substrate for epiphytes, and cover and protective habitat. Bellrose (1976) lists various species of waterfowl, such as Atlantic brant (*Branta bernicla*) and black duck (*Anas rubripes*) that feed on eelgrass. Many fish species are associated with eelgrass beds, although most do not feed directly on the plants (Good *et al*., 1978). SAV provides important habitat for juvenile and adult blue crabs (*Callinectes sapidus*) and summer flounder (*Paralichthys* dentatus) and the leaves are used by bay scallops (*Argopecten irradians*) as a setting substrate. Hard clams (*Mercenaria mercenaria*) beds are assocated with SAV. Lathrop and Haag (2011) conducted aerial survey comparisons of eelgrass beds in Barnegat Bay and Little Egg Harbor in 2003 and 2009 and found that the general extent of the beds did not change significantly although they observed a 60% decline in bed extent. Some changes were noted in the difference in seasons sampled in Barnegat Bay and Little Egg Harbor. Fertig

*et al*. (2013) attribute declines in eelgrass populations and biomass in this area to increased Nitrogen loading within the watershed. Effects of high Nitrogen loading are accelerated algal growth, epiphytic infestation, light attenuation, and shading of the estuarine floor, which can heavily stress these plants.

### 5.5.4 Wildlife

The study area is a complex of shallow water, saltmarshes, channels, inlets, and barrier island upland habitats. They provide shelter, nesting habitat, and a rich food resource that support regionally significant wildlife populations, especially migratory and wintering waterfowl, nesting waterbirds, migratory shorebirds, raptors, reptiles and mammals. Wildlife species that utilize these habitats include federal and state listed threatened and endangered species. The following provides general information on the species within major wildlife groups that utilize the study area.

Invertebrates. Benthic invertebrate communities vary spatially and temporally as a result of factors such as sediment type, water quality, depth, temperature, predation, and competition. The invertebrates inhabiting the intertidal zone have evolved special locomotory, respiratory, and morphological adaptations that enable them to survive. Most are excellent and rapid burrowers and tolerant to environmental stress. Invertebrate species known to occur in Barnegat Bay include Cnidaria (hydra, corals, anemones, jellyfish), Platyhelminthes (flatworms), *Nemertinea* (ribbon worms), Nematoda (roundworms), Polychaetes (bristle worms), Oligochaetes, *Bryozoa*, Mollusca (chitons, bivalves, snails, squids, *etc*.), Crustaceans (crabs, shrimp, amphipods), insects (Dipterans), Echinodermata (sea urchins, sea cucumbers, sand dollars, starfish), and Urochordata (tunicates). More commonly known species include the mole crab (*Emerita talpolida*), haustorid amphipods (*Haustorius* spp.), and coquina clam (*Donax variablilis*), the epifaunal blue crab (*Callinectes sapidus*) and lady crab (*Ovalipes ocellatus*). These invertebrates are prey to various shore birds and nearshore fishes.

The horseshoe crab (*Limulus polyphemus*) is not commonly found in the backbay areas as compared to the Delaware Bay beaches during their spawning season but do occur in Barnegat Bay. Horseshoe crabs migrate from offshore waters to sandy beaches in the bays to lay their eggs near the water's edge. The eggs of the horseshoe crab provide a critical food source for migratory shorebirds during their annual spring migrations to their breeding grounds in the Arctic. Populations of horseshoe crabs have experienced recent and serious declines, which also correlate with declines in shorebird population prompting resource agencies to implement immediate conservation measures to protect this species.

Reptiles and Amphibians. The diamondback terrapin (*Malaclemys t. terrapin*) is the most commonly observed reptilian resident of Barnegat Bay. They feed actively during high tide when the marsh is flooded on a variety of fish, marine snails, invertebrates, mollusks, crabs and worms. Other species that may occur in the surrounding habitats include the bog turtle (*Clemmys muhlenbergii*), musk turtle (*Sternotherus odoratus*), snapping turtle (*Chelydra serpentine*), black rat snake (*Elaphe o. obsolete*), Eastern garter snake (*Thamnophis s. sirtalis*), and ground skink (*Scincella lateralis*).

Birds. Saltmarsh habitat and islands in Barnegat Bay provide habitat for a variety of wading birds including: cattle egret (*Bubulcus ibis*), great egret (*Casmerodius albus*), little blue heron

(*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), yellow-crowned night-heron (*Nyctanassa violacea*), and black-crowned night-heron (*Nycticorax nycticorax*). Heron rookeries and gulleries have been sighted on marsh islands. Undeveloped marshes and beaches provide nesting grounds for a wide variety of migratory shorebirds including: glossy ibis (*Plegadis falcinellus*), green-backed heron (*Butorides striatus),* little blue heron, snowy egret, great egret, black-crowned night heron, yellow-crowned night heron, great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), laughing gull (*Larus atricilla*), least tern (*Sterna antillarum*), black skimmer (*Rynchops niger*) and common tern (*Sterna hirundo*). Migratory shorebirds use coastal wetlands and adjoining areas during spring and fall migrations for foraging and staging. Common species include sanderling (*Calidris alba*), semi-palmated sandpipers (*Calidris pusilla*), ruddy turnstone *(Arenaria interpres)* and willet (*Tringa semipalmata*).

A variety of raptors use habitats along the New Jersey coastline for migrations and overwintering and may occur in the study area. The most numerous species encountered during these migrations are the sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), red-tailed hawk (*Buteo jamaicensis*), red- shouldered hawk (*Buteo lineatus*), broad-winged hawk (*Buteo platypterus*), American kestrel (*Falco sparverius*), and merlin (*Falco columbarius*). Owls, which undertake a similar migration, include the barn owl (*Tyto alba*), northern saw-whet owl (*Aegolills acadicus*), and long-eared owl (*Asio otus*).

The marshes and channels within the study area provide important resting and feeding areas for migratory waterfowl. Species known to occur include the tundra swan (*Cygnus columbianus*), mute swan (*Cygnus olor*), Canada goose, Atlantic brant, American black duck, gadwall, American wigeon (*Anas americana)*, northern pintail (*Anas acuta*), blue-winged teal (*A. discors*), green-winged teal (*A. crecca*), northern shoveler (*A. clypeata*), redhead (*A. Americans*), lesser scaup (*Aythya affinis*), common goldeneye (*Bucephala clangula*), mallard, bufflehead, greater scaup, canvasback, long-tailed duck (*Clangula hyemalis*), wood duck (*Aix sponsa*), ruddy duck (*Oxyura jamaicensis*), red- breasted merganser (*Mergus serrator*), hooded merganser (*Lophodytes cucullatus*), common merganser (*M. merganser*), and canvasback (*Aythra valisneria*).

The shorelines and island that possess woodland and scrub-shrub provide habitats for passerine songbirds that migrate south along the Atlantic coast in the spring and fall and for those that nest in the area. Species may include yellow-rumped warbler (*Dendroica coronate*), American redstart (*Setophaga ruticilla*), red-eyed vireo (*Vireo livaceus*), black and white warbler (*Mniotilta varia*), pine warbler (*Dendroica pinus*), and gray catbird (*Dumetella carolinensis*) (USFWS, 1997). Other birds that may inhabit the study area include the savannah sparrow (*Passerculus sandwichensis*), song sparrow (*Melospiza melodia*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottos*), brown thrasher (*Toxostoma rufum*), common grackle (*Quiscalus quisquala*), sharp-tailed sparrow (*Ammodramus caudacutus*), seaside sparrow (*A. maritimus*), eastern kingbird (*Tyrannus tyrannus*), tree swallow (*Tachycineta bicolor,* robin (*Turdus migratorius*) and Carolina wren (*Thryothorus ludovicianus*).

Mammals. Although the majority of the study area is aquatic, mammals known to occur within upland habitats in the study area and include raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), gray squirrel (*Sciurus carolinensis*), striped skunk (*Mephitis mephitis*), meadow vole (*Microtus pennsylvanicus*), eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), red bat (*Lasiurus borealis*), little brown bat (*Myotis lucifugus*) and white-tailed deer (*Odocoileus virginianus*).

### 5.5.5 Fisheries

Shellfish. Extensive shellfish beds, which fluctuate in quality and productivity, are found in the shallow marine waters of Barnegat Bay. Atlantic surfclams, hard clams, blue mussels (*Mytilus edulis*) and blue crabs are common commercial and recreational shellfish within the coastal waters of the study area. Additionally, the soft clam (*Mya arenaria*), bay scallop (*Aequipecten irradians concentricus*) and Eastern oyster (*Crassostrea virginica*) are also found at certain locations within the study area. The blue crab and the hard clam are two of the most important invertebrates of recreational and commercial value along the New Jersey Coast, and are common in the back bays and inlets.

Fish. The presence of extensive estuarine wetlands, tidal creeks, mudflats, and SAV beds within Barnegat Bay provides extensive habitats for fish. Many species utilize the area for foraging and nursery grounds. The great diversity of fish fauna found in the study area includes both resident and transient species. Species habitat use is best understood in terms of life history, as many fish species occupy estuarine habitats only during certain life-stages. Several fish species are continuously present in coastal habitats, while others are present only during certain periods (*e.g*. during spring many fish species use specific habitats for spawning). Thus, the distribution and abundance of important indicator fish species vary both temporally and spatially (NOAA, 1994).

High marsh and tidal mud flat areas provide important year-round habitat for many groups of fishes including killifishes (*Fundulidae*), needlefishes (*Belonidae*), and silversides (*Atherinidae*) (Talbot and Able, 1984). In addition, larval and juvenile stages of numerous fish species such as herring (*Clupidae*), white perch (*Morone americana*), striped bass (*Morone saxatilis*), menhaden (*Brevoortia tyrannus*), and winter flounder (*Pseudopleuronectes americanus*) utilize high marsh and tidal mud flat environments during spring, summer, and fall seasons. The variable microhabitats found throughout these environments provide both protection and cover as well as food sources for early life stages of fish found throughout estuarine habitats and are important to the success of year classes of many of these species as nurseries, foraging areas and cover habitat.

Estuarine-dependent species comprise the majority of the ecologically, recreationally, and commercially important fisheries. Other species include weakfish (*Cynoscion regalis*), spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), northern kingfish (*Menticirrhus saxatilis*), silver perch (*Bairdiella chrysoura*), bluefish (*Pomatomus saltatrix*), summer flounder (*Paralichthys dentatus*) and winter flounder (Beccasio *et al*., 1980).

Essential Fish Habitat. Essential Fish Habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act, (PL 94-265 as amended through October 11, 1996 and 1998) as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”. Regulations further clarify EFH by defining “waters” to include aquatic areas that are used by fish and may include aquatic areas that were historically used by fish where appropriate. A purpose of the act is to “promote the protection of essential fish habitat in the review of projects conducted under federal permits, licenses, or other authorities that affect, or have the potential to affect such habitat”. An EFH assessment of managed species is required for a federal action that could potentially adversely impact essential fish

habitat. This EFH assessment also examines the potential effects on prey species for the managed fish species potentially occurring within the area.

Federally managed fish species that may be found within the Barnegat Bay project area are listed in Table 2. Several of these species, including the highly migratory species, primarily inhabit marine offshore habitats throughout their lives and are not considered to be present in the study area but are included below due to the connection of the study area with the Atlantic Ocean via nearby Barnegat Inlet. The remaining fish species can be found within the inshore habitats of Barnegat Bay during at least part of their life cycle. Not all areas of the New Jersey Back Bays are EFH for the species in Table 2.

### Table 2: Federally-managed fish species in Barnegat Bay.

| Managed Species | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|
| **Mid-Atlantic Species** | | | | |
| Atlantic butterfish *(Peprilus tricanthus)* | X | | X | X |
| Atlantic mackerel (*Scomber scrombrus*) | X | | | |
| Atlantic surfclam *(Spisula solidissima)* | | | X | X |
| Black sea bass *(Centropristus striata)* | | | X | X |
| Bluefish *(Pomatomus saltatrix)* | | | X | X |
| Short finned squid *(Illex ilecebrosus)* | X | X | | |
| Long finned inshore squid *(Loligo pealei)* | X | | X | X |
| Scup *(Stenotomus chrysops)* | | | X | X |
| Spiny dogfish *(Squalus acanthias)* | | | X | X |
| Summer flounder *(Paralicthys dentatus)**HAPC*** | | X | X | X |
| | | | | |
| **New England Species** | | | | |
| Atlantic cod *(Gadus morhua)* | X | X | | |
| Ocean pout *(Macrozoarces americanus*) | X | | | X |
| Pollock (*Pollachius virens*) | | X | | |
| White hake (Urophycis tenuis) | X | | | |
| Windowpane flounder *(Scopthalmus aquosus)* | X | X | X | X |
| Winter flounder (*Pleuronectes americanus*)** ****EFH for winter flounder does not occur south of Lat 39°22' N.** | X | X | X | X |
| Witch flounder (*Glyptocephalus cynoglossus*) | X | | | |
| Yellowtail flounder (*Limanda ferruginea*) | X | X | X | X |
| Silver hake/whiting (*Merluccius bilinearis*) | X | X | X | X |
| Red hake *(Urophycis chuss)* | X | X | X | X |
| Monkfish *(Lophius americanus)* | X | X | | |
| Little skate (*Raja erinacea*) | | | X | X |
| Winter skate (*Raja ocellata*) | | | X | X |
| Clearnose skate (*Raja eglanteria*) | | | X | X |
| Atlantic sea herring *(*Clupea harengus*)* | | | X | X |
| **Coastal Migratory Pelagic Species** | | | | |
| King mackerel *(Scomberomorus cavalla)* | X | X | X | X |
| Spanish mackerel *(Scomberomorus maculatus)* | X | X | X | X |
| Cobia *(Rachycentron canadum)* | X | X | X | X |
| **Highly Migratory Species** | | | | |
| Bluefin Tuna (*Thunnus thynnus*) | | | X | X |
| Skipjack Tuna (*Katsuwonus pelamis)* | | | | X |
| Yellowfin Tuna (*Thunnus albacares*) | | | X | |

| Shark Species | | | | |
|---|---|---|---|---|
| **Managed Species** | **Neonates** | | **Juveniles** | **Adults** |
| Sand tiger shark *(Odontaspis taurus)* | X | | X | X |
| Atlantic angel shark *(Squatina dumerili)* | X | | X | X |
| Common thresher shark (*Alopias vulpinus)* | X | | X | X |
| Dusky shark *(Charcharinus obscurus)* | X | | | |
| Sandbar shark *(Charcharinus plumbeus)* | X | | X | X |
| Sandbar shark *(Charcharinus plumbeus)* ***HAPC*** | **X** | | **X** | **X** |
| Smoothhound shark (Mustelus mustelus) | X | | X | X |
| Tiger shark *(Galeocerdo cuvieri)* | | | X | X |
| White shark *(Carcharodon carcharias)* | X | | X | X |

Habitat Areas of Particular Concern. As a subset of EFH, Habitat Areas of Particular Concern (HAPCs) are EFH habitats that are rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic (or human impact) degradation. HAPCs represent high priority areas for conservation, management, or research, are necessary for healthy ecosystems and sustainable fisheries, and are areas with greater focus, increased scrutiny, study, and planning. The NOAA Habitat Conservation and Habitat Protection EFH Mapper tool notes that Barnegat Bay is identified as HAPC for summer flounder due to the presence of SAV beds.

### 5.5.6 Threatened and Endangered Species

The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered species and a means for conserving the ecosystems upon which those species depend. Section 7 (a)(2) of the ESA requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to ensure their activities are not likely to jeopardize the continued existence of listed species, or destroy or adversely modify their critical habitat. Under the ESA, an endangered species is in danger of extinction and a threatened species is likely to become endangered within the foreseeable future.

The New Jersey Endangered Species Act (NJESA) is designed to protect species whose survival in New Jersey is imperiled by loss of habitat, over-exploitation, pollution, or other impacts. Under the NJESA, endangered species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change of habitat, over-exploitation, predation, competition, or disease. Threatened species are those that may become endangered if conditions surrounding the species begin or continue to deteriorate.

Terrestrial Species. The seabeach amaranth (*Amaranthus pumilus*) was federally listed as threatened throughout its range in 1993 (58 FR 18035 18042). It is listed as endangered by the state of New Jersey. Historically, this species occurred on coastal barrier island beaches from Massachusetts to South Carolina. Extant populations occur on coastal beaches in Monmouth, Ocean, Atlantic, and Cape May Counties. Primary habitats include overwash flats on the accreting ends of islands, lower foredunes, and the upper strand on non-eroding beaches. No known plants occur in the project area of Barnegat Bay and are not expected to occur as the backbay shoreline does not provide suitable conditions for the species. It is an annual plant and its presence in any given year is dependent on seed production and dispersal during previous years. Seeds germinate from April through July. Flowering begins as

early as June and seed production begins in July or August. Seeds are dispersed by wind and water. Seabeach amaranth is intolerant of competition; consequently, its survival depends on the continuous creation of newly disturbed habitats. Prolific seed production and dispersal enable the colonization of new habitats as they become available. A continuous supply of newly created habitats is dependent on dynamic and naturally functioning barrier island beaches and inlets (USFWS 1996).

The piping plover (*Charadrius melodus*) is a federally- and state-listed endangered small pale shorebird on sandy beaches along the Atlantic and Gulf coasts. The species was federally listed as threatened in 1986. In New Jersey piping plover nest on coastal beaches in Monmouth, Atlantic, Cape May, and Ocean Counties generally between March 15 and August 31. They are territorial birds that build their nests above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas or in between dunes. Females lay four eggs that hatch in about 25 days and chicks fledge after about 25 to 35 days. Flightless chicks follow their parents to feeding areas, which include the intertidal zone, washover areas, mudflats, sandflats, wrack lines and along the shoreline of coastal ponds, lagoons and salt marshes. Piping plover adults and chicks feed on macroinvertebrates such as worms, fly larvae, beetles, and small crustaceans. There were 119 nesting pairs of piping plovers recorded in the state of New Jersey in 2019; 56 of these pairs were in northern Monmouth County. Piping plovers may forage in the study area. In 2019, the nearest piping plover nests were located at Island Beach State Park on the northern side of Barnegat Inlet as well as on the southern side of the inlet at Barnegat Light.

The roseate tern (*Sterna dougallii*) is a medium-sized tern and primarily tropical but breeds in scattered coastal localities in the northern Atlantic temperate zone. It is federally-listed as endangered as of 1987 in the northeast region, including New Jersey and state-listed in New Jersey initially as threatened in 1979 but reclassified as endangered in New Jersey in 1984. The roseate tern can be confused with similar-appearing common tern (*Sterna hirundo*) and Forster's tern (*Sterna forsteri*), both of which are fairly common in New Jersey. The roseate tern nests on barrier islands and saltmarshes and forages over shallow coastal waters, inlets, and offshore seas. Nesting colonies are located above the high tide line, often within heavily vegetated dunes which provide cover. The last nesting pair recorded in Barnegat Bay was in 1980. Historically, roseate terns nested at Hereford Inlet and Five Mile Beach (1930s) and at Brigantine (1940s). However, populations continued to decline since the 1950s due to coastal development and high levels of recreational activity along the barrier islands. The New Jersey Natural Heritage Program considers the roseate tern to be a non-breeding species in the state and globally "very rare and local throughout its range" (NJDRP, Department of Fish and Wildlife).

The red knot (*Calidris canutus rufa*) is listed as federally-threatened (2015) endangered and state-listed as endangered (2007). The species is a large shorebird with a short straight black bill. During the breeding season, the breast and belly are a characteristic russet color (salmon to brick red). When not breeding, the bird is gray above with dirty white below with faint dark streaking. Small numbers of red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late July through November) migration periods. The primary wintering areas for the *rufa* red knot include the southern tip of South America, northern Brazil, the Caribbean, and the southeastern and Gulf coasts of the U.S. Large flocks begin arriving at stopover areas along the Delaware Bay and New Jersey's Atlantic Ocean coast each spring. The birds feed on invertebrates, especially horseshoe crab eggs as well as clams,

mussels, snails, small crustaceans, and marine worms. Horseshoe crab eggs, unlike any other food resource, are quickly metabolized into fat that is critical for red knots to double their body weight to reach their Arctic summer breeding grounds and successfully reproduce. With a decline in horseshoe crab populations during the 90s due to harvesting produced a commensurate decline in red knot populations. Although primarily found within the Delaware Bay shoreline, and transients may be found anywhere along New Jersey's ocean coasts and backbays, large numbers of migrating birds are known to use stopover habitats in Cumberland, Cape May, and Atlantic Counties.

On January 13, 2016, the U.S. Fish and Wildlife Service listed the northern long-eared bat (*Myotis septentrionalis*) as threatened under the Endangered Species Act (ESA). The species is associated with areas where trees or suitable hibernaculum and are not expected to occur in the aquatic study area.

The bald eagle (*Haliaeetus leucocephalus*) was listed as a federally as an endangered species throughout the United States in 1978. Most bald eagle nests are located in large wooded areas associated with marshes and no nests are known to occur in the study area, however bald eagles do hunt for fish in Barnegat Bay. Based on improvements in bald eagle population figures for the contiguous United States, the USFWS removed the bald eagle from the federal endangered species list in June 2007. Although the bald eagle has been removed from the federal endangered species list, the bird is still protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. These laws prohibit killing, selling, or otherwise harming eagles, their nests, or eggs. The bald eagle is a state-listed threatened species in New Jersey.

The osprey (*Pandion haliaetus*) are fish-eating raptors found along shorelines and open marshes in coastal regions. Unlike other raptors that primarily nest in trees, forested habitat is not a limiting factor for the osprey. They have adapted to a changing landscape and now nest in any type of elevated, man-made structure near water. The osprey is protected under the Migratory Bird Treaty Act (MBTA). It is also a state listed endangered species in New Jersey. The number of nesting pairs continue to climb in New Jersey, particularly around the wetlands and waterways of Barnegat Bay and Great Egg Harbor. The recovery of both osprey and bald eagle numbers in New Jersey is largely the result of a decades-old ban on DDT, a once widely-used pesticide that caused egg failure.

Peregrine falcons (*Falco peregrinus)* were placed on the federal endangered species list in 1984, however, like the bald eagle, their numbers in the Northeast region have been steadily increasing (Steidl *et al*. 1991). The peregrine falcon was removed from the list in August 1999. As with the bald eagle, peregrine falcons are protected by the Migratory Bird Treaty Act. The peregrine falcon remains a state-listed endangered species in New Jersey.

There are currently 34 bird species state-listed as endangered or threatened species in New Jersey (www.state.nj.us/dep/fgw/tandespp.htm). In addition to those already discussed, examples of state-listed species that may occur in the Barnegat Bay vicinity include the black skimmer (*Rynchops niger*), the least tern (*Sternula antillarum*), black rail (*Laterallus jamaicensis*), and cattle egret (*Bubulcus ibis*). Several raptors occur in the area including the state-listed endangered northern harrier (*Circus cyaneus*), short eared owl (*Asio flammeus*), osprey (*Pandion haliaetus*), and barred owl (*Strix varia*).

Marine Species. There are five federally-listed threatened or endangered sea turtles that can occur along the New Jersey Atlantic Ocean coast and may enter Barneget Bay through inlets. The endangered Kemp's ridley turtle (*Lepidochelys kempii*), leatherback turtle (*Dermochelys coriacea*), and hawksbill turtle (*Eretmochelys imbricata*), and the threatened green turtle (*Chelonia mydas*) and loggerhead turtle *(Caretta caretta*). With the exception of the loggerhead these species breed further south from Florida through the Caribbean and the Gulf of Mexico. The loggerhead may have historically nested on coastal barrier beaches. No known nesting sites are within the project area. All five species of sea turtles are listed in the State of New Jersey.

The Atlantic sturgeon is a federally- and state-listed endangered anadromous fish. Adult and subadults can use the nearshore waters as a migratory corridor. Atlantic sturgeon spawn in the freshwater regions of the Delaware River. By the end of their first summer the majority of young-of-the-year Atlantic sturgeon remain in their natal river while older subadults begin to migrate to the lower Delaware Bay or nearshore Atlantic Ocean. The species is not known to occur in Barnegat Bay.

The shortnose sturgeon (*Acipenser brevirostrum*) is also a federally- and state-listed endangered anadromous fish. The shortnose sturgeon generally lives in the freshwater reaches of rivers but make short trips into saltwater. Shortnose sturgeon conduct freshwater spawning migrations and are typically found in fresh and estuarine waters. Shortnose sturgeon rarely migrate between river systems or inhabit marine waters (Brundage and Meadows, 1982) and are not expected to occur in the Barnegat Bay project area.

There are five federally-listed species of endangered whales that have been observed along the New Jersey Atlantic coast. The North Atlantic right and fin whale are found seasonally in waters off New Jersey. The sperm whale (*Physeter catodon*), Sei whale (*Balaenoptera borealis),* and blue whale *(Balaenoptera musculus*) may be present in deeper offshore waters. These are migratory marine mammals that travel north and south along the Atlantic coast. All six species of whales are listed in the State of New Jersey. Whales are not likely to venture into the shallow waters of Barnegat Bay and the project area.

The harbor porpoise (*Phocoena phocoena*) and the bottlenose dolphin (*Tursiops truncatus*) are protected under the Marine Mammal Protection Act (MMPA) and New Jersey species of special concern. While mid-Atlantic waters are the southern extreme of the harbor porpoise distribution, stranding data indicate a strong presence off the coast of New Jersey, predominately during spring. The bottlenose dolphin is common in New Jersey ocean waters during the warmer months. Porpoises and dolphins are not common in the Barnegat Bay study area.

Seals are commonly found along the New Jersey coast in November through April and are also protected under the Federal MMPA of 1972. The most abundant species is the harbor seal (*Phoca vitulina*) but gray seal (*Halichoerus grypus),* and harp seal (*Pagophilus groenlandicus)* have been observed in New Jersey. New Jersey has the largest seal haul-out locations along the US Atlantic coastline south of Long Island, NY (C. Slocum, Richard Stockton College). Seals face several human-induced threats such as starvation due to over-fishing, collisions with boats, entanglement in fishing nets, weakened immunity and disease due to pollutants or oil spills. Seals are not expected to occur in the Barnegat Bay study area.

## 5.6 Cultural Resources

In preparing this EA, USACE is consulting with the New Jersey State Historic Preservation Office (NJ SHPO), the Tribes and other interested parties to identify and evaluate historic properties in the project area in order to fulfill its cultural resources responsibilities under the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800. The Area of Potential Effects (APE) includes Oyster Creek, the diffuser Site 6, and the two nearshore areas Site 10 and Site 11 located adjacent to two open areas on either side of the town of Barnegat Beach.

Oyster Creek channel will be dredged to the authorized depth of 8 feet MLLW with one foot of overdepth, approximately 25,000 cy of material, and therefore will not be impacting any submerged historic properties.

Site 6 is located within Barnegat Bay just to the west of Site 26B in deeper water. Barnegat Bay was surveyed by FEMA contractors in 2012 and 2013 to identify potential submerged historic properties and providing a buffer of protection during subsequent sediment and debris removal efforts after Hurricane Sandy. No potentially sensitive anomalies were found within this area.

Site 10 to the northeast of Barnegat Beach is not within the archaeological sensitivity grid; however, the upland area exists an individually listed historic property known as the Falkinburg Farmstead. The listed Farmstead will not be impacted. The placement of sediments within this nearshore area would serve to encapsulate and protect any submerged archaeological sites.

Site 11 to the southwest of Barnegat Beach is located within the archaeological sensitivity grid; however, the placement of sediments within this nearshore are would serve to encapsulate and protect any submerged archaeological sites.

## 5.7 Land Use, Infrastructure, and Socioeconomics

The study area is the marine environment of Barnegat Bay west of Barnegat Inlet. To the north of the inlet is Island Beach State Park, a preserved barrier island including ten miles of sandy beach with dunes, dense maritime forests, and tidal marshes. The park is seasonally used primarily by visitors for swimming or surf fishing. The west side of Barnegat Bay is occupied by residential homes on canals interspersed with undeveloped tracts of both Federal and state-owned lands. To the south of Barnegat Inlet is the residential community of Barnegat Light and the Barnegat Lighthouse State Park on Long Beach Island. Long Beach Island is a recreation and tourism-oriented resort area.

Access to Long Beach Island is provided by an excellent network of federal, state, and local roads and highways. The municipalities adjacent to the study area are in Ocean County and include Barnegat Light Borough, Loveladies in Long Beach Township and Harvey Cedars Borough. The population estimate for Ocean County American Community Survey (ACS) (2013-1017) data is 589,699. Approximately 91.3% Caucasian; 3.0% African American; 0.1% Native American; 2.0% Asian; and 9.0% Hispanic/Latino. Table 3 provides socioeconomic characteristics of Barnegat Light Borough, Long Beach Township and Harvey Cedars Borough, residential communities near the study area (U.S. Census Bureau, 2020).

**Table 3. Socioeconomic Characteristics of Barnegat Light Borough, Long Beach Township, and Harvey Cedars Borough.**

| Municipality | Population | Median Household Income | Median Value for Owner Occupied Housing Units | Poverty Rate | Employment Rate |
|---|---|---|---|---|---|
| Barnegat Light Borough | 494 | $75,000 | $699,700* | 1.2% | 39.3%* |
| Long Beach Township | 3,040 | $82,192 | $855,100* | 10% | 34.0%* |
| Harvey Cedars Borough | 430 | $85,417 | $935,400* | 3.3% | 35.3%* |

Source: ACS 2013-2017. *Data for 2017 based on ACS 2013-2017 data (U.S. Census Bureau 2020).

Three bridges span Barnegat Bay from the mainland to the peninsula: the Mantoloking Bridge from Brick Township to Mantoloking, and the Thomas A. Mathis and J. Stanley Tunney Bridges from Toms River to Ortley Beach. The Edwin B. Forsythe National Wildlife Refuge comprises broad swaths of wetlands along the inner southern part of the bay.

Oyster Creek Channel connects Barnegat Inlet to the New Jersey Intracoastal Waterway (NJIWW). The NJIWW stretches 117.7 miles from Manasquan Inlet to the western entrance to the Cape May Canal on the Delaware Bay. The bay provides extensive areas for commercial, charter, and recreational fishing vessels that contribute to the total economic impact of New Jersey's marine fisheries. Saltwater recreational fishing in New Jersey has generated approximately $1.8 billion in sales, $746 Million in income, and $1.2 billion in value added in 2016 (NMFS 2018) to the gross domestic product in a region. Fourteen recreational species of interest were identified by the New Jersey Department of Environmental Protection (NJDEP) including: scup, black sea bass, summer flounder, weakfish, bluefish, striped bass, red hake, silver hake, Atlantic mackerel, Atlantic croaker, winter flounder, cunner, Atlantic cod, and tautog. Commercial fishing in New Jersey generated 37,100 jobs, $1.4 billion in income, $6.2 billion in sales, $2.3 billion in value added, and $193 million in landings revenue in 2016 (NMFS 2018). Fifteen commercial species of fish generated over $1 million of revenue each in 2014 (NOAA 2015). In total, commercial landings in New Jersey were valued at $151,930,102 in 2014. Some of the highest grossing species include sea scallop, Atlantic surf clam, blue crab, longfin squid, skates, menhaden, summer flounder, scup, and black sea bass. "Barnegat-Long Beach" was recognized as a major U.S. port with commercial with landings valued at $25 million and $24 million in 2017 and 2018, respectively (NMFS 2020).

## 5.8 Recreational Resources

Recreation and ecotourism services provided by Barnegat Bay, adjacent resort communities of Long Beach Island and recreational services provided by Island Beach State Park are a significant economic driver for tourism for the State of New Jersey. Recreational and commercial fishing boats utilize Barnegat Inlet for access to and from marinas, the back bays and the ocean. Surf fishing is popular from the jetty rocks at the inlet and at IBSP. Anglers in Barnegat Bay's waters and tidal creeks typically target summer flounder (fluke), winter flounder, weakfish, bluefish, striped bass, kingfish, white perch, and tautog. Other popular

recreational activities include beach combing, swimming, sunbathing, boating, water skiing, jet skiing, paddling (canoes, kayaks, stand-up paddle boards), windsurfing, and bird watching.

### 5.9 Visual Resources and Aesthetics

Aesthetics refer to the sensory quality of the resources (sight, sound, smell, taste, and touch) and especially with respect to judgment about their pleasurable qualities (Canter 1993; Smardon *et al*. 1986). The aesthetic quality of the study area is influenced by the natural and developed environment. Visual resources include the natural and man-made features that comprise the visual qualities of a given area, or "viewshed." These features form the overall impression that an observer receives of an area or its landscape character. Topography, water, vegetation, man-made features, and the degree of panoramic views available are examples of visual characteristics of an area. The study area is aesthetically appealing due to its predominant coastal water environment surrounded by natural undeveloped green marshes and maritime forests and also developed resort residential areas consisting of homes, condominiums, and businesses.

## 6.0 Environmental Impacts

This section evaluates the No Action Alternative, the Current Operations and Maintenance Practice Alternative, and the proposed Beneficial Use of Dredge Material Alternatives in terms of their potential impacts to natural and socioeconomic resources in the study area. As presented in Section 4, the No Action Alternative would entail no longer maintaining the Oyster Creek channel for navigation through maintenance dredging. Under the Current Practice Alternative, the channel would continue to be periodically dredged, as needed, and the material either pumped to the previously used Site 26B or to an upland confined disposal facility (CDF) five miles away on the mainland. These options are not preferred due to concerns for existing SAV beds fringing Site 26B and the excessive cost to pump the material into the mainland CDF. The selected Beneficial Use Placement Alternative for the Section 1122 pilot program is the preferred plan (Site 6), strategically selected in order to avoid SAV beds to the east (Figure 4) and to keep valuable sediment in the natural system versus disposal in an upland site. The federal channel (Oyster Creek) would be dredged to the authorized depth (8 feet MLLW) with one foot of overdepth (approximately 25,000 cy) using a cutterhead dredge (see Figure 2:) in November/December 2020. The selected plan will pump the material using the Fullerton, owned and operated by the Barnegat Bay Dredging Co., Inc. and under contract to USACE. The material placement at the aquatic Site 6 will provide the first lift in the eventual development of an emergent island. This methodology at aquatic Sites 26A and 26B resulted in the eventual development of islands over many years. The beneficial use target objectives are to reduce water depths to create potential suitable SAV establishment as well as avian habitat and foraging areas. The plan includes monitoring to document pre- and post-placement project development and lessons learned for adaptive management as well as future EWN applications in coastal areas.

Future maintenance material placement sites are also proposed at Sites 10 and 11, utilizing the government-owned small split-hull hopper dredge Currituck. Annually, approximately 3,000 cubic yards (cy) of dredged sand would be placed (in 250-300 cy quantities/hopper) in shallow water as close to the shoreline as the Currituck's draft will allow (*i.e*. approximately 7-8 feet deep MLLW) such that the material will remain in and benefit the natural sediment system adjacent to the undeveloped shoreline.

## 6.1 Geology and Physiography

No Action. Under the No Action Alternative, no dredging would occur in Oyster Creek channel and no placement of dredged sand in Barnegat Bay. No impacts to geology and physiology of the study area would occur.

Current Practice. Oyster Creek channel maintenance dredging would continue to occur with either placement at either Site 26B or upland CDF disposal. No impacts to geology and physiology would result from this practice.

Beneficial Use Placement (Proposed Action). No impacts to geology or physiology are expected to result from dredging Oyster Creek channel and placing the dredged material in Barnegat Bay. Future placements that may occur at the nearshore Sites 10 or 11 are not expected to result in any impacts to geology but aims to provide a positive impact to physiography by providing a supplemental sand source in the nearshore zone for shoreline protection.

## 6.2 Air Quality

No Action. With no dredging and placement operations, there would be no impacts to air quality.

Current Practice. Currently, the Oyster Creek channel is dredged periodically to maintain safe navigational depths. This results in short-term negligible effects on air quality; however, maintenance dredging is excluded from General Conformity requirements under 40 CFR Section 153(c)(ix).

Beneficial Use Placement (Proposed Action)

Impacts on air quality under this alternative would be similar to those under the current practice. While impacts on air quality would be temporary and negligible, maintenance dredging operations are excluded from General Conformity requirements under 40 CFR Section 153(c)(ix). A beneficial use alternative would reduce the amount of emissions resulting from the Current Practice because the distance traveled by the dredge from the channel to the placement sites is slightly reduced. The quantities proposed for placement operations are small and the activity short-term and would result in negligible impacts on air quality. Emissions resulting from the placement of dredged material used to benefit the environment nullifies the anticipated *de minimus* levels of emissions of the placement action.

General Conformity Rule. The Clean Air Act, and its subsequent amendments, established the National Ambient Air Quality Standards (NAAQS) for seven common pollutants: particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. These air pollutants are referred to as “criteria pollutants” by the EPA because they are regulated for permissible levels based on human health and environmentally based guidelines. The General Conformity Rule, under the Clean Air Act, applies to all federal actions that are taken in designated nonattainment areas, with three exceptions: 1) actions covered by the transportation conformity rule; 2) actions associated with emissions below specified *de minimis* levels, and 3) other actions which are either exempt or presumed to conform. Maintenance dredging is excluded from General Conformity requirements under 40 Code of

Federal Regulation (CFR) Section 153(c)(ix). The additional air emissions estimated to result from the dredge traveling to the proposed beneficial use placement site is below *de minimis* levels for each annual dredging event.

## 6.3 Water Quality

No Action. Under the No Action Alternative, Oyster Creek channel maintenance dredging would no longer occur. The authorized channel would continue to shoal until depths rendered the channel unnavigable. Under this alternative, there would be no temporary negligible increase in turbidity associated with dredging and dredged material placement. No direct impacts on water quality would occur under this alternative.

Current Practice. Currently, Oyster Creek channel is dredged with placement most recently (2017) occurring at Site 26B. This results in short-term negligible direct effects on water quality associated with a temporary and localized increase in turbidity at the dredging and placement areas. Barnegat Bay is subject to tidal and wind-generated waves that nearly negate any impacts from turbidity generated by dredging and placement operations. Material dredged from the channel is clean sand, therefore, no direct, indirect or cumulative adverse effects on water quality would occur due to release of contaminants.

Beneficial Use of Dredged Material (Proposed Action). The temporary increase in turbidity associated with this alternative at the channel dredging location and the placement location in Barnegat Bay would be similar to the current practice of channel dredging and ocean disposal. The increased turbidity would be short-term, temporary, and localized as large grained sand particles settle quickly. Barnegat Bay is subject to tidal currents and wind-generated waves, particularly during storm conditions, due to the predominantly shallow nature of the bay. Best Management Practices would be used to further minimize water quality impacts during project implementation. Material dredged from the channel has been analyzed (2020) is and is clean with no chemical contamination. The benefit of placing dredged channel sand in Barnegat Bay is to keep the material in the natural sediment system. The operation is not expected to adversely affect water quality.

## 6.4 Sediment Quality and Hazardous, Toxic, and Radioactive Waste

No Action. Under the No Action Alternative, Oyster Creek channel maintenance dredging would no longer occur. While the authorized channel would continue to shoal, there would be no change in sediment quality and no impact from Hazardous, Toxic, or Radioactive Waste (HTRW).

Current Practice. Currently, Oyster Creek channel is dredged periodically to maintain navigable depths. The material was tested in 2020 and is clean sand, free of contamination, and , similar to the natural system where placement will occur. There would be no change in sediment quality and no impact from HTRW.

Beneficial Use of Dredged Material (Proposed Action). Sediment quality is not expected to change. Placement of the dredged material nearby at Site 6 or in future years, potentially placed at the nearshore Sites 10 or 11 would serve to maintain the clean, high quality material

within the natural sediment system of Barnegat Bay. There would be no impact to sediment quality due to dredging and beneficial use placement operations and no impact from HTRW.

## 6.5 Biological Resources

### 6.5.1 Terrestrial Habitats

No Action. The terrestrial habitat in and surrounding Barnegat Bay provide important resting, feeding, and nesting habitat for many migratory and resident species of birds. Under the No Action Alternative, no impact would occur to nearby terrestrial habitats in the absence of dredging and placement activities. Also, no beneficial placement of dredge material would occur to create new terrestrial habitat nor provide a sand source for natural processes to potentially increase shoreline resilience of existing habitat.

Current Practice. Under the Current Practice Alternative, no terrestrial direct, indirect, or cumulative impacts occur. Material last dredged from the Oyster Creek channel was placed at Site 26B in 2017. The placement of an additional relatively small quantity of similar sand on the island is managed effectively and is not considered an adverse impact on existing habitat.

Beneficial Use of Dredged Material (Proposed Action). There would be no adverse impacts to existing terrestrial habitats from dredging the channel, placement at Site 6 (aquatic) or nearshore placement of the dredged material at Sites 10 or 11 (aquatic). Overall the project would result in beneficial effects associated with the creation of shallow water habitat by decreasing water depths and eventually establishing an island. A heron rookery has established on the nearby island Site 26A, created previously in a similar manner by pumping sand dredged from the channel into an aquatic site. Potential future placements at either Sites 10 or 11 would provide a supplemental sand source to be naturally distributed within the nearshore by waves and currents. Barrier island habitats will continue to provide important resting, feeding, and nesting habitat for many migratory and resident species of birds. The proposed action is designed to allow some operational flexibility to determine where nearshore placement is most needed to protect these habitats.

### 6.5.2 Aquatic Habitats

No Action. Barnegat Bay provides valuable habitat to marine organisms including shellfish, SAV, macroinvertebrates and fish. It also provides important feeding habitat for migratory shorebirds, waterfowl and waterbirds. Under the No Action Alternative, no impact would occur to aquatic habitats as no dredging or placement activities would be conducted. Also, no beneficial placement of dredge material would occur to establish shallow depths conducive to SAV growth in association with island creation. Lastly, no supplemental sand source would be provided during future maintenance dredging operations adjacent to the undeveloped western shoreline to potentially increase shoreline resilience of existing habitat.

Current Practice. Oyster Creek channel is periodically dredged to maintain navigable depths with placements at either Site 26B or an upland CDF on the mainland at considerable expense due to the distance as demonstrated by a recent NJDOT project for Double Creek and High Bar Harbor channel dredging. Disturbance to the channel bottom would continue to occur periodically and impacts to aquatic habitat at Site 26B are minimal as the material is placed on the upland portion of the island which minimizes water turbidity as the large grain material settles quickly and fines beneficially contribute to the surrounding fringe areas. No

impacts to aquatic habitat result when material placement is in a CDF due to the required settlement process of total suspended solids in effluent water prior to release from the CDF.

Beneficial Use of Dredged Material (Proposed Action). As noted in Section 6.3, there would be a temporary elevation of water turbidity due to dredging the channel and placement at Site 6 or nearshore placement of the dredged material at Sites 10 or 11. The elevation of turbidity in the water column is expected to be short-lived as the material is clean fine sand that settles rapidly. Benthic organisms in the placement area are subject to burial. Benthic species typically recolonize dredged and deposition areas by recruitment from nearby undisturbed areas. The quantity of the proposed material is small and not expected to result in significant mortality of benthic organisms. Some species are capable of migrating through the newly placed sand. Overall the project would result in beneficial effects associated with the creation of new habitat by decreasing water depths suitable for the establishment of SAV. Islands provide refuge areas for fish and benthic invertebrates on the down-current side. Shallow sandy shoals formed in association with sand placement provide more foraging habitat for birds. The proposed action is designed to allow some operational flexibility to determine where nearshore placement is most needed and protect existing valuable aquatic habitat. Disturbance to the bay bottom would occur at both the channel and the placement area, however, the quantities proposed for dredging and placement are small and adverse impacts to benthic habitat are minimized through placement of material similar in grain size to existing substrate.

### 6.5.3 Plankton, Macroalgae, and Submerged Aquatic Vegetation

No Action. The No Action alternative would involve no effect on plankton, macroalgae, or SAV. Barnegat Bay conditions are subject to varying wind, waves, tidal currents dependent on weather conditions. With no action, no significant direct, indirect, and cumulative changes in the planktonic, algal or SAV communities would result. Barnegat Bay is subject to increased phytoplankton blooms (including Harmful Algal Blooms) associated with increases in nutrient loadings and estuarine eutrophication. BBP (2016) report that algal blooms, which include macroalgae and phytoplankton, are considered to be in a “degraded” state within northern Barnegat Bay.

Current Practice. Dredging of Oyster Creek channel and placement on the upland portion of Site 26B or the open ocean outside of Barnegat Inlet would result in a temporary elevation of turbidity that can affect plankton. Increased turbidity can temporarily inhibit photosynthesis and primary production provided by phytoplankton. However due to the dynamic environment in Barnegat Bay and large grain size of the dredged material, elevated turbidity is expected to dissipate quickly once the dredging and placement operations cease. Surveys will be completed at the proposed placement area prior to operations to develop a strategic placement plan to avoid impacting algal or SAV beds in the vicinity. No significant direct, indirect or cumulative impacts are expected to occur on SAV or macroalgae coverages. BBP (2016) reports that the current condition of seagrasses in Barnegat Bay are “degraded” with no discernable trends. Any significant interventions, such as changes in land use or improvements to water quality due to improvement programs may have a positive impact in reducing nutrient loads in the bay.

Beneficial Use of Dredged Material (Proposed Action). As noted previously, there would be a temporary elevation of water turbidity due to dredging the channel and placement at Site 6 or nearshore placement of the dredged material at Sites 10 or 11. The elevation of turbidity in the

water column is expected to be short-lived as the material is clean sand that settles rapidly. An increase in turbidity can temporarily inhibit photosynthesis and primary production provided by phytoplankton. The quantity proposed for dredging (25,000 cy) and the placement area are small (approximately 11 acres) and unlikely to pose a significant impact to benthic species populations. Surveys will be conducted prior to operations to develop a strategic placement plan to avoid valuable habitats such as nearby shellfish, algal or SAV beds. Overall, the project would result in beneficial effects in association with the creation of habitat for macroalgae and SAV by decreasing water depths suitable for their establishment. These sites were selected due to their water depths where macroalgal beds and SAV do not currently exist or are sparse. Environmental parameters, such as depth and water temperature dictate where SAV can establish. Aoki *et al*. (2020) found that water depth is a critical determinant of seagrass restoration success and found of seeds that germinated below 4.92 feet (MLW) their shoots did not persist. Koch (2001) noted the effect of physical parameters such as waves, currents, tides, and turbulence, and geological parameters (*e.g.* grain size and organic content) on SAV habitat suitability. The proposed action at Sites 10 and 11 is designed to allow some operational flexibility to determine where nearshore placement is most needed and to protect any neighboring existing valuable seagrasses and macroalgae beds. The additional benefit of the Section 1122 pilot program is to monitor the site in order to adaptively manage future placement operations.

### 6.5.4 Wildlife

No Action. With the No Action Alternative, no significant direct, indirect, and cumulative impacts are expected to affect wildlife in the area. The dredging and placement locations are all aquatic areas.

Current Practice. As with the No Action Alternative, the current practice of dredging Oyster Creek channel take place in the aquatic environment. Placement operations on Site 26B or at an upland CDF poses temporary impacts to wildlife terrestrial habitats.

Beneficial Use of Dredged Material (Proposed Action). Although dredging is not anticipated to result in any direct, indirect, or cumulative impact to wildlife, the placement of dredged material within the Barnegat Bay system may have the potential to provide some positive benefits to wildlife through the establishment of new island habitat at Site 6 or the addition of shoreline resiliency through the introduction of dredged sand in the nearshore zones of Sites 10 and 11. In these locations where marshes and transitional areas have room to migrate, providing a supplemental sand source contributes to the natural movement within transition zones of intertidal sand flats, flooded marshes and upland scrub shrub habitats.

### 6.5.5 Shellfish and Fish

No Action. Under the No Action alternative, no dredging or placement operations would take place and no physical direct impacts or water quality impacts to shellfish or fish species would result.

Current Practice. Impacts to shellfish and finfish species under current maintenance dredging practices are not considered significant. Shellfish are not likely to occur in the maintained channel and adult species of fish are capable of swimming out of the action area to avoid the dredge and temporarily elevated turbidity. Egg and larval fish stages are less mobile. There is significant acreage of fish habitat in Barnegat Bay surrounding the proposed dredging and

placement areas. The dredging and placement operations are typically not scheduled to occur during the time of year when egg and larval stages would occur in the area. Negligible impacts on fish habitat would occur due to the small quantities proposed to be dredged and placed on the bay bottom. The current practice results in short-term negligible effects with a temporary and localized increase in turbidity and disturbance of benthic habitat in the inlet and placement area. Natural coastal processes such as tidal currents and waves nearly negate any impacts from turbidity and burial, which would last on the order of minutes. Because this is an ongoing activity, these areas are previously disturbed.

No impacts to these species occur as a result of placement operations at either Site 26B or the upland CDF by reducing total suspended solid levels in the effluent water. Impacts to larval fish may result from elevated turbidity, however the operation is proposed to occur in November/December 2020, outside of the seasonal restriction period recommended by NMFS.

Beneficial Use of Dredged Material (Proposed Action). As noted, there would be a temporary elevation of water turbidity in the action area due to dredging the channel and placement at Site 6 or future nearshore placements of dredged material at Sites 10 or 11. The elevation of turbidity in the water column is expected to be short-lived as the material is clean sand that settles rapidly and not expected to adversely affect shellfish or fish. These species are adapted to the dynamic nature of marine environments. Shellfish are filter-feeders and trap particular matter and dissolved substances suspended in the water as a source of food. The material is large-grained and free of contamination. Bivalves are also adapted to shut down filter-feeding when water conditions become too turbid. In Barnegat Bay's shallow water depths, elevated turbidity is not expected to significantly reduce light penetration. Phytoplankton production for planktivorous mollusks depend on daylight for photosynthesis. DO levels can be reduced by elevated water turbidity but the effect is temporary and higher DO levels will return upon cessation of the operation. Finfish species can either be attracted to elevated turbidity levels or avoid turbidity by swimming out of the area. Dredging can result in the suspension of some benthic organisms in the water column, resulting in opportunistic feeding by some finfish. The dredging site is previously disturbed. At the placement site, impacts would be negligible relative to the available habitat in the adjacent areas. As with current practices, high turbidity can adversely affect larval fish, but the impact is avoided by conducting the operation outside of the NMFS recommended time periods. The proposed placement areas carried forward were selected specifically to avoid known shellfish areas. On the 2012 shellfisheries map, Site 6 is in a low to moderate area for hard clam (https://www.nj.gov/dep/landuse/download/map_058.jpg). The proposed action is designed to allow some operational flexibility to determine where best to place to avoid or minimize impacts to shellfish.

Essential Fish Habitat

No Action. Impacts on EFH (*i.e.* Barnegat Bay waters and subtidal benthic substrate) under the No Action alternative would be identical to those described for aquatic habitat in Section 6.5.2. There would be no negligible impacts to water quality or sand placement on the bay bottom substrate. There would be no impacts to any fish life stages. Discontinuing dredging would result in excessive shoaling in Oyster Creek channel, thereby reducing water depths and creating navigational hazards.

Current Practice. Short-term negligible effects would occur, associated with a temporary and localized increase in turbidity and disturbance of benthic habitat in the channel and placement area. Maintenance dredging results in short-term negligible effects from a temporary and localized increase in turbidity in the water column and disturbance of benthic habitat in the channelt and placement area. These are high energy areas and tidal currents and waves nearly negate any impacts from turbidity. Because this is an ongoing activity, these areas are disturbed periodically. Dredging typically does not take place during the period of the year when fish larvae and eggs are present, however, Barnegat Bay offers expansive aquatic habitat outside of the authorized channel and placement areas.

Beneficial Use of Sediments (Proposed Action). Impacts on EFH is essentially identical to those described for aquatic habitats (Section 6.5.2). Benthic habitat in channel and placement area is predominantly sand, with the channel bottom disturbed periodically when maintenance dredging is needed. Impacts to benthos due to burial of the benthic community during placement activities would be localized and minimized by implementing a strategic placement plan to avoid areas identified as having greater benthic assemblages. Some benthic infaunal species may be buried but the amount of dredged material to be placed is small and most benthic species are capable of migrating through placed sediments. The community would also expect to recover quickly due to recruitment from nearby undisturbed areas. While the benthic community serves as EFH in the form of habitat and prey, impacts are expected to be negligible, as the area impacted is only a fraction of the available EFH in the area.

The creation of a sand feature through placement activities could provide beneficial effects on EFH in the form of topographical relief for some species (Yozzo *et al*. 2014, Clarke and Kasul, 1994 as cited in Reine *et al*. 2012). Cumulative effects associated with the project on EFH are not anticipated. The project would have temporary through the creation of a sand feature but would not significantly alter the habitat type. It is concluded that the project would have a minimal direct effect on EFH and not result in cumulative impacts to EFH. The NOAA Fisheries Greater Atlantic Regional Fisheries Office Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Worksheet is provided in Appendix A.

### 6.5.6 Threatened and Endangered Species

Due to the marine nature and nearshore project location, the following federally-listed species were considered

- Atlantic sturgeon,
- piping plover
- red knot
- roseate tern
- seabeach amaranth
- Kemp’s ridley turtle
- leatherback turtle
- hawksbill turtle
- green turtle
- loggerhead turtle
- North Atlantic right

- fin whale

Because both dredging and placement locations have water depths unsuitable for impacts to piping plover, red knot, and roseate tern. The dredging and placement locations have water depths unsuitable for foraging. The eastern black rail, proposed for listing, occurs primarily in shallower areas within the surrounding saltmarshes and is not likely to occur in the more open water areas of the dredging and placement areas. Hopper dredges working in the backbay and inlet do not appear to disturb birds on the adjacent saltmarshes and shorelines. The vessels are a significant distance away, slow-moving with low engine vibration that is difficult to detect with the surrounding ambient sounds of wind and waves. Birds prominent in the area seek out prey species in shallower waters. Likewise, dredging and placement activities are not expected to pose an adverse impact on State-listed species of birds that occur in the vicinity. The pilot project proposes to beneficially use high quality clean sand dredged from Oyster Creek channel to place high quality sand material in water to create improved foraging habitat for birds by decreasing water depths and eventually creating an emergent island for resting and possibly nesting.

Seabeach amaranth was federally-listed as a threatened plant throughout its range in 1993 and listed as endangered by the state of New Jersey. The plant is not expected to occur in the backbay region of the proposed project area. The plants establish primarily on accreting areas (non-eroding beaches) and lower foredunes. They are found between 15 March and 30 September. The project is not scheduled to take place until November/December 2020. The NJDEP Endangered Nongame Species Program surveys the New Jersey coastline annually for beach nesting birds as well as seabeach amaranth and directly coordinates their findings with USACE.

No Action. Under the No Action alternative, Oyster Creek channel would not be dredged and no sand placement would occur in Barnegat Bay. There would be no direct or indirect impacts on threatened and endangered terrestrial or marine species.

Current Practice. Current dredging practices do not pose adverse effects on threatened and endangered species. Dredged sand has not been placed on Site 26A since prior to 2008 after establishment of a heron rookery on the created island. As noted previously, dredges working in Barnegat Bay and Inlet with nearshore aquatic placements do not appear to disturb beach nesting or foraging bird species, emit minimal noise, and are slow-moving. Dredges are equipped with turtle exclusion devices to prevent impingement of sea turtles or sturgeon. The Currituck and Murden, which operate at low suction, have grid screens with small openings and have demonstrated a very low likelihood of entraining or impinging sea turtles (NMFS 2014). The draghead is not activated until it is resting directly on the bottom to avoid impingement of marine species.

Sea turtles are less likely to occur in the study area during fall and winter months. Additionally, sea turtle mobility would help them avoid the dredge as it motors slowly from dredging to placement site. Current maintenance dredging practices may affect but are not likely to adversely affect threatened and endangered sea turtles in the study area. The operation is of a short duration for a small quantity of material to be dredged.

Atlantic sturgeon occur in the marine environment but are not likely to occur in the study area. They are highly mobile and entrainment of sturgeon during hopper dredging operations

appears to be relatively rare. NMFS (2014) calculated an interaction rate of 1 Atlantic sturgeon is likely to be injured or killed for approximately every 8.6 mcy of material removed during hopper dredging operations. Additionally, Atlantic sturgeon are demersal species and would likely leave the area of temporary elevated turbidity associated with current dredging and placement. Their mobility would help them avoid the areas of increased turbidity. Current maintenance dredging practices may affect but are not likely to adversely affect threatened and endangered Atlantic sturgeon.

North Atlantic right whales and fin whales are highly mobile and able to avoid the slow-moving dredge and are unlikely to occur in Barnegat Bay. Additionally, the dredge crew continually keep watch for protected marine species and employ all required NMFS vessel avoidance measures to avoid interactions with protected marine species. Current maintenance dredging practices may affect but are not likely to adversely affect endangered whales.

Beneficial Use of Sediments (Proposed Action). The impacts of dredging and proposed placement operations would be similar to that described previously for impacts to aquatic habitats (Section 6.5.2). Anticipated impacts to prey species for beach nesting and foraging shorebirds due to a nearshore placement are minimal as the dredging and placement areas in-water and sand is distributed naturally by currrents. . Listed marine species are unlikely to occur in the project vicinity with the exception of sea turtles. The species are highly mobile and able to avoid the action area. Operations are of a short duration and the dredge crew would continually keep watch for protected marine species and employ all required NMFS vessel avoidance measures to avoid interactions with protected marine species. Dredging Oyster Creek channel and beneficial use placement operations are not anticipated to result in significant direct, indirect, or cumulative adverse impacts to federally- or state-listed threatened or endangered species.

## 6.6 Cultural Resources

As a Federal agency, USACE has certain responsibilities for the identification, protection and preservation of cultural resources that may be located within the Area of Potential Effect (APE) associated with the project. Present statutes and regulations governing the identification, protection and preservation of these resources include, but are not limited to, the National Environmental Policy Act of 1969 (NEPA) and the National Historic Preservation Act (NHPA). A historic property is defined in the NHPA as any prehistoric or historic district, site, building, structure or object included in or eligible for inclusion on the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource.

No Action. The No Action alternative would not impact historic properties eligible for or listed on the National Register of Historic Places (NRHP).

Current Practice. Current maintenance dredging of Oyster Creek channel occurs periodically every few years to maintain depths sufficient for navigation. Placement of dredged material either on the upland portion of Site 26B or in an upland CDF does not impact historic properties eligible for or listed on the NRHP.

Beneficial Use of Sediments (Proposed Action). Since Oyster Creek Navigation Channel will only be dredged to its authorized depth, and placement of dredged material may occur the two nearshore locations of Site 10 and 11 and the mid-bay Site 6, the USACE has determined that the proposed action will have *No Effect* on historic properties eligible for or listed on the National Register of Historic Places pursuant to 36CFR800.4(d)(1). A determination letter of *No Effect* was sent to the New Jersey State Historic Preservation Office and to the Tribes including: the Delaware Nation of Oklahoma, the Delaware Tribe, the Eastern Shawnee Tribe of Oklahoma, the Oneida Indian Nation, the Stockbridge-Munsee Mohican Tribe, the St. Regis Mohawk Tribe, and the Seneca Nation of Indians.

## 6.7 Land Use, Infrastructure, and Socioeconomics

No Action. Under the No Action alternative, the Oyster Creek navigation channel would continue to shoal. This would result in an indirect negative effect on socioeconomic resources such as tourism, and commercial and recreational fisheries. These are not only economically important to the local region, but to the economy of the State of New Jersey. Oyster Creek channel connects the Barnegat Inlet navigation channel with the NJIWW.

Current Practice. Current maintenance dredging practices would not adversely affect socioeconomic resources, land use, infrastructure, or utilities. Dredging Oyster Creek channel is necessary to provide a safe, reliable navigation channel to connect Barnegat Inlet to the NJIWW. The NJIWW extends from Manasquan Inlet to the Delaware Bay, passing through a series of bays, lagoons, and thoroughfares along the New Jersey coast to Cape May Harbor. It provides a safe, reliable and operations navigation channel for the East Coast's largest and 5$^{th}$ most valuable commercial fishing fleet in the U.S. The Barnegat Inlet Federal Navigation channel complex is critical to a large fishing fleet consisting of full-time commercial, charter, and recreational vessels. The US Coast Guard requires a safe channel to fulfill their Homeland Security mission and critical life safety, search and rescue operations.

Beneficial Use of Sediments (Proposed Action). This alternative provides the same infrastructure and socioeconomic benefits as current practice but would provide an additional land use benefit by utilizing the dredged sand beneficially by keeping the material in the backbay system and potentially providing improved shallow water habitat and future island habitat. It is important to both the region and state to maintain the safety of the channel and connecting Barnegat Inlet to the NJIWW for vessel access for tourism (recreational boating and fishing) and commercial fisheries. Growth in employment, business, and industrial activity in the study area is expected to follow economic trends in national economies. The region's economic anchors of the fishing and tourist industries are expected to continue to remain important to the local and regional economy.

## 6.8 Recreational Resources

No Action. Under the No Action Alternative, the Oyster Creek navigation channel would continue to shoal, which would result in a negative effect on navigation, recreational boating, and safety. This alternative would eliminate the safe connection of the NJIWW to Barnegat

Inlet and the Atlantic Ocean. The No Action Alternative would not meet the objective of the project to beneficially use maintenance dredge material for habitat creation.

Current Practice. Under the current maintenance dredging practices, Oyster Creek channel would continue to be dredged as needed to maintain safe depths for recreational boaters, however the dredged sand would either be placed on Site 26B or pumped into an upland CDF five miles away. The current practice would not meet the objective of the project to beneficially use maintenance dredged material for development of a new habitat or would be costly to pump to a CDF, thereby reducing the likelihood of maintenance dredging cycles due to cost.

Beneficial Use of Sediments (Proposed Action). Both dredging and aquatic placement would result in indirect beneficial effects on recreational resources and natural habitat in Barnegat Bay. Dredging is necessary for maintaining the safety of the navigation channel which would benefit recreational and commercial boating. The creation of shallow habitat and eventual island creation at the placement sites is beneficial to the natural environment that draws vacationers each year for boating, fishing, and bird watching. The proposed action is designed to allow some operational flexibility to determine where best to placement the material to minimize impacts to valuable habitat. Adverse effects on recreational resources are expected to be negligible while positive effects are likely to occur through development of new shallow water and future island habitats.

## 6.9 Visual and Aesthetics

Visual resources can be subjective by nature, and therefore the level of a proposed project's visual impacts can be challenging to quantify. Generally, projects that create a high level of contrast to the existing visual character of a project setting are more likely to generate adverse visual impacts due to visual incompatibility. Thus, it is important to assess project effects relative to the existing conditions of the area. On this basis, a project components effect on the visual environment are quantified and evaluated for impact assessment purposes based on factors affecting setting compatibility such as changes in visual vividness, intactness, and unity from the existing conditions.

No Action. Under the No Action alternative, there would be no effects on visual and aesthetics of the project area.

Current Practice. Dredging Oyster Creek channel and aquatic placement within Barnegat Bay do not impact the visual aesthetics of the backbay area. Some may consider observing the dredge under operation as an adverse effect on visual aesthetics while others my appreciate observing the working dredge.

Beneficial Use of Sediments (Proposed Action). The propose dredging and aquatic beneficial use placement does not require any onshore construction activities or construction equipment. The dredge may be observable by nearby vessels but the majority of boats utilizing Barnegat Bay will not be present in November. As with the current practice, no adverse visual or aesthetic impacts would be expected. The proposed action is designed to allow some operational flexibility to determine the strategic placement location to reduce impacts to valuable habitat such as SAV beds.

## 6.10 Unavoidable Adverse Environmental Impacts

No Action. Under the No Action alternative, the unavoidable impact would be continued shoaling of Oyster Creek channel until it was no longer navigable, leading to economic impacts resulting from a decrease in commercial and recreational boat usage.

Current Practice. Under the current practice, there would be no operational flexibility to place dredged material within the bay where it would best serve to enhance or create additional valued habitat in Barnegat Bay. An unavoidable adverse impact would be temporary and insignificant impacts to water quality with short-term elevation of water turbidity and a direct but temporary impact on resident benthic organisms in the action area. Continued use of an upland CDF for placement of the dredged material adversely impacts the area by removing the high quality sand material from the bay system. Maintenance dredging results of Oyster Creek channel results in temporary impacts to air quality and emissions are considered *de minimus* based on New Jersey air quality standards.

Beneficial Use of Sediments (Proposed Action). The unavoidable adverse impact of the proposed beneficial placement of dredged sand is the same as what results from the current practice: a temporary elevation of water turbidity; a potential for the reduction of benthic organisms in the channel due to dredging and in the placement area due to the potential for burial; and *de minimus* impacts on air quality. Benthic communities are known to recover in time, such that displacement of benthic invertebrates is temporary. A strategic placement methodology would avoid impacting areas where existing SAV beds occur. Use of the dredged sand beneficially will result in long-term beneficial effects on aquatic natural resources, recreational resources, and visual resources.

## 6.11 Short-term Uses of the Environment and Long-term Productivity

No Action. No short-term uses of the environment or long-term productivity would result.

Current Practice. Barnegat Inlet requires maintenance dredging to ensure navigational safety for recreational and commercial vessels that travel between the inlet and the NJIWW. The current practice of pumping the channel material to an upland CDF removes a valuable resource from the bay system. Alternatively, placing the material at Site 26B keeps the material in Barnegat Bay and augments the size of the island to add to its long-term productivity.

Beneficial Use of Sediments (Proposed Action). The proposed action will ensure that a valuable resource of high quality channel sand will remain in the Barnegat Bay system. Placements at Site 6 will potentially increase habitat suitable for SAV growth and future placements at either Site 10 or Site 11 will provide a supplemental sand source adjacent to important undeveloped but eroding shoreline. These future placements may afford additional shoreline protection to the EBFNWR or to the Lighthouse Center for Natural Resource Education. The monitoring program will provide valuable information for potential future beneficial use, RSM and EWN based applications in the project area but also in other parts of coastal NJ. Monitoring will assess the pre- and post-application sedimentation patterns and the results of the monitoring studies will contribute to the understanding of RSM for this region. Adverse impacts to the placement area are short-term and minimal as currents will distribute the material naturally and benthic fauna will re-establish.

## 6.12 Irreversible and Irretrievable Commitments of Resources

No Action. No commitment of resources.

Current Practice. The dredging of Oyster Creek channel and current placement operations utilize time and fossil fuels, which are irreversible and irretrievable. Impacts to the benthic community would not be irreversible, as benthic communities recolonize through recruitment from neighboring areas with cessation of placement activities.

Beneficial Use of Sediments (Proposed Action). As with current practice, dredging Oyster Creek Channel and beneficial use placement in Barnegat Bay involves the utilization of time and fossil fuels, which are irreversible and irretrievable. Impacts to the benthic community would not be irreversible, as benthic communities recolonize through recruitment from neighboring areas with cessation of placement activities.

## 6.13 Climate Change

USACE considers three sea level rise scenarios when describing a project's study area (Figure 8). These include a low rate based on the historic rate of rise and intermediate, and high rates of rise. See the USACE Sea Level Change Curve Calculator, available at: http://www.corpsclimate.us/ccaceslcurves.cfm. This calculator uses the methodology described in Engineer Regulation (ER) 1100-2-8162, *Incorporating Sea Level Changes in Civil Works Programs* (USACE 2013). The low (historic) sea level change scenario produces a 0.46-foot rise during the 50-year period of analysis and the intermediate and high rates of rise produce a 0.94 and 2.43 rate over the same period. Over a 100-year period, the projected increase is 0.84, 2.23, and 6.62 for the low, intermediate, and high rates of rise respectively. New Jersey coastal areas, including Barnegat Bay, are experiencing some of the highest rates of sea-level rise in the continental United States.

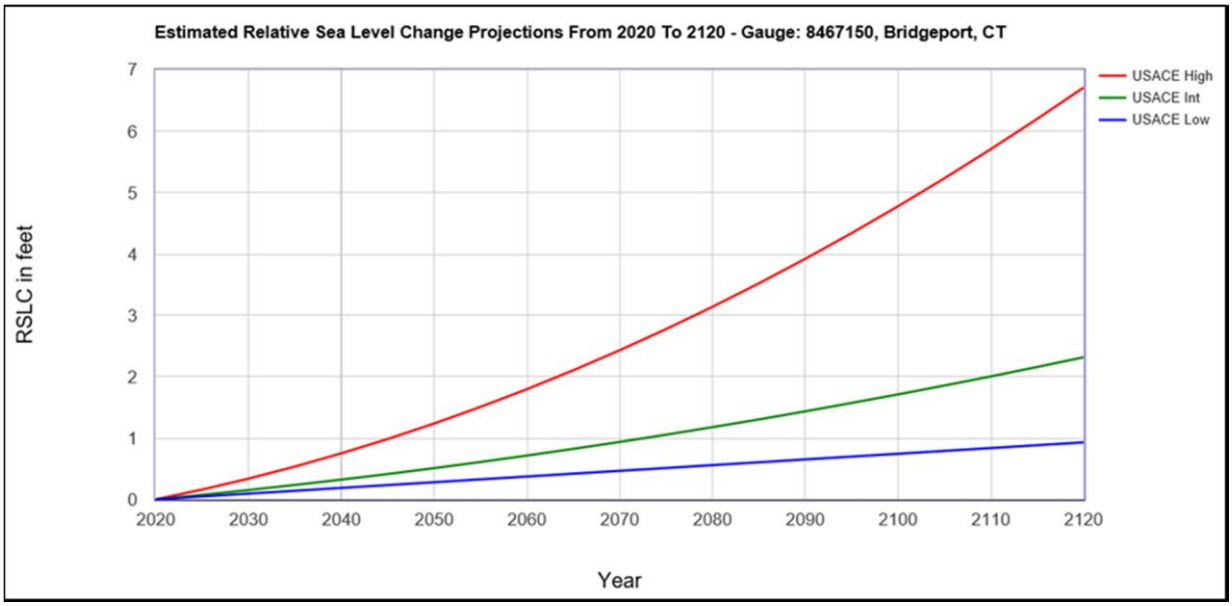


**Figure 8: Relative sea level rise projections.**

No Action. The backbay region of New Jersey is a dynamic environment that is densely populated. Hurricane Sandy emphasized the vulnerability of the area to coastal storms that are expected to become more frequent and devastating in the future with climate change and rising sea levels. In the absence of channel dredging and placement operations, no dredged material placement will occur in areas where it could potentially provide additional resilience and these areas would continue to be exposed to the cumulative damages of inundation. The study area that is currently at risk will likely see an increase in future damages with the expected sea level rise in the future without project condition. Valuable foraging and nesting habitats will be impacted as sea level rises.

Current Practice. Barnegat Inlet requires maintenance dredging to ensure navigational safety. The current practice of pumping the channel material to an upland CDF removes a valuable resource from the bay system where it is most needed to combat sea level rise and land subsidence. Alternatively, placing the material at Site 26B keeps the material in Barnegat Bay and augments the island's elevation to add longer-term resilience and habitats in the face of rising sea levels.

Beneficial Use of Sediments (Proposed Action). The target objective of the Section 1122 pilot program and subsequent maintenance dredging operations is to use Oyster Creek channel dredged material in a manner that benefits the Barnegat Bay ecosystem. Accelerating losses of seagrass beds is of primary concern in Barnegat Bay and has prompted restoration efforts of these highly productive habitats. Sea level rise has contributed to the loss of SAV, saltmarsh, and island habitats. The proposed plan will place dredged material in an area where current conditions are not suitable for the establishment of SAV with an objective to eventually develop an emergent island over many years. The monitoring plan will provide valuable information to direct future placements in an effort to reduce seagrass losses.

## 6.14 Cumulative Effects

The National Environmental Policy Act (NEPA) defines cumulative effects as: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or Non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

No Action. No cumulative impacts resulting from dredging or placement would occur in the absence of these operations.

Current Practice. The last dredged material placement to Site 26B (2017) occurred on the east side upland portion of the island in order to minimize runoff impacts to the fringing SAV beds. The deposition of dredged material on Site 26B would likely not provide additional suitable habitat for SAV to establish. No adverse cumulative effects would occur to benthic invertebrate resources or fish as benthic organisms are known to recolonize disturbed bottom and fish are mobile and can leave the area temporarily while turbidity is elevated.

Beneficial Use of Sediments (Proposed Action). Past actions that have occurred in Barnegat Bay not associated with navigation channel dredging include bulkheading, piling driving, the filling of saltmarshes, and the destruction of maritime forest for development. These actions have degraded the habitat quality of Barnegat Bay. Development in turn attracts more recreational users to the bay. Boaters impact bay habitats with water pollution and

disturbance to saltmarshes and SAV beds with boat wakes. Future activities in Barnegat Bay are anticipated to remain similar to those present actions.

Cumulative impacts associated with the propose action (*i.e*. recurring beneficial use of dredged material) are positive effects. Use of the dredged material to reduce depths and other environmental conditions that are conducive to SAV growth at Site 6 and to provide a supplemental sand source in the nearshore zone of Sites 10 and 11 will benefit the Barnegat Bay ecosystem and help in combatting adverse effects due to sea level rise.

## 7.0 Environmental Justice

Environmental justice issues arise if activities associated with the project caused a disproportionate impact to low-income or minority populations. Disproportionate impacts could be related to human health effects or adverse environmental effects. Census data indicate that the racial makeup of the nearest residential areas is 91.3% Caucasian; 3.0% African American; 0.1% Native American; 2.0% Asian; and 9.0% Hispanic/Latino. The median household income (2006-2010) ranged from $75,000 - $85,000, depending on the municipality (U.S. Census Bureau 2020). The communities present in the surrounding area of the Barnegat Bay study area do not meet the criteria for a population with predominant members of a minority group or low-income.

Therefore, the project is expected to comply with Executive Order 12898 which requires that "each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations."

## 8.0 Relationship of the Selected Plan to Environmental Requirements, Protection Statutes, and other Requirements

Compliance with environmental quality protection statutes and other environmental review requirements is ongoing. Table 4 provides a listing of compliance with federal environmental statutes. The project requires State approval pursuant to Section 401 of the Clean Water Act, Section 307 of the Coastal Zone Management Act, and Section 106 of the National Historic Preservation Act. USACE has applied for these approvals. All approvals will be obtained prior to initiation of construction.

**Table 4. Compliance of the Proposed Action with Environmental Protection Statutes and other Environmental Requirements**

| STATUTES | COMPLIANCE STATUS |
|---|---|
| Clean Air Act | Complete |
| Clean Water Act | Complete |
| Coastal Zone Management Act | In progress |
| Endangered Species Act | In progress |
| Fish and Wildlife Coordination Act | In progress |
| National Historic Preservation Act | In progress |
| National Environmental Policy Act | In progress |
| Environmental Justice (E.O. 12898) | Complete |

| STATUTES | COMPLIANCE STATUS |
|---|---|
| Marine Mammals Protection Act of 1972 | Complete |
| Magnuson-Stevens Fishery Conservation and Management Act of 1976 | In progress |
| Federal Water Project Recreation Act | Complete |
| Submerged Lands Act of 1953 | Complete |
| Rivers and Harbors Act of 1899 | Complete |
| Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990 | Complete |
| Anadromous Fish Conservation Act | Complete |
| Migratory Bird Treaty Act and Migratory Bird Conservation Act | Complete |
| Marine Protection, Research and Sanctuaries Act (Ocean Dumping Act) | Complete |
| Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 | Complete |
| Executive Order 11988, Floodplain Management | Complete |
| Executive Order 12898, Environmental Justice | Complete |
| Executive Order 13045, Disparate Risks Involving Children | Complete |

## 9.0 Section 404(b)(1) Analysis

A review of the impacts associated with discharges to waters of the United States for the National RSM Program WRDA 2016 Section 1122 Phase 2, Oyster Creek Channel Beneficial Use Pilot Project in Barnegat Inlet, NJ is required by Section 404(b)(1) of the Clean Water Act, as amended (Public Law 92-500).

I. PROJECT DESCRIPTION

A. Location. The project area is located in Barnegat Bay in Ocean County, New Jersey. See Figure 2:.

B. General Description. A project description and objectives are provided in Sections 3.0 and 4.0 of this EA. Approximately 10 acres of shoaling within Oyster Creek channel will be dredged (25,000 cy) and placed initially at Site 6 in 2020 and in subsequent maintenance dredging years, approximately 3,000 cy of dredged material may be placed at Sites 10 or 11.

C. Purpose. The purpose of the project is to remove critical shoaling from Oyster Creek channel that pose hazards to navigation and public safety and beneficially utilize the dredged material by keeping the high quality sand material in the system and expanding habitat suitable for SAV establishment and future island habitat for foraging and nesting birds.

D. General Description of Dredged or Fill Material.

1. General Characteristics of Material: sand

2. Quantity of Discharge: The estimated quantity of dredged material is initially approximately 25,000 cy in 2020 and approximately 3,000 cy/year during future maintenance dredging operations.

3. Source of Material: All material would be obtained from the existing authorized Oyster Creek channel which is part of the Barnegat Inlet navigation project.

E. Description of Discharge Sites.

1. Location: See Section 4.4 (Selected Plan) and Figure 4 in the EA for the project location.

2. Size (acres): The initial proposed placement location (Site 6) is approximately 11 acres. The future proposed placement locations at Sites 10 and 11 are approximately 11 acres.

3. Type of Sites: The project entails placement of material in waters of Barnegat Bay (7-8 feet MLLW).

4. Type of Habitat: nearshore subtidal sand.

5. Timing and Duration of Discharge: initial construction: approximately 1 month. Future placements: approximately 3 days. Initial construction is anticipated during November/December 2020.

F. Description of Discharge Method. Discharge from hopper dredge.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations.

1. Substrate Elevation and Slope: varies.

2. Sediment Type: sand.

3. Fill Material Movement: Sediment from the initial placement is expected to naturally settle at the placement sites under existing natural hydrodynamic conditions.

4. Physical Effects on Benthos: Temporary loss of existing benthos during dredging and placement actions. The areas should reach a stabilized equilibrium subsequent to construction.

5. Actions taken to Minimize Impacts: Construction best management practices will be used during construction.

B. Water Circulation, Fluctuation, and Salinity Determinations.

1. Water:

a. Salinity – No effect

b. Water Chemistry – Temporary, minor effect.

c. Clarity – Temporary, minor effect.

d. Color - No effect.

e. Odor – Temporary, minor effect.

f. Taste - No effect.

g. Dissolved Gas Levels – No effect.

h. Nutrients – No effect.

i. Eutrophication - No effect.

j. Temperature- No effect.

2. Current Patterns and Circulation:

a. Current Patterns and Flow – No significant effect.

b. Velocity – No significant effect on tidal velocity and current velocity regimes.

c. Stratification – Normal stratification patterns would continue.

d. Hydrologic Regime – The regime is nearshore and would remain that way subsequent to construction of the project.

3. Normal Water Level Fluctuations – No effect on tidal regime.

4. Salinity Gradients – No effect on existing salinity gradients.

5. Actions That Will Be Taken To Minimize Impacts: strategic placement of small quantities of dredged material to minimize impacts to nearby bottom habitats.

C. Suspended Particulate/Turbidity Determinations.

1. Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Fill Site: Temporary effects when the dredged material is being placed. The area should reach a stabilized equilibrium in a relatively short time period due to the predominantly large grained sand content of the material.

2. Effects on Chemical and Physical Properties of the Water Column:

a. Light Penetration: Short-term, limited reductions during dredging and placement activities. No long-term effects.

b. Dissolved Oxygen: There is a potential for a temporary decrease in dissolved oxygen levels during dredging and placement activities. No long- term effects.

c. Toxic Metals and Organics: No effect.

d. Pathogens: No effect.

e. Aesthetics: Minor, temporary effects limited to the construction period.

f. Temperature: No effect.

3. Effects on Biota:

a. Primary Production, Photosynthesis: Temporary, minor effect during dredging and placement activities. The areas should reach a stabilized equilibrium in a relatively short time period.

b. Suspension/Filter Feeders: Temporary, minor effect on suspension feeders during dredging and placement activities. The area should reach a stabilized equilibrium in a relatively short time period.

c. Sight feeders: Temporary, minor effect on sight feeders during dredging and placement activities. The area should reach a stabilized equilibrium in a relatively short time period.

4. Actions Taken to Minimize Impacts: Best management practices will be used to minimize turbidity.

D. Contaminant Determinations:

The area to be dredged is expected to be greater than 90 percent sand and considered clean relative to contaminants.

E. Aquatic Ecosystem and Organism Determinations:

1. Effects on Plankton: Temporary, minor effect on plankton during dredging and placement activities. The area should reach a stabilized equilibrium in a relatively short time period.

2. Effects on Benthos: Temporary, minor effect on benthos during dredging and placement activities. The area should reach a stabilized equilibrium in a relatively short time period.

3. Effects on Nekton: No effect.

4. Effects on Aquatic Food Web: Temporary, minor effect on the aquatic food web during dredging and placement activities. The area should reach a stabilized equilibrium in a relatively short time period.

5. Effects on Special Aquatic Sites:

(a) Sanctuaries and Refuges: Potential positive benefit to shoreline with supplemental sand source in system.
(b) Wetlands: Potential positive benefit to shoreline with supplemental sand source in system.
(c) Tidal flats: Potential positive benefit to shoreline with supplemental sand source in system.
(d) Vegetated Shallows: Potential positive benefit to shoreline with supplemental sand source in system.

6. Threatened and Endangered Species: No effect.

7. Other Wildlife: Temporary, minor effects during construction.
8. Actions to Minimize Impacts: Best management construction practices will be used to minimize any disturbance.

F. Proposed Disposal Site Determinations:

1. Mixing Zone Determinations: The following factors have been considered in evaluating the placement sites.

a. Depth of water.

b. Current velocity.

c. Degree of turbulence.

d. Stratification.

e. Discharge vessel speed and direction.
f. Rate of discharge.
g. Dredged material characteristics.

2. Determination of Compliance with Applicable Water Quality Standards: A section 401 Water Quality Certificate will be obtained from the NJDEP prior to project construction.

3. Potential Effects on Human Use Characteristics:

a. Municipal and Private Water Supply: No anticipated effect.

b. Recreational and Commercial Fisheries: Temporary, minor effect during construction offseason.

c. Water Related Recreation: Temporary, minor effect during construction offseason.

d. Aesthetics: Temporary, minor effect during construction.

e. Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites, and Similar Preserves: N/A.

G. Determination of Cumulative Effects on the Aquatic Ecosystem.

No significant adverse effects are anticipated.

H. Determination of Secondary Effects on the Aquatic Ecosystem.

No significant secondary effects are anticipated.

III. <u>FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE</u>

A. Adaptation of the Section 404(b)(1) Guidelines to this evaluation - No significant adaptation of the guidelines were made relative to this evaluation.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site - The selected plan was determined to be the best alternative for enhancing habitat at the placement site.

C. Compliance With Applicable State Water Quality Standards - The selected plan is not expected to violate any applicable state water quality standards in New Jersey.

D. Compliance with Applicable Toxic Effluent Standards or Prohibition Under Section 307 of the Clean Water Act - The proposed discharge is not anticipated to violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973 -The selected plan will comply with the Endangered Species Act of 1973. Informal Section 7 consultation will be completed with the U.S. Fish and Wildlife Service and National Marine Fisheries Service prior to initiation of construction.

F. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972 - No Marine Sanctuaries, as designated in the Marine Protection, Research, and Sanctuaries Act of 1972, are located within the area.

G. Evaluation of Extent of Degradation of Waters of the United States - The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, and recreational and commercial fishing, plankton, fish and shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and wildlife will not be adversely affected. Significant adverse impacts on aquatic ecosystem diversity, productivity and stability, and recreation, aesthetics and economic values will not occur as a result of the project.

H. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem – Best management construction methods will be employed to minimize potential adverse impacts of discharging material in the aquatic ecosystem.

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