ENVIRONMENTAL APPENDIX
CLEAN WATER ACT
SECTION 404(B)(1) EVALUATION

NEW JERSEY BACK BAYS
COASTAL STORM RISK MANAGEMENT
FEASIBILITY STUDY

PHILADELPHIA, PENNSYLVANIA

APPENDIX F.4

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NJBB
NEW JERSEY BACK BAYS STUDY
U.S. Army Corps of Engineers
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1.0 INTRODUCTION

The US Army Corps of Engineers (USACE) in partnership with the Non-Federal Sponsor (NFS), the New Jersey Department of Environmental Protection, are conducting the New Jersey Back Bays Draft Integrated Feasibility Study and Supplemental Environmental Impact Statement (NJBB Study) to determine the feasibility of alternatives that provide coastal storm risk management (CSRM) along the New Jersey coast.

1.1 Authority and Purpose

As a result of Hurricane Sandy in October 2012, Congress passed Public Law (P.L.) 113-2, Disaster Relief Appropriations Act, 2013 which authorized supplemental appropriations to Federal agencies for expenses related to the consequences of Hurricane Sandy. Chapter 4 of P.L. 113-2 identifies those actions directed by Congress specific to the USACE, including preparation of two interim reports to Congress, a project performance evaluation report, and a comprehensive study to address the flood risks of vulnerable coastal populations in areas affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the U.S. Army Corps of Engineers (NAD).

The NACCS identified nine focus areas in the NACCS Study Area to more comprehensively identify problems, needs and opportunities including the development of CSRM strategies to manage risk associated with coastal flooding and sea level change in areas of need. The Back Bays of the State of New Jersey is one of these focus areas.

The New Jersey State Chapter within the State and District of Columbia Analyses Appendix of the NACCS discussed State-specific conditions, presented a risk analyses, developed focus areas and CSRM strategies within New Jersey. The NJBB CSRM Study aligns with the NACCS goals and purpose towards the conduct of a systems analysis/plan to better understand and manage coastal risk.

The study authority for the NJBB CSRM Study was the New Jersey Shore Protection Authority (1987). The resolution reads as follows:

Resolutions adopted by the Committee on Public Works and Transportation of the U.S. House of Representatives and the Committee on Environment and Public Works of the U.S. Senate in December 1987, and by House resolution adopted by the Committee on Public Works and Transportation on December 10, 1987 offers specific authority for the conduct of study along the coast of New Jersey:

"that the Board of Engineers for Rivers and Harbors, created under Section 3 of the Rivers and Harbors Act, approved June 13, 1902, be, and is hereby requested to review existing reports of the Chief of Engineers for the entire coast of New Jersey with a view to study, in cooperation with the State of New Jersey, its political subdivisions and agencies and instrumentalities thereof, the changing coastal processes along the coast of New Jersey. Included in this study will be the development of a physical, environmental, and engineering database on coastal area changes and processes, including appropriate monitoring, as the basis for actions and programs to prevent the harmful effects of shoreline erosion and storm damage; and, in cooperation with the Environmental Protection Agency and other Federal agencies as appropriate, develop recommendations for actions and solutions needed to preclude further water quality degradation and coastal pollution from existing and anticipated uses of coastal waters affecting the New Jersey Coast. Site specific studies for beach erosion control, hurricane protection, and related purposes should be undertaken in areas identified as having potential for a Federal project, action, or response".

The purpose of the U.S. Army Corps of Engineers (USACE) New Jersey Back Bays (NJBB) Coastal Storm Risk Management (CSRM) Draft Supplemental Integrated Feasibility Study and Environmental Impact Statement (Draft Integrated Report) is to implement comprehensive CSRM strategies to increase resilience and to reduce risk from future storms and compounding impacts of sea level change (SLC). The objective of the NJBB CSRM Study is to investigate CSRM problems and identify solutions to reduce damages from coastal flooding that affects population, critical infrastructure, critical infrastructure, property, and ecosystems.

The Atlantic Coast of New Jersey is fronted by a Federal CSRM program (USACE, 2013) along it's ocean fronting coastline. However, the region currently lacks a comprehensive CSRM program that will protect communities on the bay side of the barrier islands. As a result, the NJBB region experienced major impacts and devastation during Hurricane Sandy and subsequent coastal events thus damaging property and disrupting millions of lives owing to the low elevation areas and highly developed residential and commercial infrastructure along the back-bay coastline.

2.0 PROJECT DESCTIPTION

The Supplemental EIS contains environmental reviews for the tentatively selected plan (TSP) which includes Nature-Based Solutions (NBS) with dredged material (from dredged material placement facilities [DMPFs]/confined disposal facilities [CDFs] or navigation channels) used to maintain vulnerable salt marsh habitat at risk of conversion to open water at approximately 7 locations in the back bay area (Figure 3). These are the only features of the TSP which would result in discharges of dredged or fill materials into waters of the United States including wetlands. (Figure 2).

2.1 Location

The NJBB Study Area (study area) includes the bays and river mouths located landward of the barrier islands and Atlantic Ocean-facing coastal areas in the State of New Jersey. The study area covers more than 950 square miles, and 3,500 linear miles of shoreline from Long Branch at the northern study area boundary to Cape May Point at the southern boundary. It comprises portions of ninety municipalities and five counties including Monmouth, Ocean, Atlantic, Burlington and Cape May Counties. The study area has been subdivided into five regions based on problems and opportunities, geomorphology and hydraulic interconnectedness of water bodies (see Figure 1).

Under the TSP, only the NBS would require fill in the waters of the U.S and therefore, evaluated in this 404(B)(1) evaluation. The NBS would use dredged material (from DMPFs/CDFs or navigation channels) to restore degraded salt marsh habitat at approximately 7 locations in the back bay area (Figure 2).

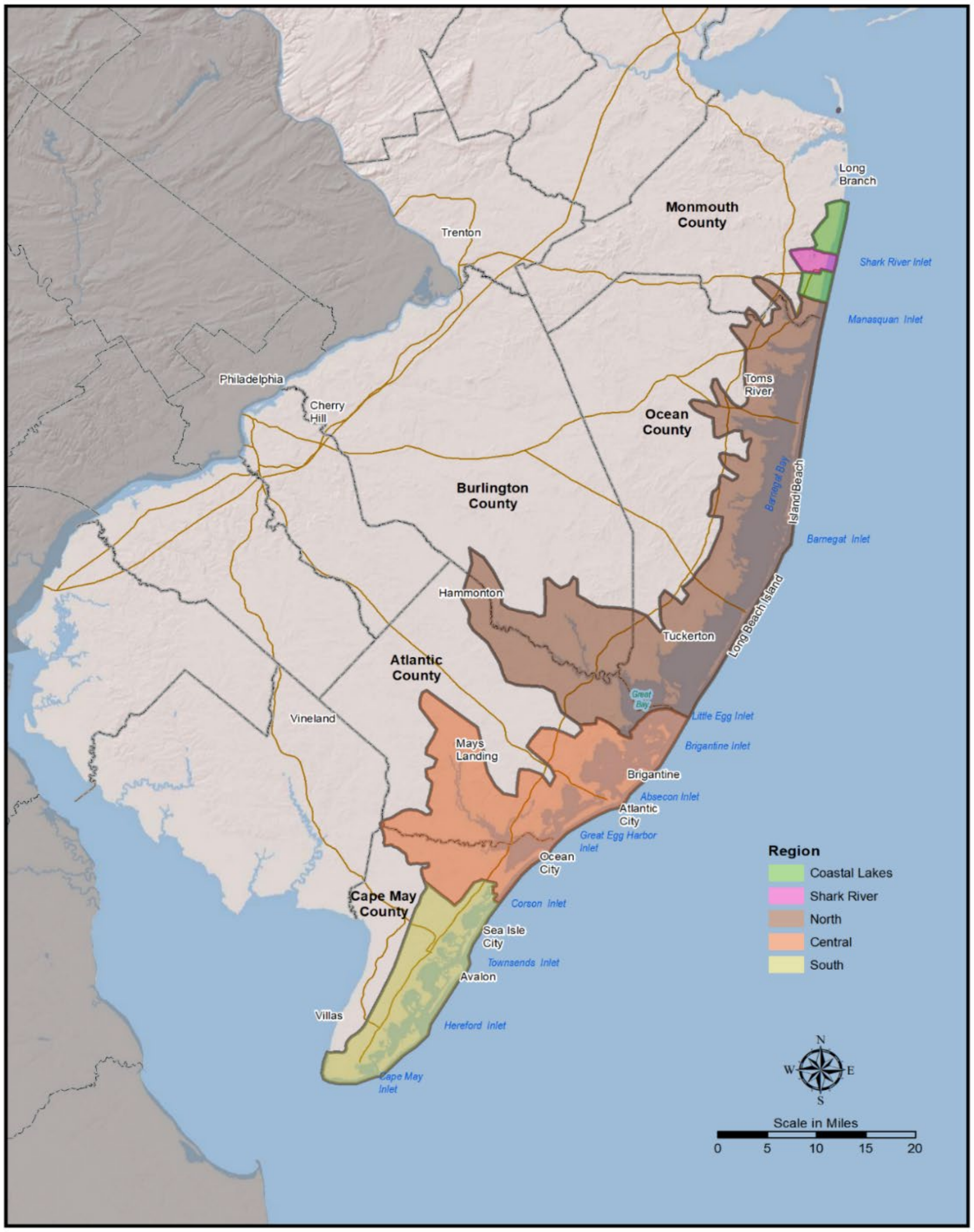

Figure 1. New Jersey Back Bay Study Area

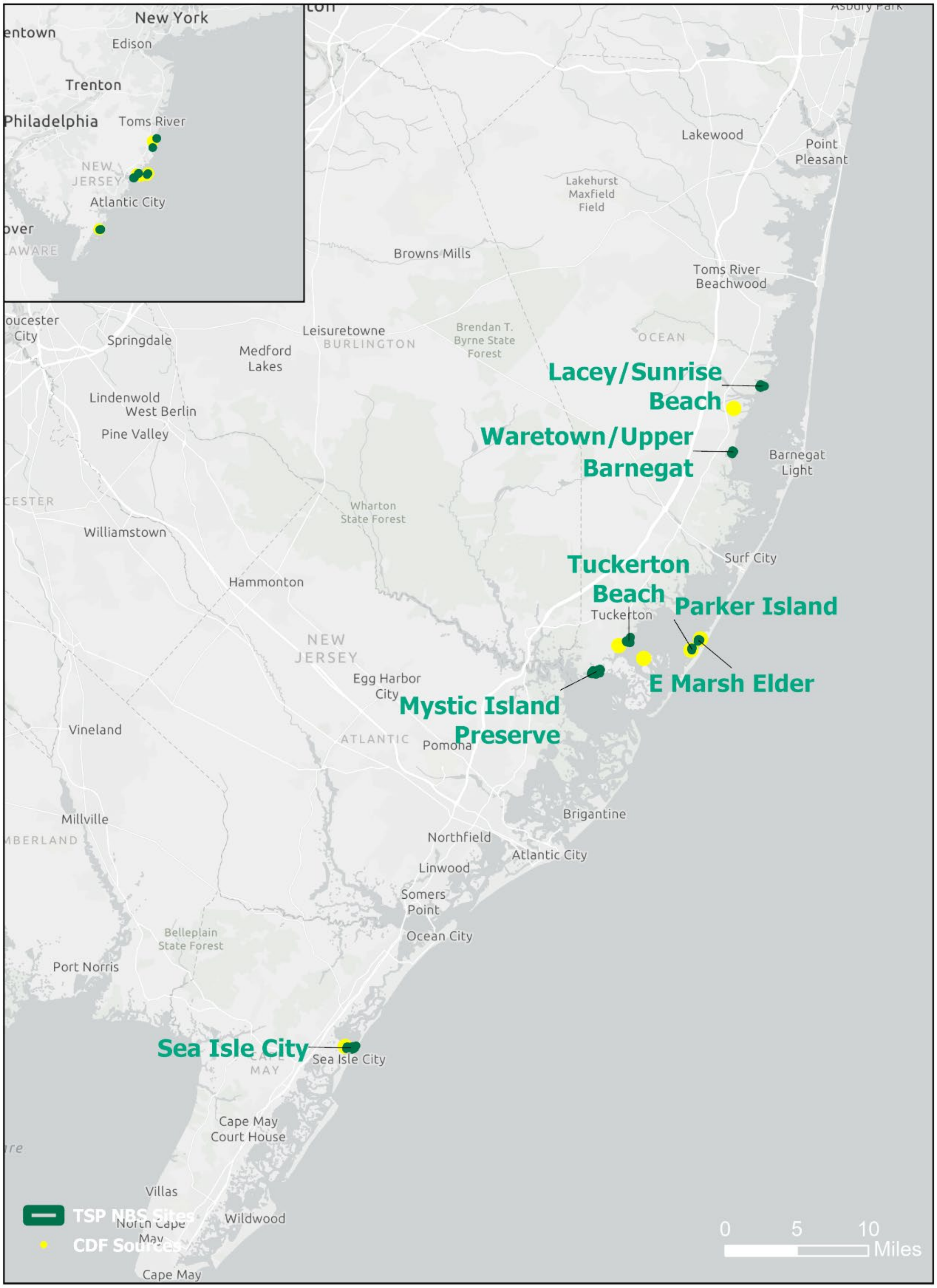

Figure 2. NJBB CSRM NBS Sites and DMPFs/CDFs in the Tentatively Selected Plan

2.2 General Description

The NBS plan consists of augmenting sediment supply to 7 strategic saltmarshes vulnerable to habitat conversions to intertidal unconsolidated shore and open water due to the effects of sea level change, while avoiding converting the marsh tidal regime/elevation (e.g., low marsh would not be converted to high marsh and high marsh would not be converted to upland) (see Table 1 and Figure 2). These 7 marsh complexes were identified as having clear potential CSRM benefits, as well as several factors that support constructability within the near future. Additional information on the formulation of NBS is provided in Appendix G.

Table 1. Proposed Nature-Based Solutions Locations, Size, and Estimated Sediment Need

Marsh Maintenance Candidate		**Estimated Area (Acres)**	**Estimated Sediment Amount (CY)**
Lacey/Sunrise Beach	(-74.152941°, 39.836079°)	26	63,000
Waretown/Upper Barnegat	(-74.191295°, 39.769090°)	12	30,000
East Marsh Elder	(-74.236227°, 39.579067°)	7	6,000
Parker Island	(-74.245257°, 39.570439°)	5	4,000
Mystic Island Preserve	(-74.371060°, 39.545776°)	79	64,000
Tuckerton Beach	(-74.328494°, 39.577697°)	29	24,000
Sea Isle City	(-74.690486°, 39.165470°)	59	50,000
Total		217	241,000

Future without project conditions in the Main Report illustrate significant marsh loss across the study area associated with sea level change and other sources of erosion (e.g., waves). DMPFs and shoaling in maintained navigation channels represent a significant supply of leverageable sediment to nourish the strategic marsh complexes. Traditional navigation channel dredging and placement/spraying on the marsh will also be used.

2.2.1 Pre-construction

Prior to construction of NBS, investigations may include wetland characterizations or delineations, subsurface geotechnical investigations, HTRW sampling, and Submerged aquatic vegetation (SAV) mapping. If needed, sediments to be used within the saltmarshes will be tested for contaminants and determined to be acceptable for beneficial use placement within the local system prior to implementation in accordance with New Jersey criteria to meet sediment quality objectives appropriate for these uses.

If it is determined that a potential conflict with SAV exists, SAV would be mapped near NBS sites. These investigations are currently being developed.

USACE has previously characterized many of the DMPFs proposed for sediment mining as suitable candidates in past Environmental Restoration studies along the NJIWW in the 2000s, although additional sediment suitability characterization would be required going forward. If sediments in a DMPF are not suitable for reuse in a habitat restoration project, they would not be used.

2.2.2 Construction

While the following describes construction of the NBS, construction methods will be further refined and optimized to each site.

Construction of the NBS require significant amounts of fill material. Dredged material obtained from existing DMPFs and existing navigation channels will be used to augment the marshes at the NBS sites. The selected NBS marsh sites would be maintained through the strategic placement of dredged material. If the need for dredging federal, state, or local navigation channels, does not align with these placements, sediment would originate from formerly dredged materials placed in upland DMPFs along the NJBB study area. Sediment within these DMPFs will be hydraulically mined or transported by scow or truck. For scow or truck, backhoes would mine and place material. For hydraulic pumping, backhoe or eductor systems would be used to combined dried sediment with water to create a pumpable slurry and transferred via high-solids pumps to the target locations via pipeline (and or scow if necessary). Temporary moorings would be installed as necessary.

Methods to transport sediment to each NBS site are provided in Table 2. It is assumed that permanent docks and roads would not be constructed. If it is necessary to access marshes with vehicles or pipelines, marsh buggies and mats would be used to minimize impacts. Temporary impacts to marshes would be restored to the maximum extent possible.

Table 2. Considerations for Transporting Sediments to NBS Sites

Marsh Maintenance Candidate	Source Note	Direct Distance (miles)	Approx. Waterway Distance (mi)	Approx. Road Distance (mi)	Crossed within Direct Distance	Potential Placement Method
Lacey/Sunrise Beach	Oyster Creek total quantity affects share between this and Waretown	2.5	4.4	5	Communities to avoid in between. Scow may be easier than pipeline cross.	Scow or Truck, then Repulp at Site
Waretown/Upper Barnegat	Oyster Creek total quantity affects share between this and Lacey/Sunrise Beach	3	3	4.2	Roads/Marsh or Communities or Water	Scow or Truck, then Repulp at Site
EMarshElder	DMPF Source on Same Island	0.2	0.2	NA	Marsh	Direct Repulp and pipe
Parker Island	DMPF Source on Same Island	0 or 1	0 or 1	NA	Marsh	Direct Repulp and pipe
Tuckerton Beach	DMPF within mile as well (but assumed that goes to Mystic Island Preserve)	1.6 or 0.7	1.6 / 0.7	NA or 5	Water	Scow, then Repulp at Site
Mystic Island Preserve	Nearest sources north across marsh peninsula, complicate access	2.5	13.5	4.2	Significant Area of Marsh/marsh tributaries	Pipeline or Truck
Sea Isle City	DMPF Immediately Next to Placement Site	0.5	0.5	NA	Marsh	Direct Repulp and pipe

Strategic placement will occur approximately three times per placement site across the study period, with those sites in more microtidal zones possibly requiring additional lifts. The approach would be to place material centrally on the marsh platform target areas across multiple lifts. The approach of several placements is designed to provide continued sediment supply (i.e., augmentation of accretion rates), while leveraging the natural accretion. These actions assume that plan implementation will begin prior to such significant marsh degradation that sediment augmentation is no longer enough to maintain the NBS sites. Placing through time avoids converting the tidal elevation regimes of the targeted marshes and thereby requiring additional mitigation for the implementation of the NBSs themselves for the conversion of upland.

Sediment would be piped or sprayed to depth of 2 to 4 inches over the marsh complex (i.e., an average cumulative rate of 800 cubic yards per acre). This would occur 2 to 3 times between 2030 and 2080 for most marsh complexes. A total of approximately 0.5 feet of material would be placed on most marsh complexes over the 50 years. Monitoring would occur during construction. Two northern Barnegat Bay (Lacey/Sunrise Beach and Waretown/Upper Barnegat) sites would require approximately 18 inches of material, which would be placed during 4 placements over the 50 years. Coir logs may be used to maintain sediments on the marsh platform. Site-specific containment and shoreline enhancement needed to maintain placement will be designed in the next phase of the study.

Vegetation in the DMPFs, most likely Phragmites, would be treated prior to use so the potential for spreading invasives is minimized. In general, the material will be fluidized in the DMPF using water pumped from the nearby navigational channel. The dried sediments and water would be mixed with a longreach backhoe or eductor system. The slurry could be pumped from the DMPF and piped over the marsh, using a high solids pump (similar to a hydraulic dredge). A bobcat/marsh buggy may also be used in the DMPF. Construction activities in the DMPF may include clearing, grading, excavations, and backfilling.

Other construction activities may also include temporary excavations, and wetland/upland vegetation planting.

2.2.3 Operation and Maintenance

There is no operation or maintenance associated with NBS. However, given that this plan is formulated based on periodic sediment placements (3 to 4 times over 50 years), a monitoring and adaptive management plan is appropriate. Over a 50-year period, monitoring of marsh vegetative vigor, coverage, and elevations would be conducted every five to ten years to ensure that the marsh platform is functioning for CSRM purposes and to monitor resilience at the placement site.

An adaptive management and monitoring plan with be developed and implemented for the NBS. Survey results from pre-construction, construction, and post-construction surveys will provide information about opportunities to apply adaptive management to future placements at the seven selected sites and at other estuarine saltmarshes with comparable hydrodynamic and morphologic conditions.

2.3 General Description of Dredged or Fill Material

In accordance with 33 CFR Part 323 and 40 CFR Part 232 a final rule was published in 2002 to provide a definition of "fill material", which was defined *as material placed in waters of the U.S. where the material has the effect of either replacing any portion of a* *water of the United States with dry land or changing the bottom elevation of any portion of a water. The examples of ''fill material'' identified in today's rule include rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and materials used to create any structure or infrastructure in waters of the U.S.* The dredged or fill material would predominantly consist of naturally occurring sediments composed of sands, silts and clays obtained from previous or current channel dredging.

2.3.1 General Characteristics of Material

NBS would require significant amounts of fill materials (approximately 241,000 cubic yards total). Various fill materials would be considered for aquatic placement including suitable sands and silts either mined from existing DMPFs or beneficially placed sediments from dredging from within the dimensions of existing maintained navigation channels. Coir logs may also be used.

2.3.2 Sources and Quantity of Material

The construction of NBS would require fill materials. Various fill materials would be considered for aquatic placement including suitable sands and silts either mined from existing DMPFs or beneficially placed during dredging of nearby navigation channels. Other fill materials may include biogenic shell materials, coir logs and fabrics, geotextile, stone/riprap, and plant materials.

Dredged material placement is not expected to introduce significant contaminants as pre-dredge testing and/or testing of sediments within a DMPF would be conducted and reviewed prior to use for placement and ensure that sediment concentrations meet the most current NJ criteria for beneficial use in saltmarshes.

2.4 Description of the Proposed Discharge Sites

Wetland and associated aquatic habitats dominate much of the study area. These habitats are principally associated with backwater sound and bay areas such as Richardson Sound and Grassy Sound, Great Sound, Jenkins Sound, Townsend Sound, Corson's Sound, Great Egg Harbor, Peckman Bay, Lakes Bay, Absecon Bay, Great Bay, Little Bay, Little Egg Harbor, and Barnegat Bay. In addition, nearshore and intertidal habitats are present within various channels and thorofares, while intertidal low marsh wetlands dominated by saltmarsh cordgrass (*Spartina alterniflora)* are the dominant vegetation feature. Common reed (*Phragmites australis*) marshes are also found throughout the area at higher elevations and around the edges of disturbed marsh areas. N.J.A.C. 7:7-9.15 defines intertidal and subtidaL shallows as "all permanently or temporarily submerged areas from the spring high water line to a depth of four feet below mean low water. Spring high water and mean low water line delineations as well as visual observance aid in determining if intertidal subtidal shallows are present."

Tidal flats are generally soft bottom (mud or sand) areas that are covered with water at high tide and exposed at low tide. 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 New Jersey Back Bays, 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.

Estuarine emergent wetlands occur extensively throughout the back bays, channels, and inlets of the study area. The low marsh areas are typically dominated by saltmarsh cordgrass, the dominant saltmarsh plant species in the northeastern United States (Mitsch and Gosselink, 1993). This species grows in the intertidal zone between mean low water and mean high tide levels, so it is subject to daily tidal inundation. Wildlife species utilizing the low saltmarsh habitats include birds such as clapper rails (*Rallus longirostris*), common moorhen (*Gallinula chloropus*), waterfowl, and other species that feed on insects, crabs, and other invertebrates that this community supports. The low marsh and tidal channel complex provide significant habitat for numerous fish species that depend on estuaries for nursery and spawning grounds, as well as smaller resident fish such as mummichog, killifish and silversides (Mitsch and Gosselink, 1993; Tiner, 1985).

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. However, since high saltmarshes are inundated far less regularly than the low saltmarshes, waterfowl such as black ducks and mallards may breed within this habitat. White-footed mice (Peromyscus leucopus) and meadow voles (Microtus pennsylvanicus) may use this habitat, as well as raptors (hawks and owls) that feed on the rodents throughout the year. High marshes are also important habitat supporting the eastern black rail (Laterallus jamaicensis jamaicensis), which is listed as Federally threatened and State endangered.

The critical, or upland, edge of the wetlands, is crucial for the survival of those coastal zone species that rely on this habitat for breeding, food, cover, and travel corridors. It also acts as a buffer from nonpoint source pollution and activities affecting wildlife. Scrub/shrub habitats are common 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.

Coastal wetlands can adapt and keep pace with sea level change through vertical accretion and inland migration, but must remain at the same elevation relative to the tidal range and have a stable source of sediment. Under intermediate and high sea level change scenarios, marsh accretion at a rate of 4 mm per year would not keep pace with sea level change. Estuarine wetlands may transition to another habitat type such as brackish wetlands, palustrine emergent wetlands, unconsolidated shore, or open water.

The NJBB study area is dotted with a number of DMPFs. In many cases these areas are perched on top of existing salt marshes. DMPFs are diked (confined) areas that receive dredged fluidized sediments (mostly sands and muds) that are pumped in via pipeline from a hydraulic dredge (typically) from a navigation project such as the NJIWW, State -maintained channels and public/private marinas. When these areas are being filled with dredged material, they are flooded with water and sediments. The water is either drained off through a weir and discharged into the bays or can remain in the site for evaporation while the sediments settle and consolidate. The interior of the DMPF is typically supratidal and is not affected by outside tidal fluctuations, although some DMPFs that aren't maintained or used frequently may subside and dike failure could re-establish some tidal influence. Vegetation usually volunteers into these sites between intervening uses and can consist of successional species that tolerate wetland conditions. The most prominent vegetation that becomes established in these areas is *Phragmites*, which have marginal habitat value.

The saltmarshes and intertidal flats of the NJBB area are maintained by a steady supply of sediment to keep pace with Sea Level Change. However, saltmarshes are experiencing conversions to tidal flats and tidal flats are experiencing conversions to open water. This process is exacerbated by SLR and in areas where these habitats cannot migrate up the landscape gradient because of restrictions from manmade structures and development.

In the future without the project during the 2030 – 2080 study period, estuarine wetlands in the NJBB Study Area are projected to decrease by approximately 12,000 acres and 95,700 acres under the intermediate and high sea level change scenarios, respectively. This loss is accompanied by increases other habitat types. Under the intermediate and high sea level change scenarios:

- Brackish water wetlands would increase by approximately 7,400 acres and 7,000 acres, respectively.
- Palustrine emergent wetlands would increase by approximately 280 acres and 220 acres, respectively.
- Unconsolidated shoreline is also expected to increase by approximately 17,500 acres and 72,300 acres under the intermediate and high sea level change scenarios, respectively.

- Open water habitat is projected to increase by approximately 6,700 acres under the intermediate sea level change scenario and 51,700 acres under the high sea level change scenario.

In response to sea level change, intertidal habitats could experience increased inundation and/or their tidal regimes could change from intertidal to subtidal. Some habitats may transition to unconsolidated shoreline. Distributions of intertidal and subtidal shellfish beds could change in New Jersey Back Bays in response to changing sea levels and habitats.

Habitat at the NBS placement sites is currently predominantly low saltmash, with some unconsolidated shore (i.e., mudflat). Table 3 provides more detail on the existing habitat in the NBS saltmarshes. Changes to intertidal habitat are expected to be imperceptible. The installation of sediments in NBS are designed to maintain habitat present at the time of placement and would not result in significant conversion of saltmarsh habitat to unconsolidated shore/mudflat and subtidal open water. Placement at the target saltmarsh areas would maintain areas of intertidal mudflat and vegetated low marsh, which would remain accessible to finfish. Therefore, all effects are expected to be temporary and would end after construction is complete and the areas become stabilized with vegetation or other biogenic processes. Overall, the construction of NBS would have beneficial impacts, by allowing 7 vulnerable marsh areas to keep pace with sea level change.

Table 3. Existing Habitat in the NBS Saltmarshes

NBS	Saltmarsh (acres)	Unconsolidated Shore (mudflat) (acres)	Open Water (acres)
Sea Isle City	60.07	6.77	3.5
Mystic Island	90.43	0	1.94
Tuckerton Beach	29.61	0	0
Parker Island	3.97	0	0
Marsh Elder Island	5.79	0	0.34
Waretown/Upper Barnegat	11.71	0	0
Lacey/Sunrise Beach	26.2	0	0

3.0 FACTUAL DETERMINATIONS

3.1 Physical Substrate Determinations

3.1.1 Substrate Elevation and Slope

The Beneficial Use of Dredged Material (BUDM) can be used to nourish the marshes where sediment is needed to maintain a marsh platform. Several successful BUDM projects have been completed along the New Jersey Intracoastal Waterway (NJIWW) for wetland habitat restoration. As part of the NJIWW, the Seven Mile Island Innovation Laboratory (SMIIL) in Cape May County is a partnership of Federal, State and non-governmental organizations to advance and improve dredging and marsh restoration techniques in coastal New Jersey through innovative research, collaboration, knowledge sharing and practical application. The SMIIL promotes the use of clean NJ Intracoastal Waterway (NJIWW) dredged channel sediments that are used to uplift low marsh areas that have fallen below the suitable ranges for low marsh by infilling expanding pools to strengthen ecosystem resilience. Completed projects in this area includes a marsh area behind Avalon, Gull Island (Cape May Wetlands WMA), Ring Island (Stone Harbor), and Great Flats (Stone Harbor). Scotch Bonnet Island is an 86-acre saltmarsh island as part of the Cape May Wetlands WMA and the Wetlands Institute will be undergoing BUDM to raise the marsh platform for restoration. Other BUDM efforts for wetland and associated habitats outside of SMIIL include Mordecai Island in Little Egg Harbor and Section 1122 island creation in Barnegat Bay.

The approach of placing an average of 2 – 3 inches per acre through several placements within each NBS site allows for continued sediment supply and augmentation of accretion rates, while leveraging the natural accretion by the targeted marshes. Placing through time avoids converting the tidal elevation regimes of the targeted site. Sediment placements will be implemented in such a manner that benefits to sediment supply outweigh the temporary disruptions to the marsh environments.

Based on projected future saltmarsh habitat conversions into unconsolidated shore/mudflats and open water from SLR, the periodic sediment infusions from BUDM would reduce these conversions. This alternative would provide a direct positive impact by raising the substrate elevation to bolster intertidal mudflats and elevate the low marsh substrate platform to a level suitable for low marsh saltmarsh vegetation such as smooth cordgrass to persist with rising sea levels. Sediment placements are expected to occur 3 to 4 times over a 50-year project life resulting in an average cumulative placement of 800 cubic yards per acre. This would result in lifts of 2-4 inches at a time, but would not modify the marsh type from the baseline condition (ie. a low marsh would not be converted into a high marsh or high marsh converted to upland).

3.1.2 Sediment Type

While localized exceptions can occur, areas along saltmarshes are likely to contain fine silts/muds and peaty materials. Prior to placement at the NBS sites, testing would be conducted to characterize the underlying substrate the NBS and borrow sites to confirm that suitable dredged materials (e.g., sand and silt) are placed at the site.

3.1.3 Dredged/Fill Material Movement

Distribution of sediments onto the marsh platform would be accomplished through the hydraulic pumping of fluidized sediments through a "Y" valve configuration and pipeline. Coir logs may be used to maintain sediments on the marsh platform, if necessary.

3.1.4 Physical Effects on Benthos

Shellfish beds are not expected to be within the vegetated saltmarshes; however, shellfish beds may be present within the tidal creeks and unconsolidated shores, and shallows within and near the placement sites. Direct sediment placement within these areas would be avoided to the maximum extent practicable and turbidity can be managed by directional placement of sediments via "Y" valves on the distribution pipeline that allows for better control of the distribution. If necessary, sedimentation into nearby waterways can be managed through the use of coir logs to intercept sediments before exiting the saltmarsh platform.

Dredging within the navigation channel will result in the temporary loss of benthos that may be prey items for benthic fish species. All dredging would occur in an already maintained (and disturbed) navigation channels.

The mining of sediments from within a DMPF would not have any direct effects on benthic habitats or shellfish beds adjacent to the NBS sites. DMPFs are separate from the adjacent waterways. Any dredging activity would be limited to existing navigation channels, which are not expected to contain shellfish beds or other important benthic habitat due to repeated disturbance associated with channel maintenance.

Dredging and placement activities may result in loss benthic organisms due to physical disturbance, mobilization of sediment contaminants, and increasing concentrations of suspended sediments (Montagna et al., 1998). Thin-layer placement in marshes and mudflats for some NNBF measures would have temporary effects on benthos, but recovery is expected to occur within months from either horizontal and/or vertical migrations of benthic organisms.

3.1.5 Other Effects

Dredged material placement is not expected to introduce significant contaminants as pre-dredge testing and/or testing of sediments within a DMPF would be conducted and reviewed prior to use for placement and ensure that sediment concentrations meet the most current NJ criteria for beneficial use in saltmarshes.

3.1.6 Actions Taken to Minimize Impacts

To avoid and minimize impacts of NBS placement on surrounding waters, coir logs would be used to maintain sediment on the marsh platform, if necessary.

3.2 Water Circulation, Fluctuation, and Salinity Determinations

3.2.1 Water

3.2.1.1 Salinity

No effects to negligible effects on salinity are anticipated from construction of NBS.

3.2.1.2 Water Chemistry

Actions requiring dredging and placement of sediments would result in short-term and localized impacts and would not be expected to degrade the long-term water quality within the project area. These patterns would return to their previous condition following completion of dredging. Temporary changes to dissolved oxygen (DO), nutrients, turbidity, and contaminant levels may occur due to sediment disturbance and mixing during construction. NBS are not expected to have significant adverse effects on water chemistry.

Turbidity generated during construction would be localized and minimized by using coir logs to maintain sediments on the marsh platform, if needed. Dredged materials placed in wetlands would meet NJDEP water quality standards and testing protocols in the document "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters" (NJDEP, 1997). No significant indirect or long-term effects are anticipated with implementing NBS.

3.2.1.3 Clarity

Short-term localized effects on water clarity are expected during NBS placement as turbidity is expected to increase in areas undergoing construction.

3.2.1.4 Color

Short-term localized effects on water color are expected during construction activities during NBS place as turbidity is expected to increase in areas undergoing construction.

3.2.1.5 Odor

Negligible amounts of hydrogen sulfide may be expected during excavation and placement activities, which would be temporary and localized.

3.2.1.6 Taste

It is anticipated that no drinking water sources would be impacted by the TSP; no effects to taste are anticipated.

3.2.1.7 Dissolved Gases

H_2S and other gases like methane are associated with high amounts of decaying organic matter, which could be encountered in lagoons and saltmarsh areas where NBS may be constructed with sediments dredged from anaerobic sources. These effects would be temporary.

3.2.1.8 Nutrients

Minor amounts of nutrients could be released through the disturbance of sediments during construction activities where fine-grained or organic sediments are present, but these effects would be short-term. Implementation of BMP's would minimize nutrient releases through minimizing turbidity.

3.2.1.9 Eutrophication

Minor amounts of nutrients could be released through the disturbance of sediments during construction activities where fine-grained or organic sediments are present, but these effects would be short-term and not expected to increase eutrophication. Implementation of BMP's would minimize nutrient releases through minimizing turbidity and any indirect causes of eutrophication.

3.2.1.10 Others as Appropriate

No other potential impacts to water quality have been identified.

3.2.2 Current Patterns and Circulation

Placement of material in 7 eroding NBS sites would have no effects on current patterns and circulation. The approach of placing an average of 2 – 3 inches per acre through several placements within each NBS site allows for continued sediment supply and augmentation of accretion rates, while leveraging the natural accretion by the targeted marshes. Placing through time avoids converting the tidal elevation regimes of the targeted site.

3.2.2.1 Current Patterns and Flow

The NBS sites would have no effect on current patterns and flow.

3.2.2.2 Velocity

The NBS sites would have no effect on velocity.

3.2.2.3 Stratification

The NBS would not affect stratification as the bays are shallow lagoonal systems that are well-mixed by wind-driven and tidal currents and do not exhibit under normal circumstances significant thermal or saline stratification.

3.2.2.4 Hydrologic Regime

The NBS sites would have no effect on hydrologic regime.

3.2.3 Normal Water Level Fluctuations

The NJBB study area experiences semidiurnal tides and tidal ranges are variable throughout the NJBB study area. Mean tidal ranges in the coastal bays are generally least in the Northern Barnegat Bay at approximately 0.3 to 0.5 feet and gradually increase further south with tide ranges in Cape May Harbor at approximately 4.0 to 4.5

feet. NJ Atlantic Coast marine tides are more consistent that range from 3.5 to 4.0 feet to 4.0 to 4.5 feet.

NBS are not expected to change tidal regimes as fill placement would be adaptable to changes in sea levels over time.

3.2.4 Salinity Gradients

No effects on salinity anticipated.

3.2.5 Actions that Will Be Taken to Minimize Impacts

With the exception of implementing the use of coir logs during construction to maintain sediments on the marsh platform and minimize turbidity, no other specific actions to minimize effects are proposed at this time.

3.3 Suspended Particulate/Turbidity Determination

3.3.1 Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

There would be expected temporary increases in local turbidity during in-water construction activities where dredging/excavation and fill material discharges occur. Turbidity is expected to subside upon cessation of dredging and placement activities. If necessary during placement, sedimentation into nearby waterways can be managed through the use of coir logs to intercept sediments before exiting the saltmarsh platform.

3.3.2 Effects on Chemical and Physical Properties of the Water Column

As described above, dredging and placement for the construction of NBS would result in temporary increases in local turbidity during in-water construction activities where dredging/excavation and fill material discharges occur. If necessary, during placement, sedimentation into nearby waterways can be managed through the use of coir logs to intercept sediments before exiting the saltmarsh platform.

3.3.2.1 Light Penetration

Temporary increases in turbidity would be accompanied by a decrease in light penetration. Normal levels of light penetration are expected upon cessation of construction activities that would produce turbidity.

3.3.2.2 Dissolved Oxygen

Temporary and localized increases in turbidity, particularly in areas with higher organic matter in sediments, may place an oxygen demand through aerobic decomposition that could result in temporary decreases in DO during construction (excavation/dredging and fill placement). Normal levels of DO are expected upon cessation of construction activities that would produce turbidity/organic matter discharges.

3.3.2.3 Toxic Metals and Organics

Discharges of toxic metals and organics are not expected to be released during construction. Fill material would meet NJDEP water quality standards and testing protocols in the document “The Management and Regulation of Dredging Activities and Dredged Material in New Jersey’s Tidal Waters” (NJDEP, 1997). Therefore, fill associated with NBS would be non-polluting.

3.3.2.4 Pathogens

Sediments or fill materials are not expected to contain or influence pathogens.

3.3.2.5 Aesthetics

Discharges that generate turbidity could temporarily degrade aesthetics of odor .

3.3.2.6 Others as Appropriate

No other potential impacts to water quality have been identified.

3.3.3 Effects on Biota

3.3.3.1 Primary Production, photosynthesis

Minor, short term localized effects related to increased turbidity during construction are expected. The effects of turbidity on light penetration would reduce photosynthesis of phytoplankton thus, reducing primary production.

3.3.3.2 Suspension/Filter Feeders

Minor, short term localized effects on filter feeders related to increased turbidity during construction are expected.

3.3.3.3 Sight Feeders

Minor and short-term localized effects on sight feeders are expected that are related to increased turbidity during construction.

3.3.4 Actions Taken to Minimize Impacts

For all CSRM measures including NNBF, implementation of BMPs during construction would minimize the effects of turbidity on aquatic biota.

3.4 Contaminant Determinations

USACE has previously characterized many of the DMPFs proposed for sediment mining as suitable candidates by past Environmental Restoration studies along the NJIWW in the 2000s. Although additional sediment suitability characterization would be required going forward. If sediments in a DMPF are not suitable for reuse in a habitat restoration project, they would not be used.

Discharges of toxic metals and organics are not expected to be released during construction. If dredged or fill materials are placed in waters or wetlands, they would need to meet NJDEP water quality standards and testing protocols in the document

"The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters" (NJDEP, 1997).

3.5 Aquatic Ecosystem and Organism Determinations

3.5.1 Effects on Plankton

Minor, short term localized effects related to increased turbidity during construction are expected. The effects of turbidity on light penetration would reduce photosynthesis of phytoplankton thus, reducing primary production. Indirect impacts could be the resuspension of sediments containing nutrients and a decrease of transitional upland areas (by increasing hardened shoreline) that act as filters for non-point source run-off. An indirect effect of increased run-off and nutrients would contribute to eutrophication and phytoplankton blooms.

3.5.2 Effects on Benthos

Shellfish beds are not expected to be within the vegetated saltmarshes; however, shellfish beds may be present within the tidal creeks and unconsolidated shores, and shallows within and near the placement sites. Direct sediment placement within these areas would be avoided to the maximum extent practicable and turbidity can be managed by directional placement of sediments via "Y" valves on the distribution pipeline that allows for better control of the distribution. If necessary, sedimentation into nearby waterways can be managed through the use of coir logs to intercept sediments before exiting the saltmarsh platform.

Dredging within the navigation channel will result in the temporary loss of benthos that may be prey items for benthic fish species. All dredging would occur within already maintained (and disturbed) navigation channels.

The mining of sediments from within a DMPF would not have any direct effects on benthic habitats or shellfish beds adjacent to the NBS sites. DMPFs are separate from the adjacent waterways. Any dredging activity would be limited to existing navigation channels, which are not expected to contain shellfish beds or other important benthic habitat due to repeated disturbance associated with channel maintenance.

3.5.3 Effects on Nekton

Turbidity associated with construction of the NBS could result in the temporary disturbance of nekton during construction. Nektonic species would be temporarily displaced. Many of the disturbed individuals would be capable of moving outside of the impact areas until construction activities cease. However, some smaller or less mobile species on the marsh platform may become entrained or smothered in the turbidity plume.

3.5.4 Effects on Aquatic Food Webs

Dredging/excavation and fill placement within construction areas would have localized temporary effects on the aquatic food webs by displacing habitat of benthos, primary producers – phytoplankton and smaller consumers such as zooplankton and smaller nekton including various finfish, cnidarians and mollusks.

The installation of sediments in NBS are designed to maintain habitat present at the time of placement and would not result in conversion of saltmarsh. Placement at the target saltmarsh areas would maintain areas of intertidal mudflat and vegetated low marsh, which would remain accessible to finfish and benthos. Therefore, all effects are expected to be temporary and would end after construction is complete and the areas become stabilized with vegetation or other biogenic processes. Overall, the construction of NBS would have beneficial impacts, by allowing 7 marshes vulnerable to conversion from sea level change to keep pace with sea level change.

3.5.5 Effects on Special Aquatic Sites

3.5.5.1 Sanctuaries and Refuges

Four NBS are on “sanctuaries and refuges”; Lacey/Sunrise Beach and Marsh Elder Island are on Forsythe National Wildlife Refuge; Parker Island is a bird sanctuary; and Waretown is part of Upper Barnegat Bay Wildlife Management Area. The NBSs are consistent with the purposes of a sanctuary or refuge and would be implemented in close coordination with the agencies that manage these areas.

3.5.5.2 Wetlands

The installation of sediments in NBS are designed to maintain habitat present at the time of placement and would not result in conversion of saltmarsh habitat. Placement at the target saltmarsh areas would maintain areas of intertidal mudflat and vegetated low marsh, which would remain accessible to finfish and benthos (Table 4). Therefore, all effects are expected to be temporary and would end after construction is complete and the areas become stabilized with vegetation or other biogenic processes. Overall, the construction of NBS would have beneficial impacts, by allowing 7 marshes vulnerable to conversion from sea level change to keep pace with sea level change.

Table 4. Habitat in the NBS Sites in the Future with the Project

NBS	Saltmarsh (acres)	Unconsolidated Shore (mudflat) (acres)	Open Water (acres)
Sea Isle City	58.21	7.9	4.23
Mystic Island	49.2	39.18	2.05
Tuckerton Beach	21.75	6.68	1.18
Parker Island	3.27	0.7	0
Marsh Elder Island	4.96	0.43	0.74
Waretown/Upper Barnegat	7.98	3.02	0.71
Lacey/Sunrise Beach	23.59	1.83	0.78

3.5.5.3 Mudflats

The installation of sediments in NBS are designed to maintain habitat present at the time of placement and would not result in conversion of mudflats. Placement at the target saltmarsh areas would maintain areas of intertidal mudflat, which would remain accessible to finfish and benthos. Therefore, all effects are expected to be temporary and would end after construction is complete and the areas become stabilized with vegetation or other biogenic processes. Overall, the construction of NBS would have beneficial impacts, by allowing 7 marshes vulnerable to conversion from sea level change to keep pace with sea level change.

3.5.5.4 Vegetated Shallows

No sediments are expected to be placed directly in open waters during the construction of the NBS. Placed sediments would be maintained on the saltmarsh to be restored, to the maximum extent possible. Coir logs would be used to help intercept sediments from leaving the marsh platform, if necessary. Therefore, SAV habitat is not expected to be affected.

Short-term effects would involve the resuspension of fine-grained materials either at the sediment sources (i.e., the existing DMPFs or navigation channel dredging) and at the placement locations (saltmarshes). All the NBS placement sites in Upper Barnegat Bay and Little Egg Harbor have SAV either presently or historically within 150 m of the marsh platforms. The short-term resuspension of sediments would be localized but would likely temporarily increase turbidity. This could result in a temporary effect on photosynthesis of adjacent SAV. Additionally, the generation of turbidity could release nutrients associated with organic materials in the sediments and may contribute to a short-term increase in algal uptake and associated blooms, which could have a temporary effect on SAV. At the most, SAV effects are expected to last one season. This is because the NBS will not affect SAV habitat and SAV distribution changes seasonally. The long-term benefits of for saltmarshes would be the maintenance of existing saltmarshes, which are instrumental in nutrient uptake and nutrient cycling and could have beneficial effects on regulating algal blooms and SAV health.

The mining of sediments from within a DMPF would not have any direct effects on eelgrasses or other important SAV since these areas are separate from the adjacent waterways. Any dredging activity would be limited to existing navigation channels, which are not expected to contain SAV due to repeated disturbance associated with channel maintenance.

3.5.5.5 Coral Reefs

There are no coral reefs within the affected area for any of the CSRM structural measures and NBS considered.

3.5.5.6 Riffle and Pool Complexes

There are no riffle and pool complexes within the affected area for any of the CSRM structural measures and NBS considered.

3.5.6 Threatened and Endangered Species

A number of Federal and State listed threatened and endangered species or other special status species inhabit a number of habitat types within these areas as either breeding populations and/or migratory populations. Sections 2.0 and 4.0 of the Main Report and Appendix F.3 provide greater detail of the special status species, their habitats and potential impacts. Table 5. provides a summary of the effects on special status species from construction of the NBS.

Table 5. Special Status Species Affected by TSP and Other Measures

Species	Status	Habitat in NJBB	NBS Impacts
American Bittern (*Botaurus lentiginosos*) BR	SE	Freshwater and brackish marshes for breeding season. Salt marshes rest of year.	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Bald Eagle (*Haliaeetus leucocephalus*) BR/NB	SE/ ST	Forest edges, open water	No impact.
Northern Harrier (*Circus cyaneus*) BR	SE	Tidal marshes	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Red knot* (*Calidris canutus rufa*) NB	**FT***, SE	Sandy beaches, spits, marsh islands, tidal flats	Disturbance and food chain would be avoided by avoiding placement during migration season.
Red knot* Critical habitat	PCH	Gently sloping, sandy beaches.	Potential for beneficial effect by helping saltmarsh and mudflats to keep pace with sea level change. A temporary loss of use of the critical habitat would

Species	Status	Habitat in NJBB	NBS Impacts
			be avoided by not placing sediments during red knot spring or fall migration.
Short-Eared Owl (*Asio flammeus*) BR	SE	Coastal marshes	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Black-Crowned Night-Heron (*Nycticorax nycticorax*) BR	ST	Maritime forests, scrub-shrub, mixed *Phragmites* marshes	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Yellow-Crowned Night-Heron (*Nyctanassa violacea*)	ST	Maritime forests, scrub-shrub on barrier and bay islands	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Osprey (*Pandion haliaetus*) BR	ST	Coastal rivers, marshes, bays & inlets. Nest on dead trees, platforms, poles	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Piping plover* (*Charadrius melodus*)	**FT*** SE	Ocean beaches, inlets, washover areas, tidal flats	Disturbance and food chain would be avoided by avoiding placement during migration season.
Black Rail* (*Laterallus jamaicensis*) BR/NB	FT/SE/ ST	High marshes	Temporary impacts during construction. Nesting disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.

Species	Status	Habitat in NJBB	NBS Impacts
Black Skimmer (*Rynchops niger*)	SE	Sandy beaches, inlets, sandbars, offshore islands	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Least Tern (*Sternula antillarum*)	SE	Sandy beaches, bay islands	Temporary impacts during construction. Disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Roseate Tern (*Sterna dougallii*)	**FE**/SE	Beaches w/ vegetated dunes	No breeding population currently in NJ. Potential disturbance to foraging areas. Indirect impacts through disruptions in food chain.
Sedge Wren (*Cistothorus platensis*)	SE	High marshes	Temporary impacts during construction. Nesting disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
American oystercatcher (*Haematopus palliates*)	SOC	Breed in coastal beaches, inlet spits, and back bay marshes.	Nesting disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Common Tern (*Sterna hirundo*)	SOC	Nest on islands, barrier beaches, coastal promontories, dredged material islands, and some other artificial structures.	Temporary impacts during construction. Nesting disturbance would be avoided by avoiding placement during nesting season. Negligible indirect impacts through disruptions in food chain would be temporary and localized.
Atlantic Loggerhead* (*Caretta caretta*)	**FT***/SE	Marine/Estuarine Pelagic/demersal	No direct impacts anticipated. Temporary indirect impacts through disruptions in food chain.

Species	Status	Habitat in NJBB	NBS Impacts
Kemp's Ridley* (*Lepidochelys kempii*)	**FE***/SE	Marine/Estuarine Pelagic/demersal	No direct impacts anticipated. Temporary indirect impacts through disruptions in food chain.
Atlantic Green Sea Turtle* (*Chelonia mydas*)	**FT***/ST	Marine/Estuarine Pelagic/demersal	No direct impacts anticipated. Temporary indirect impacts through disruptions in food chain.
North Atlantic Right Whale (Eubalaena glacialis)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Blue Whale (*Balaenoptera musculus*)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Fin Whale (*Balaenoptera physalus*)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Humpback Whale (*Megaptera novaeangliae*)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Sei Whale (*Balaenoptera borealis*)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Sperm Whale (*Physeter microcephalus*)	**FE**/SE	Marine pelagic	No direct or indirect impacts anticipated.
Northern Long-Eared Bat (*Myotis septentrionalis*)	FT	Summertime roosts beneath the bark of live and dead trees.	No direct or indirect impacts anticipated.
Tri-colored bats (*Perimyotis subflavus*)	PE	Caves, abandoned mines, road-associated culverts and forested habitats, and occasionally human structures.	No direct or indirect impacts anticipated.

Species	Status	Habitat in NJBB	NBS Impacts
Atlantic Sturgeon* (*Acipenser oxyrinchus oxyrinchus*)	**FE***/SE	Marine/estuarine Demersal/pelagic	Disturbance would be avoided by avoiding construction during migration season.
Northeastern Beach Tiger Beetle (*Cincindela d. dorsalis*)	SE	Atlantic coast sandy beaches	No direct or indirect impacts anticipated.
Bronze Copper (butterfly) (*Lycaena hyllus*)	SE	Brackish marshes	Potential disturbance to habitat: brackish marshes.
Seabeach amaranth* (*Amaranthus pumilus*)	**FT***/SE	Upper sandy beaches, accreting ends of inlets	No direct or indirect impacts anticipated.
Swamp Pink (*Helonias bullata*)	FT/SE	Forested wetlands, primarily in Atlantic white cedar forests	No direct or indirect impacts anticipated.

3.5.7 Other Wildlife

Construction of NBS would have minor short-term adverse impacts on wildlife species, particularly for migratory shorebirds, water birds and waterfowl. However, NBS have the potential for having beneficial impacts on these wildlife species by providing suitable foraging, resting, and breeding habitats 7 marshes vulnerable to conversion from sea level change to keep pace with sea level change.

3.5.8 Actions Taken to Minimize Impacts

The following measures would be implemented during NBS construction, to avoid effects on fish and wildlife.

- No roads or docks would be constructed for NBS construction. Marsh mats would be used if vehicles need to access marshes for removal of sediments from a DMPF or placement on a NBS site. Temporary moorings would be used as necessary. All temporary structures would be removed after construction and ground/sediment disturbance would be restored to the extent possible.
- Vessels would operate at speeds of less than 10 knots.

- Whenever operating in areas where sea turtles or marine mammals may be present, surrounding waters would be monitored during dredging or vessel operations. If sea turtles or marine mammals are observed, measures would be taken to avoid them.
- SAV surveys would be conducted, if it is deemed necessary to avoid impacts on surrounding SAV.
- Construction of NBS would comply with the seasonal restrictions in Table 6, to the maximum extent practicable. If the bird seasonal restrictions cannot be implemented, USACE would:
    - contact USFWS;
    - conduct surveys for active migratory bird nests and use buffers around nests to avoid impacts;
    - work with USFWS to determine if the DPMFs or placement sites are used by roseate terns, red knots, or black rail and if monitoring is necessary.

Table 6. Seasonal Restrictions for NBS construction

Restricted Activity	**Time of Year**	**Resource of Concern**
DPMF mining and placement for NBS	March 15 – September 30	Migratory birds (MBTA)
DPMF mining and placement for NBS	May 1 – June 15; July 15 – November 1	Red knot
DPMF mining and placement for NBS	May 1 – September 30	Roseate tern
DPMF mining and placement for NBS	April 1 – September 15	Black rail
Dredging and placement for NBS in areas south of Absecon Inlet	March 1 -June 30	Peak fish migration
Dredging and placement for NBS in areas north of Absecon Inlet	January 1 – June 30	Winter flounder/peak fish migration

<u>Black Rail</u>

For unavoidable, temporary impacts to black rail habitat (i.e., marsh vegetation) occurring outside the restricted season, USACE would:

- Use wetland mats and the smallest and lightest equipment practicable to minimize impacts to the marsh substrate; and
- Provide USFWS with a monitoring and contingency plan to document recovery of the native marsh vegetation within 2 years.

<u>Red Knot</u>

USACE would implement the following BMPs to avoid impacts to red knot and their habitat:

- Avoid or minimize vegetation planting in rufa red knot habitat.
- Use only native, non-woody plant species, when planting is necessary.
- Use care to avoid accidental introductions of non-native plants (e.g., clean construction equipment off-site before use).
- Minimize and monitor disturbance of rufa red knots from other human activities.
- Avoid deliberate introductions of non-native marine species (e.g., avoid aquaculture of nonnative species).
- Use care to avoid accidental introductions of non-native marine species and marine diseases (e.g., avoid ballast water discharges near rufa red knot habitat).

3.5.8.1 General BMPs

The following BMPs would be implemented for all construction activities:

Black Rail

- If an eastern black rail is observed, it would be reported to:
  - The NJFO and the NJDEP Wildlife Tracker (located at: https://dep.nj.gov/njfw/conservation/reportingrare-wildlife-sightings/).
  - eBird via smartphone application or online at: https://ebird.org/. Identification tips are available from the Cornell Lab of Ornithology. Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.

Northern Long-eared Bat, Tri-Colored Bats

- If a northern long-eared bat or tri-colored bat is observed, it would be reported to the USWFWS NJFO and the NJDEP Wildlife Tracker (located at: https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/).

Red Knot

- If a red knot is observed, it would be reported to:
  - The NJDEP Wildlife Tracker (located at: https://dep.nj.gov/njfw/conservation/reporting-rare-wildlifesightings/).
  - eBird via smartphone application or online at: https://ebird.org/. Identification tips are available from the Cornell Lab of Ornithology. Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.
  - If the red knot is banded it would be reported to bandedbirds.org.

Piping Plover

- While beach plantings are unlikely, USFWS would be contacted, prior to any beach plantings.
- If a piping plover is observed, it would be reported to:
  - The NJFO and the NJDEP Wildlife Tracker (located at: https://dep.nj.gov/njfw/conservation/reportingrare-wildlife-sightings/);

  - https://www.fws.gov/story/congratulations-spotting-banded-piping-plover-now-what, if it has a color leg band.

Roseate Tern

- Observations of roseate terns would be reported to the following:
  - The NJDEP Wildlife Tracker (located at: https://dep.nj.gov/njfw/conservation/reportingrare-wildlife-sightings/).
  - eBird via smartphone application or online at: https://ebird.org/. Identification tips are available from the Cornell Lab of Ornithology. Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.
  - United States Geological Survey Bird Banding Lab, if they are leg banded. Reports are most useful when they include a photo and the alphanumeric code on the colored band.

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3.6 Proposed Disposal Site Determinations

3.6.1 Mixing Zone Determination

It is assumed that there would be no discharge quality concerns and that no mixing zones would be required.

3.6.2 Determination of Compliance with Applicable Water Quality Standards

Prior to undertaking any actions for the CSRM structural alternatives or NNBFs, a Clean Water Act Section 401 Water Quality Certification and a Coastal Zone Management Act Federal Consistency Determination would be obtained from NJDEP.

3.6.3 Potential Effects on Human Use Characteristics

3.6.3.1 Municipal and Private Water Supply

There would be no effect on municipal and private water supplies.

3.6.3.2 Recreational and Commercial Fisheries

Construction impacts would have minor, localized, temporary adverse impacts on finfish and shellfish through the generation of turbidity. Most mobile fish species are capable of moving out of the area until these activities cease. However, smaller, and less mobile fish and prey species are more likely to be impacted.

3.6.3.3 Water-related Recreation

Construction of NBS may result in temporary reduced recreational access and opportunities.

3.6.3.4 Aesthetics

The NBS sites would be constructed in aquatic ecosystems, and would therefore, be low-profile. Therefore, they are not expected to have adverse effects on viewsheds.

Additionally, the NBS, may improve aesthetics by preserving natural features that are part of the surrounding landscapes and bay features.

3.6.3.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

Four NBS are on “sanctuaries and refuges”; Lacey/Sunset Beach and Marsh Elder Island are on Forsythe National Wildlife Refuge; Parker Island is a bird sanctuary; and Waretown is part of Upper Barnegat Bay Wildlife Management Area. The NBSs are consistent with the purposes of a sanctuary or refuge and would be implemented in close coordination with the agencies that manage these areas.

3.7 Determination of Cumulative Effects on the Aquatic Ecosystem

Short-term effects on water quality and habitat disruptions are expected to occur and may intensify if other similar actions occur in the region. Overall, NBS would be expected to have beneficial cumulative effects, by providing more “softer” nature-based solutions that augment existing natural systems are already under stress from sea level change and other anthropogenic influences such as development, water quality and habitat degradation.

3.8 Determination of Secondary Effects on the Aquatic Ecosystem

The indirect/secondary impacts of NBS would be beneficial by providing sustainable aquatic habitats for a number of aquatic biota such as shellfish, finfish, and a number of different types of birds including shorebirds, wading birds, waterfowl, raptors, and neo-tropical migrants.

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

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

B. The alternative measures considered for accomplishing the project objectives are detailed in Sections 7.4 and 7.5 of the Supplemental Draft Integrated Feasibility Report and Environmental Impact Statement (SDIFR-EIS).

C. A Section 401 Water Quality Certification will be obtained from the New Jersey Department of Environmental Protection prior to undertaking any of the actions discussed in this evaluation.

D. The proposed actions are not expected to violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. The proposed actions would comply with the Endangered Species Act of 1973. Section 7 Consultation would be completed prior to undertaking any of the actions discussed in this evaluation.

F. The proposed actions would not violate the protective measures for any Marine Sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

G. With appropriate mitigation, the proposed actions are not expected to result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on life stages or aquatic life and other wildlife dependent on aquatic ecosystem diversity, productivity, and stability; and recreational, aesthetic, and economic values will not occur.

H. Appropriate steps to minimize potential adverse impacts of the discharge on aquatic systems include implementing BMPs and incorporating “avoid” and “minimize” in subsequent design phases along with including compensatory mitigation.

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

5.0 REFERENCES

New Jersey Department of Environmental Protection (NJDEP). 1997. The management and regulation of dredging activities and dredged material in New Jersey's tidal waters.