

**US ARMY CORPS
OF ENGINEERS
NEW YORK DISTRICT**



**NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION**

**ATLANTIC COAST OF NEW JERSEY,
SANDY HOOK TO BARNEGAT INLET
BEACH EROSION CONTROL PROJECT,
SECTION I - SEA BRIGHT TO OCEAN TOWNSHIP:**

ELBERON TO LOCH ARBOUR REACH

**DRAFT INTEGRATED HURRICANE SANDY
LIMITED REEVALUATION REPORT AND
ENVIRONMENTAL ASSESSMENT**

February 2014

**Atlantic Coast of New Jersey,
Sandy Hook to Barnegat Inlet,
Beach Erosion Control Project,
Section I - Sea Bright to Ocean Township:**

Elberon to Loch Arbour Reach

**Draft Integrated Hurricane Sandy Limited
Reevaluation Report and
Environmental Assessment**



**New York District
U.S. Army Corps of Engineers**

Executive Summary

The U.S. Army Corps of Engineers (USACE), New York District (District), in partnership with the non-Federal sponsor, New Jersey Department of Environmental Protection (NJDEP), is proposing to construct the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township: Elberon to Loch Arbour Reach within the Elberon neighborhood of the City of Long Branch, the Borough of Deal, the Borough of Allenhurst, and the Village of Loch Arbour, in Monmouth County, New Jersey.

The Elberon to Loch Arbour Reach is an approximately 3.5 mile reach within the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township (“Sandy Hook to Barnegat Inlet Section I”). Construction of the other reaches that comprise Sandy Hook to Barnegat Inlet Section I, were completed between 1995 and 1999. However, the Elberon to Loch Arbour Reach was not built due to a lack of public access, lack of support by the local municipalities and, as a result, NJDEP’s inability to acquire the necessary real estate.

In response to extensive storm damages resulting from Hurricane Sandy and an increased vulnerability to future events, Congress passed the Disaster Relief Appropriations Act of 2013 (Public Law [P.L.] 113-2). The Elberon to Loch Arbour Reach was identified in the Second Interim Report to Congress as an authorized but unconstructed (ABU) project.

An approved Hurricane Sandy Limited Reevaluation Report (HSLRR) is required to proceed with construction and to be completed with funds appropriated through P.L. 113-2. This HSLRR will serve as the decision document to use funds provided by P.L. 113-2 and for execution of a new Project Partnership Agreement (PPA) with the non-Federal sponsor, the NJDEP, in order to complete initial project construction and continue renourishments for the remaining 32-year period of analysis of Sandy Hook to Barnegat Inlet Section I.

The recommended plan consists of constructing a 100 ft wide beach berm at an elevation of +7.3 ft North American Vertical Datum 1988 (NAVD88) (+10 ft Mean Low Water (MLW)) that includes 2 ft high storm cap designed at an elevation of +9.3 ft NAVD88 (+12 ft MLW). Approximately 4,450,000 cubic yards (cy) of sand from the Sea Bright Borrow Area (SBBA) will be used to construct the beach berm. Six existing groins will be modified to allow sediment to pass through and prevent sediment impoundment. Sixteen existing outfalls will be modified as a result of the beach berm construction. Renourishment for the Elberon to Loch Arbour Reach will occur every six years for the remaining 32-year period of analysis at an expected volume of 660,000 cy per renourishment cycle.

The total project first cost, which includes real estate administration costs and pertinent contingency, engineering and design and construction management costs, is \$134,638,000. Pursuant to P.L. 113-2, the initial construction cost of the project will be implemented at 100% Federal expense. The cost for each renourishment cycle for the Elberon to Loch Arbour Reach is \$17,124,000 and is a fraction of the total cost of \$54,676,000 for each renourishment cycle for Sandy Hook to Barnegat Inlet Section I, both to be cost-shared at 65% Federal and 35% non-Federal.

The recommended plan has total average annual costs of \$8,412,000, and total average annual benefits of \$34,450,000. Because the Elberon to Loch Arbour Reach is not a separable element of Sandy Hook to Barnegat Inlet Section I, costs and benefits were analyzed for Sandy Hook to Barnegat Inlet Section I as a whole and determined that the project is economically justified, with a Benefit Cost Ratio (BCR) of 4.1.

Escalating to the midpoint of construction, the fully funded initial project first cost is \$139,409,000 for the Elberon to Loch Arbour Reach and the fully funded renourishment cost (total continuing construction) for Sandy Hook to Barnegat Inlet Section I is \$498,900,000. The fully funded renourishment cost is based upon a renourishment quantity of 2,600,000 cy per renourishment cycle every six years for the remaining 32-year period of analysis for Sandy Hook to Barnegat Inlet Section I. These two fully funded costs are required to support the PPA.

The Environmental Assessment updates the 1989 Environmental Impact Statement and 1990 Record of Decision for Sandy Hook to Barnegat Inlet Section I and addresses any changes to environmental conditions and minor changes proposed by this HSLRR for the Elberon to Loch Arbour Reach. No adverse impacts to cultural or environmental resources will occur as a result of project implementation. Monitoring of potential impacts to cultural resources will occur to ensure that there are no impacts to shipwrecks in the Elberon to Loch Arbour Reach.

PERTINENT DATA

DESCRIPTION

The Hurricane Sandy Limited Reevaluation Report (HSLRR) provides for coastal storm risk management through the construction of a beach berm and groin modifications from the southern portion of the City of Long Branch in the Elberon neighborhood to the Village of Loch Arbour, Monmouth County, NJ.

LOCATION: Elberon neighborhood of the City of Long Branch, Borough of Deal, Borough of Allenhurst, Village of Loch Arbour, Monmouth County, NJ

COASTAL STORM RISK MANAGEMENT FEATURES

Beach Fill for the Elberon to Loch Arbour Reach

Volume of Initial Fill	4,450,000 cy
Volume of Renourishment Fill	660,000 cy
Interval of Renourishment	Every six years for 32-year period of analysis
Length of Fill	3.5 miles
Width of Beach Berm	100 ft at +7.3 ft NAVD88 (+10 ft MLW) with 2 ft berm cap at +9.3 ft NAVD88 (+12 ft MLW)

Slopes

Beach Berm	1V:10H from +9.3 ft NAVD88 to -2.7 ft NAVD88; 1V:35H from -2.7 ft NAVD88 to -25 ft NAVD88
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Groins

Six existing groins will be modified to prevent sediment impoundment.

Outfall Modifications

Sixteen existing outfalls will be modified to ensure they remain operational after construction and that their discharges do not damage the newly constructed beach. The proposed modifications include:

- Extending nine outfalls to the edge of the construction template
- Installing retention systems for five outfalls
- Resetting two outfalls

ENVIRONMENTAL MITIGATION

Cultural resources mitigation will consist of monitoring the effects of the project on the *Adonis/Rusland* archaeological complex with each renourishment cycle. Wrecks within the Sea Bright Borrow Area (SBBA) will be buffered to prevent impacts from dredging.

COSTS FOR ELBERON TO LOCH ARBOUR REACH (FY14 price levels)

Initial Project First Cost	\$134,638,000
Total Real Estate Cost (included in Initial Project First Cost)	\$1,148,000
Renourishment at 6-year intervals	\$17,124,000

ECONOMIC ANALYSIS (FY14 price levels)

Elberon to Loch Arbour Reach

Initial Project First Cost	\$141,080,000
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Sandy Hook to Barnegat Inlet Section I

Annual Project Cost (FY14 PL, Discounted at 3.5% over 50 years)	\$18,160,000
Annual Project Cost (FY88 PL, Discounted at 3.5% over 50 years)	\$8,412,000
Average Annual Benefits (FY88 PL)	\$34,450,000
Average Annual Net Benefits (FY88 PL)	\$26,038,000
Benefit Cost Ratio*	4.1 *

* Represents updated Benefit Cost Ratio (BCR) for the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I – Sea Bright to Ocean Township. The Elberon to Loch Arbour Reach is located within the Project and was not analyzed as a separable element. Refer to Section 4.6 Economic Analysis for further discussion on the economic analysis.

COST APPORTIONMENT (October 2013 price levels)

Fully Funded Initial Project First Cost for PPA

Federal Project Cost (100%)	\$139,409,000
Non-Federal Project Cost (0%)	\$0
Total	\$139,409,000

Fully Funded Renourishment Cost for PPA

Federal Project Cost (65%)	\$324,285,000
Non-Federal Project Cost (35%)	\$174,615,000
Total	\$498,900,000

COST ALLOCATION FOR FUTURE RENOURISHMENTS

(Every 6 years for 32 years – FY14 price levels)

Federal (65%)	\$35,539,000
Non-Federal (35%)	\$19,137,000
Total (per cycle)	\$54,676,000

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J: Clean Air Act General Conformity Determination
K: Public Access Plan
L: Finding of No Significant Impact
M: Cultural Resources Programmatic Agreement

GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS

ABU	Authorized but Unconstructed
AFI	Anadromous Fisheries Inventory
APE	Area of Potential Effect
ARA	Abbreviated Risk Analysis
BA	Biological Assessment
BCR	Benefit to Cost Ratio
BO	Biological Opinion
CEQ	Council On Environmental Quality
CERCLIS	Comprehensive Environmental Response, Compensation, Liability Information System
CFR	Code Of Federal Regulations
CW	Civil Works Program
CWCCIS	Civil Works Construction Cost Index
cy	Cubic yards
CZM	Coastal Zone Management
District	New York District
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ERDC	Engineering and Design Research Center
FCCE	Flood Control and Coastal Emergency Program
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
FWOPC	Future Without Project Conditions
GDM	General Design Memorandum
GIS	Geographic Information System
HSLRR	Hurricane Sandy Limited Reevaluation Report
HTRW	Hazardous, Toxic, And Radiological Waste
IPCC	Intergovernmental Panel for Climate Change
KCS	Known Contaminated Sites
MLW	Mean Lower Water
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NACCS	Northeast Atlantic Coast Comprehensive Study
NAVD88	North American Vertical Datum of 1988
NED	National Economic Development
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
N.J.A.C.	New Jersey Administrative Code

GLOSSARY OF TERMS, ACRONYMS AND ABBREVIATIONS

NJBMP	New Jersey Biological Monitoring Plan
NJDEP	New Jersey Department of Environmental Protection
NJDEP LURP	New Jersey Department of Environmental Protection, Land Use Regulation Program
NJFWS	New Jersey Fish and Wildlife Service
NJHPO	New Jersey Historic Preservation Office
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmosphere Administration-Fisheries
NOx	oxides of nitrogen
NPL	National Priorities List
NRC	National Research Council
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
OMR&R	Operations, Maintenance, Repair and Rehabilitation
PA	Programmatic Agreement
PAL	Planning Aid Letter
PCB	Polychlorinated biphenyl
PED	Preconstruction Engineering And Design
P.L.	Public Law
PPA	Project Partnership Agreement
RCRIS	Resource Conservation and Recovery Information System
S&A	Supervision And Administration
SAV	submerged aquatic vegetation
SBBA	Sea Bright Borrow Area
SBO	Streamlined Biological Opinion
SLR	Sea Level Rise
SMA	Seasonal Management Areas
SOC	Statement of conformity
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish And Wildlife Service
VOCs	Volatile Organic Compounds
WRDA	Water Resources Development Act

1. Introduction

The U.S. Army Corps of Engineers (USACE), New York District (District), in partnership with the non-Federal sponsor, New Jersey Department of Environmental Protection (NJDEP), is proposing to construct the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township: Elberon to Loch Arbour Reach (“Elberon to Loch Arbour Reach”) which encompasses the Elberon neighborhood of the City of Long Branch, the Borough of Deal, the Borough of Allenhurst, and the Village of Loch Arbour, in Monmouth County, New Jersey (Figure 1). This project was originally authorized as a beach erosion control project, commonly referred to as a shore protection project. The USACE now refers to shore protection projects as coastal storm risk management projects to improve the communication of the true risks the public faces from coastal storms.

The Elberon to Loch Arbour Reach is approximately 3.5 mile long and the last reach of the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township (“Sandy Hook to Barnegat Inlet Section I”) to be constructed and was authorized by the River and Harbor Act of July 3, 1958.

Construction of the other reaches in Sandy Hook to Barnegat Inlet Section I was initiated in 1994 and completed in 1999. However, construction of the Elberon to Loch Arbour Reach was deferred due to inadequate public access, lack of project support from several municipalities, and the inability to acquire real estate necessary to construct the project.

In response to extensive storm damages resulting from Hurricane Sandy and an increased vulnerability to future events, Congress passed the Disaster Relief Appropriations Act of 2013 (Public Law (P.L.) 113-2). The Elberon to Loch Arbour Reach was identified in the Second Interim Report to Congress as an authorized but unconstructed (ABU) project. An approved Hurricane Sandy Limited Reevaluation Report (HSLRR) is required to proceed with construction and completed with funds appropriated through P.L. 113-2.

The recommended plan consists of constructing a 100 ft wide berm at an elevation of +7.3 ft North American Vertical Datum 1988 (NAVD88) (+10 ft Mean Low Water (MLW)) that includes a 2 ft high storm cap designed at an elevation of +9.3 ft NAVD88 (+12 ft MLW). Six existing groins will be modified to allow sediment to pass through and prevent sediment impoundment. Sixteen existing outfalls will be modified as a result of the beach berm creation. The project includes a renourishment cycle of every six years for the 32-year period of analysis. This HSLRR will identify the sand quantities and associated costs for initial construction and renourishments for the Elberon to Loch Arbour Reach as well as sand quantities and costs for Sandy Hook to Barnegat Inlet Section I to support the Project Partnership Agreement (PPA).

This integrated HSLRR and Environmental Assessment (EA) serve as a decision document to support the construction of the Elberon to Loch Arbour Reach and meet National Environmental Policy Act (NEPA) requirements. The HSLRR provides updated costs that serve as the basis for a PPA between the Federal Government and the non-Federal Sponsor. This HSLRR also provides an updated economic analysis and demonstrates that the plan is economically justified, environmentally sound and technically acceptable, in accordance with USACE policy. Finally,

this HSLRR addresses the requirements of P.L. 113-2, including cost sharing, sustainability, resiliency, and consistency with the North Atlantic Coast Comprehensive Study (NACCS).

The EA updates the 1989 Environmental Impact Statement and 1990 Record of Decision for Sandy Hook to Barnegat Inlet Section I and addresses any changes to environmental conditions and minor changes proposed by this HSLRR for the Elberon to Loch Arbour Reach. No adverse impacts to cultural or environmental resources will occur as a result of project implementation. Monitoring of potential impacts to cultural resources will occur to ensure that there are no impacts to shipwrecks in the Elberon to Loch Arbour Reach

This report summarizes the history of the project, the results of the limited reevaluation and contains sections appropriate for EA documentation. Some section headings are marked with an asterisk to indicate consistency with requirements of USACE studies and NEPA documents.

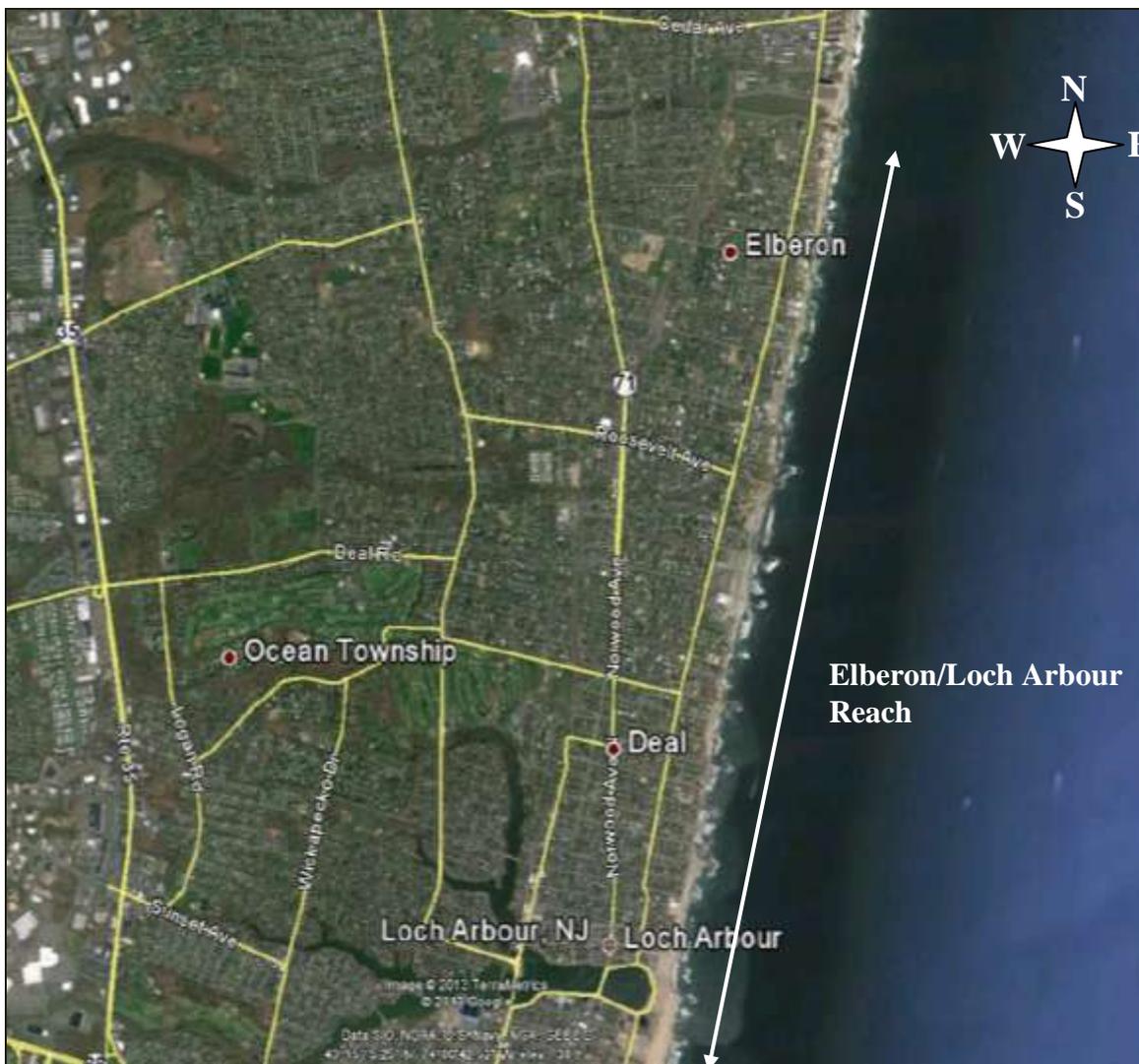


Figure 1: Elberon to Loch Arbour Reach - Project Area

1.1 Project History and Authorization

The Elberon to Loch Arbour Reach is located within Sandy Hook to Barnegat Inlet Section I which was as initiated in response to continued beach erosion and damages incurred along the coast of New Jersey as a result of coastal storms such as hurricanes and nor'easters. The original Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project report recommending Federal action was submitted to Congress in 1956 and authorized by the River and Harbor Act of July 3, 1958, in accordance with House Document No. 332, 85th Congress, second session.

“Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet, House Document Numbered 332, Eight-fifth Congress, at an estimated cost of \$6,775,000;”

Further modifications associated with the non-Federal sponsor cost share and public access requirements were made by Section 854 of the Water Resources Development Act (WRDA) of 1986, (P.L. 99-662)

“SEC. 854. SANDY HOOK TO BARNEGAT INLET, NEW JERSEY.

(a) Subject to section 903(a) of this Act, the project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, authorized by the River and Harbor Act of 1958, is modified to provide that the first Federal construction increment of the Ocean Township to Sandy Hook reach of such project shall consist of a berm of approximately 50 feet at Sea Bright and Monmouth Beach extending to and including a feeder beach in the vicinity of Long Branch, at a total cost of \$40,000,000, with an estimated first Federal cost of \$21,200,000 and an estimated first non-Federal cost of \$18,800,000.

(b) The non-Federal share of the cost of construction and maintenance of the Ocean Township to Sandy Hook reach of the project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, shall consist of amounts expended by non-Federal interests for reconstruction of the seawall at Sea Bright and Monmouth Beach, New Jersey.

(c) Before initiation of construction of any increment of the project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, non-Federal interests shall agree to provide public access to the beach for which such increment of the project is authorized in accordance with all requirements of State law and regulations.”

Section 4 of the 1988 WRDA (P.L. 100-676):

“SEC. 854. SANDY HOOK TO BARNEGAT INLET, NEW JERSEY.

“(a) Subject to section 903(a) of this Act, the project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, authorized by the River and Harbor Act of 1958, is modified to provide that the first Federal construction increment of the Ocean Township to Sandy Hook reach of such project shall consist of a berm of approximately 100 feet at Sea Bright and Monmouth Beach extending to and including a feeder beach in the vicinity of Long Beach substantially in accordance with the plan recommended in the draft General Design Memorandum (GDM) entitled ‘Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet, Beach Erosion Control Project, Section I - Sea Bright to Ocean Township, New Jersey’, dated May 1988, at a total initial cost for such increment of \$91,000,000 and an annual cost of \$1,200,000 for periodic beach nourishment over the life of such increment.

“(b) The non-Federal share of the costs of construction and maintenance of the increment referred to in subsection (a) shall be--

"(1) for the first \$40,000,000 in costs, the amounts expended by non-Federal interests for reconstruction of the seawall at Sea Bright and Monmouth Beach, New Jersey; and

"(2) for costs in excess of \$40,000,000, a non-Federal share which is in accordance with title I of this Act.

"(c) Before initiation of construction of any increment of the project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, non-Federal interests shall agree to provide public access to the beach for which such increment of the project is authorized in accordance with all requirements of State law and regulations."

Section 102(r) of the WRDA of 1992 (P.L. 102-580):

"SANDY HOOK TO BARNEGAT INLET, NEW JERSEY- The project for beach erosion control, Sandy Hook to Barnegat Inlet, New Jersey, authorized by the River and Harbor Act of 1958, is modified to provide that costs incurred by the non-Federal interests to stabilize the seawall at Belmar and Spring Lake, New Jersey, shall be credited, to the extent that the Secretary determines that the work of stabilizing the seawall is compatible with the project, against the non-Federal share of the cost of construction and maintenance of section 2 of the project (Asbury Park to Manasquan)."

Due to its size, the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project was divided into sections (Figure 2). Sections I and II are located within the New York District Civil Works Program boundary. Section I extends 12 miles from Sea Bright to Loch Arbour (formerly Ocean Township) with the Elberon to Loch Arbour Reach comprising the southernmost 3.5 miles. Section II begins immediately south of the Elberon to Loch Arbour Reach in the City of Asbury Park and extends nine miles to the south end of the Manasquan. Section III is located within USACE Philadelphia District's Civil Works Boundary.

The 1958 authorized plan for Section I included constructing a 100 ft wide berm at an elevation of +7.3 ft NAVD88 (+10 ft MLW), 23 new groins and extending 14 existing groins. New groins would be spaced 1,000 to 1,200 ft apart. Additionally, the authorized plan included Federal participation in periodic renourishment costs for a period of ten years.

A GDM for Sandy Hook to Barnegat Inlet Section I was completed in 1989 (1989 GDM). The purpose of the 1989 GDM was to present final formulation and design of Section I of the authorized project. The Modifications to the authorized design resulting from the 1989 GDM reevaluation consisted of:

- Adding a 2 ft high storm cap on the proposed berm to manage risk of overtopping and erosion; and
- Modifying 15 existing groins to allow sediment transport to prevent sediment impoundment.

Sandy Hook to Barnegat Inlet Section I was further sub-divided into four construction contracts: 1A, 1B, 2, and 3 (Figure 3). The Elberon to Loch Arbour Reach comprises the 3.5 mile Contract 3 reach from Lake Takanassee to Deal Lake. Since WRDA 1992, there have been no modifications to the Project or Project Authorization.

The District completed construction of Section I Contracts 1A and 1B in November 1995 and December 1996 respectively. Section I, Contract 2, was completed in September 1999. The Elberon to Loch Arbour Reach was not constructed due to lack of public access, a lack of project support from several of the municipalities and real estate acquisition issues. The construction of Sandy Hook to Barnegat Inlet Section II – Asbury Park to Manasquan was completed by the District in 2001. Renourishments were completed in limited areas of Sandy Hook to Barnegat Inlet Section I and Section II in 2002, 2009, 2012 and 2013.

On October 29, 2012, Hurricane Sandy made landfall approximately six miles north of Atlantic City, New Jersey, after it collided with a blast of arctic air from the north, creating conditions for an extraordinarily historic storm along the East Coast with the worst coastal impacts on the Atlantic Coast of northern New Jersey and New York. Damages within the Elberon to Loch Arbour Reach included the destruction of two homes, damage to existing bulkheads and seawalls, and loss of oceanfront property. There was extensive erosion to the shoreline, but inundation was less of a problem due to the existing high ground throughout the Elberon to Loch Arbour Reach.

The Elberon to Loch Arbour Reach was subsequently identified in the Second Interim Report to Congress prepared under the Disaster Relief Appropriations Act of 2013 through P.L. 113-2 as an ABU project. Funds to prepare this HSLRR and the future work (initial construction only) being recommended for construction is being funded under the Disaster Relief Appropriations Act of 2013.



Figure 2: Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project – Section I and II – Project Area

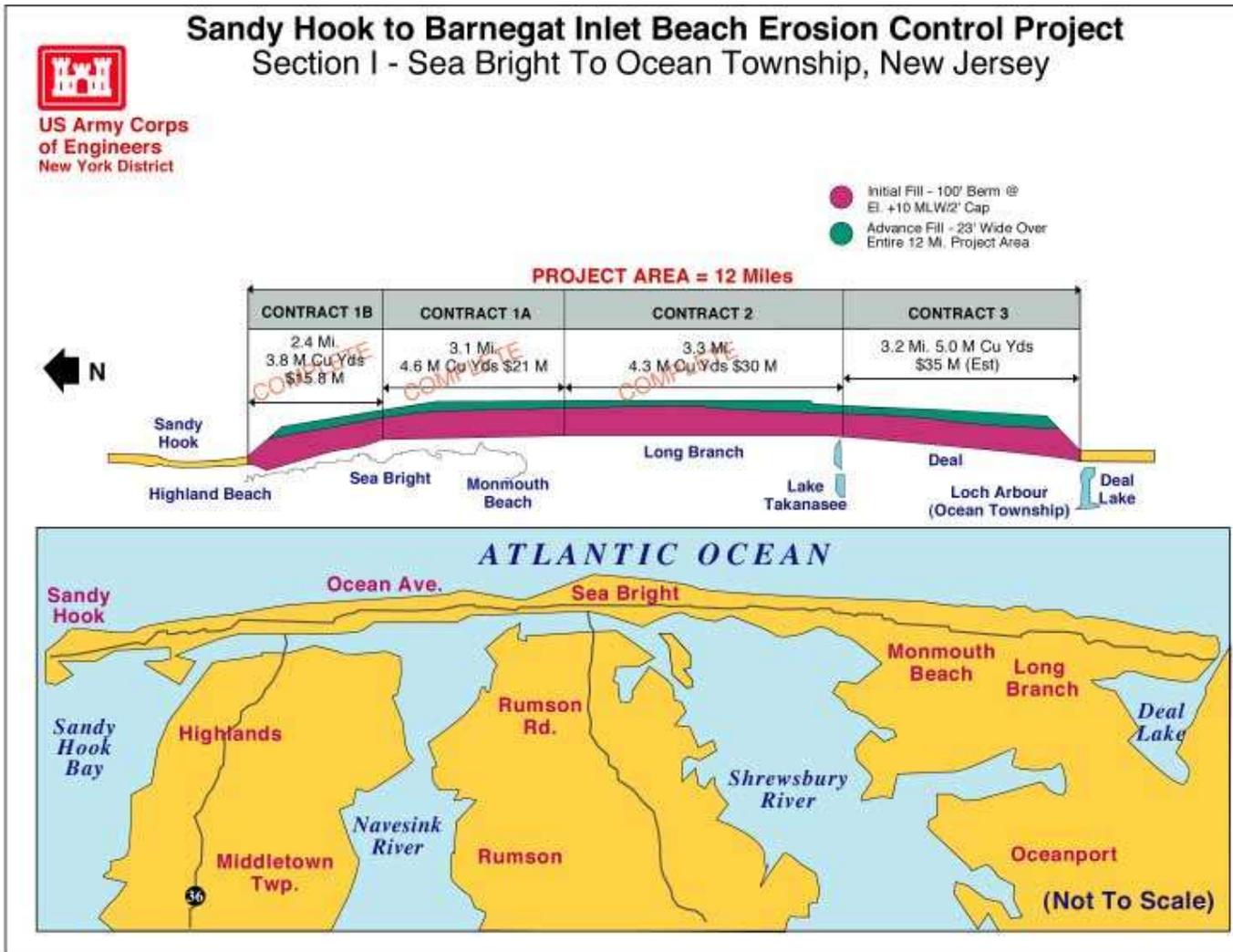


Figure 3: Construction Contracts for the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township

1.2 Project Description

The Elberon to Loch Arbour Reach extends approximately 3.5 miles, beginning at Lake Takanessee in the City of Long Branch neighborhood of Elberon and ending near Deal Lake, in the Village of Loch Arbour.

This 3.5 mile unconstructed portion of Sandy Hook to Barnegat Inlet Section I will be designed and constructed in accordance with the 1958 authorized plan for Section I including construction of a 100 ft wide berm at an elevation of +7.3 ft NAVD88 (+10 ft MLW). Though authorized, new groin construction and extension of existing groins are not required for the construction of the Elberon to Loch Arbour Reach. The project will include, as authorized in WRDA 1958, Federal participation in periodic renourishment. No modifications to Sandy Hook to Barnegat Inlet Section I will be made and no further authorizations are required to design and construct the Elberon to Loch Arbour Reach.

The features of the Elberon to Loch Arbour Reach include the following:

- Construction of beach berm
 - 100 ft wide berm at an elevation of +7.3 ft NAVD88 (+10 ft MLW);
 - 2 ft high storm berm cap designed at an elevation of +9.3 ft NAVD88 (+10 ft MLW) will be included to manage risk from overtopping and erosion;
 - Slopes of design profile consist of an onshore slope of 1V:10H from elevation +7.3 ft NAVD88 to -2.7 ft NAVD88 and an offshore slope 1V:35H from elevation -2.7 ft NAVD88 to -25 ft NAVD88. (Figure 4);
 - Approximately 4,450,000 cubic yards (cy) of sand;
- Modification of six existing stone groins to allow for sediment transport and prevent sediment impoundment;
- Modification of 16 outfall structures; ten of which will be extended to the edge of the construction template; and
- A beach renourishment cycle every 6 years for 32 years at an expected volume of 660,000 cy of sand per cycle.

Construction is currently scheduled to begin in October 2014 and to be completed in November 2015.

The 4,450,000 cy of material to create the berm cap would come from the Sea Bright Borrow Area (SBBA) (Figure 5). The SBBA is a 3-square mile area located 1-3 miles offshore of the southern end of Sandy Hook, NJ and has been used for previous beach nourishment actions (USACE-WES 1996). The mean water depth of the borrow area is 50 feet (USACE-NYD 2006).

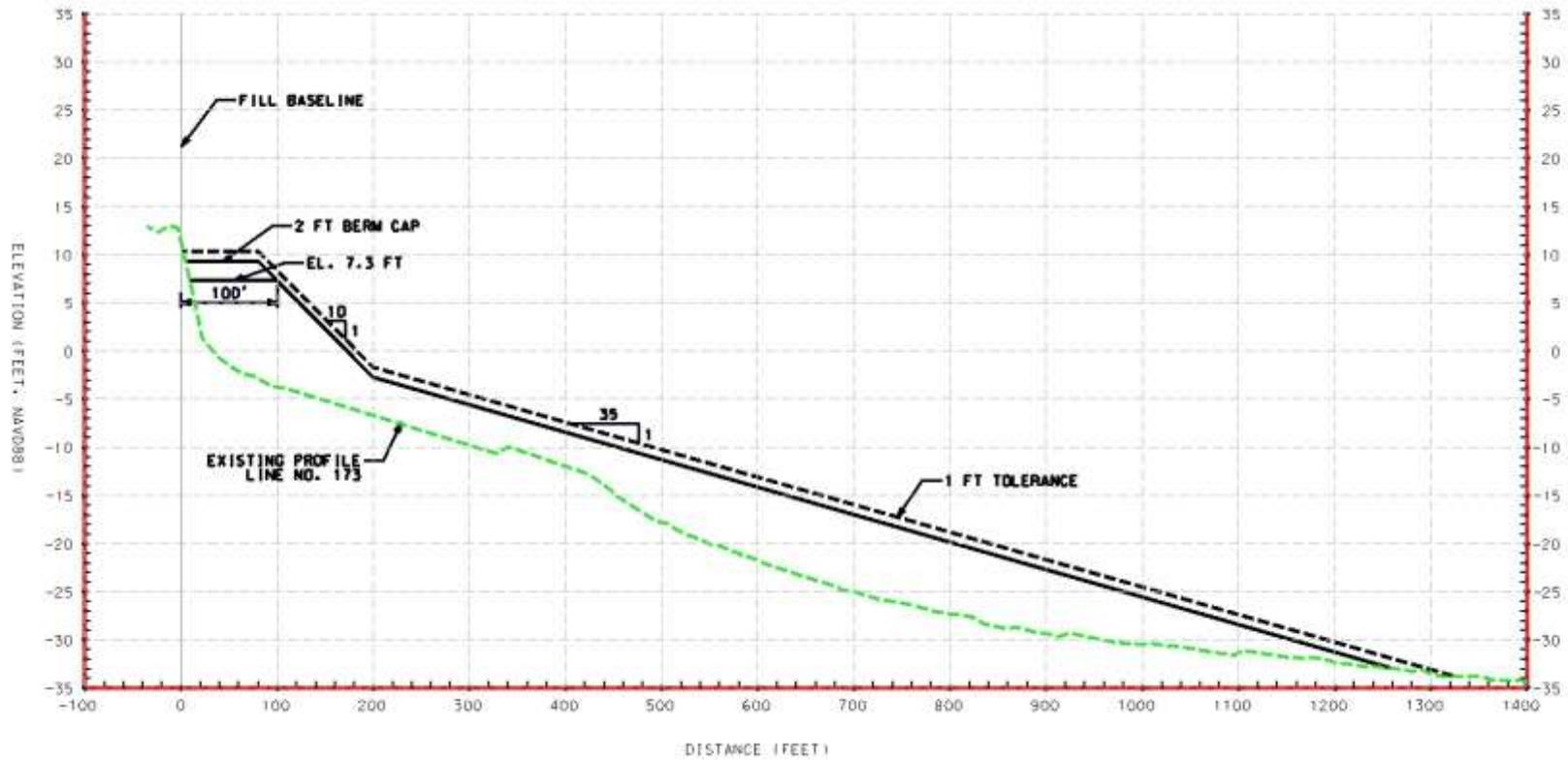


Figure 4: Typical Design Profile Cross Section for the Elberon to Loch Arbour Reach

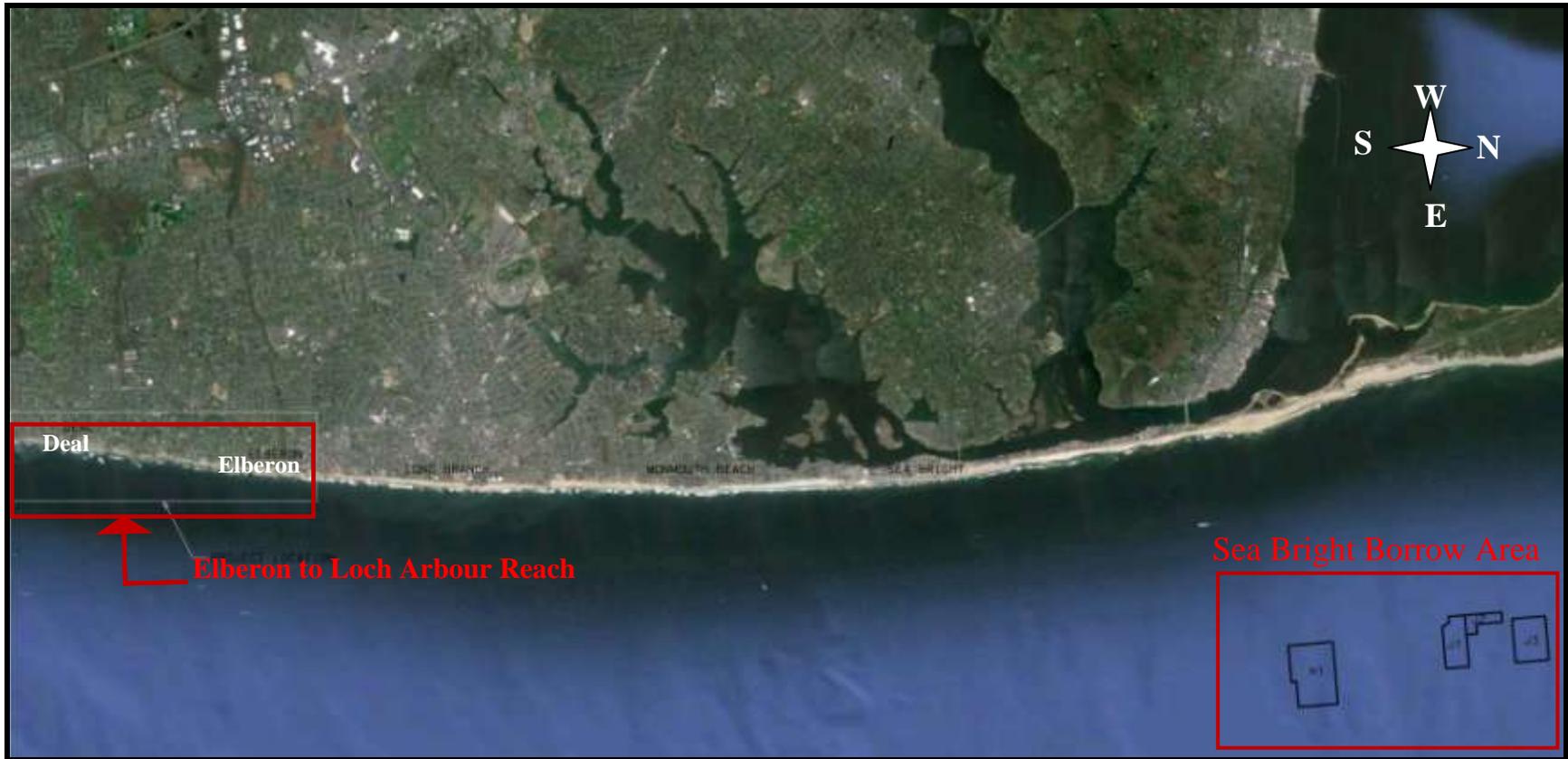


Figure 5: Sea Bright Borrow Area Location in Relation to the Elberon to Loch Arbour Reach

1.3 Purpose and Need For Action*

In general, erosion has significantly reduced the width of the naturally occurring beach within the project area thus increasing the susceptibility of existing development and infrastructure to storm damage. Attempts have been made by individual homeowners and municipalities to prevent erosion utilizing variations of rip-rap and bulkheads to protect the bluffs and adjacent structures and infrastructure in several locations within the project area. Hurricane Irene, and to a much greater extent, Hurricane Sandy, have further exacerbated the conditions and have increased community vulnerability to future storm events. In many locations throughout the Elberon to Loch Arbour Reach, bulkheads, sea walls, residential property, and outfalls were significantly damaged by Hurricane Sandy. The most significant loss occurred at Pullman Avenue where 50 feet of the street was eroded landward. At this location two homes were destroyed with approximately one-third of the associated oceanfront property completely lost. The proposed project will provide a comprehensive and long term reduction in risk to erosion and wave attack from future coastal storms and will manage risk to the private and public property that has been damaged or lost due to past storm events, and most recently, Hurricane Sandy.

This HSLRR has been prepared to address the requirements of P.L. 113-2 and the USACE Second Interim Report to Congress and to support construction of the Elberon to Loch Arbour Reach. This HSLRR also serves as the basis for a PPA between the Federal Government and the non-Federal Sponsor, the NJDEP.

The PPA is the agreement which commits both the Federal Government and the non-Federal sponsor to implement a coastal storm risk management project with a remaining 32-year period of analysis, to be accomplished via initial construction and periodic beach fill renourishment at 6-year intervals. This HSLRR does not reanalyze the alternatives, but simply updates the economic and environmental analysis, and reaffirms the economic justification and project purpose.

1.4 National Environmental Policy Act Requirements

Unlike other single-topic environmental laws (e.g., Clean Air Act, or Clean Water Act), the NEPA encourages protection of all aspects of the environment. The President's Council on Environmental Quality (CEQ) has pointed out that "NEPA is distinguishable, purposefully so, from other environmental statutes. It targets no specific pollution sources or human health risks for treatment, prescribes formulation of no abatement techniques or remedial actions, and establishes neither milestones nor timetables for achieving its goals" (CEQ, 1990). Instead, NEPA requires that agencies take a systematic, interdisciplinary approach to agency decision making that will ensure the integrated use of the natural sciences, social sciences, and design arts.

The EA updates the 1989 Environmental Impact Statement and 1990 Record of Decision for Sandy Hook to Barnegat Inlet Section I and addresses any changes to environmental conditions and minor changes proposed by this HSLRR for the Elberon to Loch Arbour Reach. No adverse impacts to cultural or environmental resources will occur as a result of project

implementation. Monitoring of potential impacts to cultural resources will occur to ensure that there are no impacts to shipwrecks in the Elberon to Loch Arbour Reach.

An EA is a concise public document prepared by the Federal agency to determine whether the proposed action has the potential to cause significant environmental effects (40 Code of Federal Regulations (CFR) 1508.9(a)). The purposes of an EA are to:

- Provide evidence and analysis sufficient to determine whether an Environmental Impact Statement (EIS) is required;
- Aid a Federal agency's compliance with NEPA when no EIS is necessary;
- Facilitate preparation of an EIS when one is necessary; and
- Serve as the basis to justify a finding of no significant impact (FONSI).

The CEQ NEPA regulations (40 CFR 1500-1508) do not contain a detailed discussion regarding the format and content of an EA. However, the EA must discuss:

- The need for the proposed action;
- The proposed action and alternatives;
- The probable environmental impacts of the proposed action and alternatives; and
- The agencies and persons consulted during preparation of the EA.

NEPA requires federal agencies to integrate the environmental review into their planning and decision-making process. This integrated report is consistent with NEPA statutory requirements. The report reflects an integrated planning process, which avoids, minimizes, and mitigates adverse project effects associated with flood damage reduction actions.

2. Existing Conditions / Affected Environment*

2.1 Land Use

Land use west of the shoreline action area is primarily residential. Several private and municipal beach clubs are directly located within the project area. Ocean Avenue bounds the project construction area on the west and serves as one of the major north/south routes along this New Jersey shore community.

The Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township: Elberon to Loch Arbour Reach ("Elberon to Loch Arbour Reach") is characterized by extremely eroded beach with bluffs or embankment landward. Significant erosion has led to armoring and construction of bulkheads to reduce risk to the remaining shoreline. Many of the existing groins are in disrepair due to impacts from constant wave action. Thirty nine shoreline drainage structures including outfall pipes and retention systems are located within the project reach, many of which channel surface runoff to the ocean. The two outfalls in Lake Takanassee and Deal Lake function as outlets from fresh water systems, allowing tidal exchange between each lake and the Atlantic Ocean.

2.2 Topography, Geology and Soils

Presently, there is a very small portion of the beach remaining above high tide. Sands are characterized by medium, fine, well-sorted sand, with the median sand diameter of 0.226-0.312 mm. Most of the soils series describe disturbed areas that are filled with various materials that have varying drainage qualities (National Resource Conservation Service (NRCS) 2004). In general the majority of the shoreline consists of a narrow, eroding, gently sloping sandy beach.

Geologically, the project area lies in the Atlantic coastal plain province. In Monmouth County, this consists of layers of sands, gravels, marls, and clays deposited during the Cretaceous and Tertiary Periods (USACE 1989). These sediments frequently overlain by Quarternary deposits and are exposed directly to wave attack. The general form of the present day beach line was formed as sea level experienced its most recent significant rise. From Lake Takanassee to Deal Lake, the Manasquan and Shark River marls appear. These formations are similar in content consisting generally of a mixture of glauconite with greenish-white clay or light-colored earth.

2.3 Water Resources

2.3.1 Regional Hydrogeology and Groundwater Resources

The Elberon to Loch Arbour Reach lies within the New Jersey Coastal Plain Physiographic Province. The aquifers in the Coastal Plain consist of unconsolidated sands and gravel and are composed of alternating layers of clay, silt, sand, and gravel; the layers of sand and gravel comprise the aquifers and layers composed predominantly of silts and clays are the confining units (USACE 1989). The Elberon to Loch Arbour Reach falls within the NJDEP watershed management area #12 which is dominated by the drainages of the Navesink and Manasquan Rivers.

Rapid expansion and development of the coastal regions of Monmouth County led to increased usage and draw down of the aquifers. In 1986, the NJDEP designated two Water Supply Critical Areas in the New Jersey Coastal Plain. These areas were established in an attempt to manage withdrawals from aquifers in which water-level declines were a matter of concern. Withdrawals from specified aquifers were cut back and new allocations (with the exception of temporary construction dewatering and ground-water remediation activities) were limited. The project area is located within Critical Area 1 which lies within Middlesex, Monmouth, and Ocean Counties. These areas were designated to help control the decline in water levels in some of the confined aquifers. Restrictions on withdrawals in Critical Area #1 began in 1989, and water levels in some of the aquifers began to recover in 1991.

However, as coastal resort areas were developed, and the need for freshwater continued to increase ground water levels of chloride concentrations reached 250 mg/L, the United States Environmental Protection Agency (USEPA) secondary maximum contaminant level for chloride. Although withdrawals subsequently were decreased, chloride concentrations continued to climb (unpublished data on file at the U.S. Geological Survey office in West Trenton, NJ).

2.3.2 Surface Waters/ Water Quality

In New Jersey, water quality standards have been established to protect human health and maintain the integrity of the state's water resources. State surface water is classified according to its designated use: swimming, boating, shellfish harvesting, water supply, maintaining a fish population, and supporting fish reproduction. The Federal Clean Water Act (P.L. 95-217) requires that wherever possible the water-quality standards provide water suitable for fish, shellfish, and wildlife to thrive and reproduce and for people to swim and boat. Major land uses within this watershed include residential, urban, industrial, commercial, recreational, forested, and coastal areas. Average annual precipitation is approximately 42 inches and is generally evenly distributed throughout the year. The watershed has 625 miles of waterways, consisting mainly of small rivers and streams.

The Elberon to Loch Arbour Reach contains three freshwater, surface water bodies. At present two of them, Lake Takanassee and Deal Lake have constructed outfalls allowing for permanent connection to the Atlantic Ocean, making them tidally influenced. The third, Poplar Brook, is the shallow, relatively narrow eastern end of the brook which no longer maintains a permanent opening to the ocean. However, it is likely that storms of adequate strength or duration could re-establish a temporary connection to the ocean under present existing conditions. Poplar Brook extends upstream approximately 5.7 miles (3.9 square mile watershed).

NJDEP water quality monitoring has shown that Poplar Brook has excessive phosphorus due to upstream agricultural runoff as well as high counts of fecal coliforms from urban surface flow and storm sewer inputs. Poplar Brook is considered an impaired (nitrogen levels, oxygen demand, and presence of pathogens) as well as a eutrophic water body and has been classified by the NJDEP as FW2-NT (Fresh Water – Non Trout Supporting) and not suitable for primary contact.

Lake Takanassee is located in Elberon and is considered the northern boundary of the Elberon to Loch Arbour Reach. The surface area of the lake is only about 0.03 square miles and consists of a partially impounded eastern terminus of the larger, landward surface water body. The lake is only 1.5 m deep and is subject to very warm seasonal temperatures which favor algal blooms and excessive growth of other types of aquatic vegetation. NJDEP monitoring observations have shown that low dissolved oxygen does not appear to be an issue, possibly because of the lake's very shallow nature and the influences of wind mixing and tidal exchange. Lake Takanassee is considered impaired and eutrophic. Past NJDEP fishery monitoring records have shown that Lake Takanassee at one time supported spawning runs of various species of herring.

Water fowl including geese, swans, gulls and cormorants are a major source of fecal coliforms and nitrogen which support primary production in the lake. Construction of the project will include rebuilding the flume structure and the (extended) outfall pipe. These structures should help to increase flushing and ultimately improve water quality in the lake.

Deal Lake lies between the southern end of Loch Arbour and Asbury Park forming the southern end of the Elberon to Loch Arbour Reach. Similar to Lake Takanassee it represents the eastern section of a much larger water body with a permanent outlet to the ocean. The

waters running east to Deal Lake extend landward for about nine miles. Deal Lake itself occupies an area of approximately 163 acres. The NJDEP has classified Deal Lake as FW2-NT as well as Saline Coastal. However, the lake is severely impaired from urban and agricultural runoff. The waters are considered eutrophic with high concentrations of fecal coliform and other nutrients. Although the lake does support some fish populations that may include spawning herring, a fishery consumption advisory does exist. Fish from Deal Lake have been shown to contain chloradane, DDT and its metabolites, mercury and polychlorinated biphenyl (PCBs). The outfall structure and an extended pipeline have been recently updated and no work or modification to this infrastructure is expected as part of the proposed project.

2.3.3 Tidal Influences

Astronomical tide elevations for the project area and vicinity are summarized in Table 1.

Table 1: Astronomical Tides - Datums for Station 8531680, Sandy Hook NJ

Elevations on Station Datum		
Station: 8531680, Sandy Hook, NJ		
Status: Accepted (Apr 17 2003)		
Units: Feet		
T.M.: 75 W		
Epoch: 1983-2001		
Datum: STND		
Datum	Value	Description
MHHW	7.74	Mean Higher High Water
MHW	7.41	Mean High Water
NAVD88	5.33	North American Vertical Datum of 1988
MTL	5.06	Mean Tide Level
MSL	5.09	Mean Sea Level
DTL	5.13	Mean Diurnal Tide Level
MLW	2.71	Mean Low Water
MLLW	2.51	Mean Lower-Low Water
STND	0	Station Datum
GT	5.22	Great Diurnal Range
MN	4.7	Mean Range of Tide

2.4 Wind and Waves

Prevailing winds on a seasonal basis are from the south from April through September and from the west from October through March. Most winds are of moderate velocity (14 to 29 mph) and winds of greater velocities are usually from the northeast. Hurricanes, formed in tropical latitudes, are the most destructive storms affecting the Atlantic Coast, but extratropical storms, which blow from the east or northeast and are known locally as "nor'easters," can be nearly as destructive, and are particularly effective in eroding beaches due to their duration (USACE 1989). Waves approach the project area predominantly from a southward orientation relative to the shoreline, generating a prevailing northward longshore current that carries with it littoral drift that has resulted in the formation of the barrier peninsula to the north.

2.5 Vegetation

The narrow berm areas landward of the beach, where they still exist, are sparsely vegetated with a variety of plant species including beach grass, seaside goldenrod, beach rocket, and other common salt and wind resistant plants typical of this mid beach environment. Sparse dune remnants remain at some locations, however these more upland habitats have also been severely impacted from waves and erosion and have lost most of their characteristic dune vegetation except for intermittent patches of dune grasses and other common dry beach species. Along the bluff areas, less susceptible to direct wave impact, salt spray resistant grasses and secondary often stunted woody vegetation including several invasive species may be present. There are no known occurrences of any state or federally listed plant species within the Elberon to Loch Arbour Reach.

The intertidal area does not support any significant populations of submerged aquatic vegetations (SAV), including seaweed. Within the near shore littoral (i.e. sub-tidal placement footprint) the influence of the breaking surf and general nature of this high energy zone makes this an unstable environment thus the attachment and subsequent growth of SAV highly unlikely. However, along any of the rock groins with the project area, attachment of SAV is common, especially along the lower reaches of the intertidal portion of these structures.

2.6 Fish and Wildlife

2.6.1 Finfish

In cooperation with the National Oceanic and Atmosphere Administration-Fisheries (NOAA-Fisheries), the United States Fish and Wildlife Service (USFWS), NJDEP and USEPA, the District conducted a 7-year (1994-2001) biological monitoring program called the New Jersey Biological Monitoring Plan (NJBMP). The habitats that were studied included the beach, intertidal/surf zone, nearshore and offshore. The components that were sampled included benthos, suspended sediments, finfish, finfish feeding habits, water quality, grain size, ichthyoplankton, endangered species and recreational fishing. The NJBMP near shore encompassed an area from Allenhurst to Manasquan and contained 24 sampling “cells”. Each cell consisted of an open beach station with north and south adjacent groin stations. Post monitoring analysis compared placement sites from Sea Bright to Manasquan including areas to the north that encompass the Elberon to Loch Arbour Reach (USACE ERDC 2004).

2.6.1.1 Intertidal and Near Shore

Near shore and surf zone habitats contained a diverse and abundant assemblage of 33 seasonally present larval and juvenile fish species as well as other small forage species (USACE 2001). Larval fish species were dominated by flounder, mackerel, croaker, anchovies and hake species. Seasonally abundant juveniles included bluefish, menhaden and scup. Numerically, silversides were the most abundant and common species observed in the nearshore/surf zone. Anchovies (striped and bay) were also caught in large abundances. Juveniles and adults of striped bass (*Morone saxatilis*), summer flounder (*Paralichthys dentatus*), windowpane (*Scopthalmus aquosus*), spot (*Leiostomus xanthurus*) and other common species as well as some exotics were also found in the near shore. The greatest

abundances and species diversity were correlated to proximity to hard structure (groins) along the beach. Other fish species associated with these structures include black fish (*Tautoga onitis*), black bass (*Centropristus striata*), scup (*Stenotomus chrysops*) and sculpins (*Scorpaeniformes*).

As previously discussed, Lake Takanassee and Deal Lake (Elberon and Loch Arbour) are two freshwater drainage basins with openings to the Atlantic Ocean within the project study area. Both lakes may support spawning runs of blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*) and gizzard shad (*Dorosoma cepedianum*). Other species which are known to inhabit these lakes and can be considered typical of urban coastal brackish ponds include American eel (*Anguilla rostrata*), carp (*Cyprinidae*), bluegill (*Lepomis macrochirus*), and largemouth bass (*Micropterus salmoides*).

According to the NJDEP, both Takanassee and Deal Lakes have confirmed spawning migration runs of blueback and alewife herring. These migrations were confirmed by the Bureau of Freshwater Fisheries as part of their Anadromous Fisheries Inventory (AFI) that was instituted following the Clean Water Act of 1972. At Deal Lake the AFI confirmed the presence of the alewife at Main Street in 1974 and the blue back herring was confirmed below the dam in 1976. The same two species were confirmed at Takanassee Lake in 1985 but only the alewife was identified in 1987. Further coordination with the NJDEP revealed that the State may recommend a March through June restriction to protect adults that are moving into the areas to spawn. Alewife herring spawning from mid-March through April and blueback herring spawn from mid-April to early June. An additional timing restriction to protect juvenile river herring emigrating from these impoundments may also be requested September through October (NJDEP email 8/20/2013, see pertinent correspondence).

There is no data on clupeid (herring) spawning migrations at Poplar Brook. However, if an outlet to the ocean is available there is the potential that river herring may utilize it to go up into the stream to spawn (Mark Boriek, NJDEP Bureau Fresh Water Fish, pers com).

2.6.1.2 Sea Bright Borrow Area

There is a diversity of important recreational and commercial and fishery resources associated within the regional waters of the New York Bight Apex, within which the SBBA is located. Results of 991 bottom trawls within the Bight Apex conducted by the National Marine Fisheries Service (NMFS) from 1986 – 1989 revealed that fifty-eight species of fish representing 33 families, were identified from the trawl catches. Eleven species (spiny dogfish, (*Squalus acanthias*); little skate, (*Raja erinacea*); silver hake, (*Merluccius bilinearis*); red hake, (*Urophycis chuss*); ocean pout, (*Macrozoarces americanus*); scup, (*Stenotomus chrysops*); cunner, (*Tautogolabrus adspersus*); butterflyfish, (*Peprilus triacanthus*); fourspot flounder, (*Paralichthys oblongus*); windowpane, (*Scophthalmus aquosus*); and winter flounder, (*Pleuronectes americanus*) comprised 90 percent of both total number and weight of all fish collected.

Other important species that were captured include but were not limited to: weakfish, black sea bass, summer flounder, bluefish, striped bass, Atlantic mackerel, Atlantic menhaden, scup, and Atlantic herring.

The state and federally endangered Atlantic sturgeon maintains a geographically distinct breeding population within the Hudson River and its estuary. The SBBA may fall within the migratory corridor utilized by both adult and subadult sturgeon, and/or, this borrow area may be contiguous with or adjacent to areas where Atlantic sturgeon congregate outside the estuary.

2.6.2 Benthic Resources

2.6.2.1 Intertidal Benthos

The intertidal and near shore littoral zone of the project area contains habitats that support a variety of benthic invertebrates both on and in the benthic sediments. Naturally occurring rocky intertidal zones are absent from the project area. However, rock groins and in some locations shoreline armoring with stone provide a substitute habitat. Barnacles, small and large crustaceans, sessile and mobile mollusks are abundant in and on these structures. Sediments are characterized predominantly by medium and fine sands. Fine sands are predominant in fall whereas medium sands dominate in the spring. This pattern reflects the annual cycle of erosion and deposition associated with high energy sandy beaches (USACE NJ BMP 2001).

Major taxa in samples collected were rhynchocoels, oligochaetes, and the polychaete, (*Scolelepis squamata*). These taxa were consistently the three most abundant taxa, constituting over 95% of all individuals. Biomass was dominated by *S. squamata* (73%) and the mole crab (*Emerita talpoida*) (22%). The overall mean density of infauna in the sampling area samples was 13,721 organisms per square meter. Biomass averaged 52 g-wet weight per square meter. There were no differences in taxa richness among areas. Likewise, there were no differences in species composition among areas or stations (USACE NJ BMP 2001).

2.6.2.2 Nearshore Benthos

A total of 141 taxa was collected in the nearshore benthic samples Asbury Park to Manasquan. Dominant taxa included (*Magelona*) polychaetes, tellinid clams, (*Spisula solidissima*) surf clam, (*Mytilus edulis*) blue mussel, and (*Ilyanassa trivitata*) mud snail, the amphipods (*Psammonyx nobilis*), (*Acanthohaustorius millsi*) and (*Unciola irrorata*), the isopod (*Chirodotea tuftsi*), and the spionid polychaete (*Dispio uncinata*).

The polychaete (*Magelona papillicornis*) was the most numerically dominant taxon, comprising 36% of all nearshore specimens. (*Tellina agilis*) and nephyid polychaetes made up an additional 21% and 14% of the collections respectively.

Biomass was dominated by molluscs and annelids. The proportion of total biomass represented by molluscs was highest in fall collections. Annelids dominated spring samples. Benthic biomass was significantly higher in the fall than in the spring.

Sediment texture varied among the three areas with fine grain sizes (fine sands, very fine sands, and silts and clays) steadily decreasing and the proportion of medium sands increasing

along a South to North gradient. As was observed for the intertidal stations, nearshore sediments were somewhat coarser in spring than fall due to the annual pattern of sediment erosion and deposition. Despite this seasonal variation in sediment texture, the pattern of increasing coarseness among areas remained consistent across years. Presumably, the temporal shift in sediment texture is a reflection of long-term longshore sediment transport processes. As with the intertidal data, there was no clear relationship between sediment texture and community composition.

Macro- and mega-invertebrate were also collected as by-catch in the nearshore beach seines hauls. Common species included grass shrimp, crabs: rock, green, blue claw, calico, mud, spider, hermit, amphipods, mollusks, moon snails, whelks, periwinkles, bivalves, gem shells, cockles, tellins.

2.6.2.3 Sea Bright Borrow Area

Seventeen species of megainvertebrates representing 14 families were identified from the trawl catches. Eight species longfin squid, (*Loligo pealeii*); northern shortfin squid, (*Lilex illecebrosus*); horseshoe crab, (*Limulus polyphemus*); American lobster, (*Homarus americanus*); Jonah crab; (*Cancer borealis*); Atlantic rock crab, (*Cancer irroratus*); lady crab, (*Ovalipes ocellatus*); and starfish, (*Asterias sp.*) comprised 99 percent of both total number and weight of all megainvertebrates collected.

Sediment (grab) sample analysis revealed that the borrow area supports a sand fauna community with numerous macrobenthic organisms with bivalves dominating the biomass. The most important bivalve species were surf clams (*Spisula solidissima*) and the tellin (*Tellina agilis*), the razor clam (*Ensis directus*). Other macro benthic organisms included amphipods isopods, sand dollars. Numerically polychaete worms, mostly (*Spiophanes bombyx*) and (*Prionospio malmgreni*) showed the greatest abundance. All of the previously mentioned specimens are commonly occurring species in New Jersey Coastal waters, and did not distinguish the SBBA in diversity or abundance from other adjacent or regional sandy habitats.

Within the SBBA commercial shellfish harvesting is prohibited, however, surf clam density within this borrow is generally considered too low to make it a viable area exploit.

2.6.3 Reptiles and Amphibians

In general almost all of the (terrestrial) project site is confined to the narrow beach shore area, wedged between Ocean Avenue, bluffs, and the ocean. This situation offers little in the way of terrestrial habitat for regional reptiles and amphibians for two reasons. First because the roadway and/or the bluffs acts as a barrier landward of the project site and second, the sandy beach or armored shore front does not offer suitable habitat two typical regional reptiles or amphibians. However, there are three fresh/brackish water seaside drainages within the project area. Species that may be present in or around the vegetated non bulkheaded non developed shoreline habitats of Takanassee Lake, Deal Lake and Poplar Brook (not necessarily within the immediate project site) may include snapping turtle (*Chelydra serpentina*), the garter snake

(*Thamnophis sirtalis*), spring peepers (*Pseudacris crucifer crucifer*) and American toad (*Bufo americanus*). All are regionally common where habitat is available.

There is potential for several sea turtle species to seasonally inhabit offshore waters from June through October, including within the vicinity of the borrow area. Turtle species known to occur in the project area include the Federal and State listed endangered Kemp's Ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), and the threatened green (*Chelonia mydas*) turtles. Studies have shown that these three species of sea turtle can migrate north from warmer south Atlantic waters in the spring (May-June) to take advantage of abundant prey in warming north eastern embayments and estuaries (Morreale and Standora 1994). Turtles return to southern waters as north east water temperatures begin to drop in the fall. Sea turtles are considered no longer present in District waters after November 30. The leatherback turtle (*Dermochelys coriacea*) is also listed as endangered by state and federal authorities. This species feeds largely on jelly fish and is highly pelagic in nature. It is also thought to be more tolerant of cooler oceanic temperatures. Unlike the other three species, the leatherback does not migrate into shallow embayments to prey on benthic invertebrates or sea grasses. Nesting of these four species of sea turtle species does not occur north of Delaware. Further discussion of sea turtle species is located in Section 2.7 – Threatened and Endangered Species.

2.6.4 Birds

Because the project site is a narrow band of shore line, relatively isolated and susceptible to wave induced erosional forces, the Elberon to Loch Arbour Reach only supports bird habitat consisting of foraging or loafing areas for resident shore birds. These would include gull species including common gulls (*Larus Canus*), herring gulls (*Larus argentatus*) and blackback gulls (*Larus marinus*), and sandpipers including the common sandpiper (*Actitis hypoleucous*), and the sanderling (*Calidris alba*). The project site does lie within the Atlantic Flyway and is probably of some seasonal value as a resting/foraging site for migrating shorebirds, as is most of the Atlantic coast of New Jersey.

Due to the presence of severe erosion and the resulting narrow beach, and revetments, and bulkhead protection along some of the shoreline of the project, adequate nesting habitat is not available for either beach or dune nesting species there at this time. Some of the common 'urban' perching birds that may be observed in the area of the project site may nest in trees, woody vegetation, or residential or commercial structures landward of the beach. These might include robins, sparrows, blue jays, mocking birds, mourning doves, pigeons, and starlings etc.

Lake Takanassee and Deal Lake offer suitable habitat to common regional water fowl, some of which may have become year round residents. Species likely to use these fresh/brackish water areas would include mallards, Canada geese and swans. Concentrations of these birds are largely responsible for high levels of nitrogen and resulting eutrophication of these lakes. Several species of herons probably use these shallow lakes for foraging as well. Because these ponds lie within the Atlantic fly way they may offer important refuge/resting areas for migrating flocks of waterfowl.

2.6.5 Mammals

The situation for terrestrial mammals at the project site is similar to that for birds in that the amount of development and the resulting barriers present little in the way of beach related habitat with the possible exception of those species known to coexist in urban environments. Because of its eroded condition and corresponding lack of vegetation/suitable habitat, it is unlikely that any species other than small rodents would be considered common or resident to the project beach.

In general mammals that may possibly be found in or around the project site may include (but may not be limited to) raccoon (*Procyon lotor*), eastern cottontail rabbit (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), the brown rat (*Rattus norvegicus*) house mouse (*Mus musculus*), dogs (*Canis familiaris*), and (feral) cats (*Felis silvestris*). All of these species are common and found throughout New Jersey especially in urbanized areas. In addition, the presence of the two fresh to brackish water impoundments produce many types of flying insects that are prey to several species of bats which may include the little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*).

Four species of seals utilize the New York Bight including SBBA, harbor seal (*Phoca vitulina*), harp seals (*Phoca groenlandica*), grey seals (*Halichoerus gryphus*), and hooded seals (*Cystophora cristata*) (USFWS 1997). Harbor seals, and less frequently grey seals, are seen during the winter in bays and inlets, using the jetties, docks, and islands as haul out areas. These species may utilize the beaches or rock groins along the project shoreline. In general one or more of these species may be in the project vicinity year round.

Several species of dolphins may be found in nearshore waters year round within the vicinity of the project area. Bottlenosed dolphins (*Tursiops truncatus*) are commonly seen within the nearshore waters of the project site during the warmer months. Endangered whales are discussed in the Endangered Species section that follows.

2.7 Threatened and Endangered Species

All appropriate Federal and State agencies were consulted regarding the documentation of rare, threatened, and endangered species and species of special concern within the project site and its vicinity. The USFWS and NOAA-Fisheries were contacted regarding Federally listed threatened and endangered species, while the NJDEP, Division of Fish, Wildlife, and Marine Resources gave comments regarding state-listed species. Correspondence with these agencies can be found in Appendix E.

2.7.1 Terrestrial Species

With the exception of occasional transient individuals, no Federally-listed or proposed endangered or threatened species under USFWS jurisdiction are known to exist/breed in the project placement area. In addition no habitat in the project placement area is currently designated or proposed 'critical habitat' in accordance with provisions of the Endangered

Species Act. However, some species have been found within several miles of the project site including the piping plover (*Charadrius melodus*), a beach nesting bird, and seabeach amaranth (*Amaranthus pumilus*) a beach plant which favors over-wash and naturally disturbed beach areas. Seabeach amaranth is not found at the site. The peregrine falcon and the osprey are no longer listed federally, but are listed as endangered and threatened respectively in the state of New Jersey. None of these avian species nest within the project site, however ospreys from within the region may prey on fish in project area waters, and the peregrine falcons have been known to pass through the project site during the annual migration flights.

This EA updates the 1989 Environmental Impact Statement and 1990 Record of Decision for Sandy Hook to Barnegat Inlet Section I which included all of the appropriate FWS NEPA requirements including the Fish and Wildlife Coordination Act Report (FWCAR). As this project had previously completed Section 7 coordination with the USFWS (FWCAR, ROD and authorization) the District is currently consulting with the USFWS to update and impacts to wildlife resources of the Elberon to Loch Arbor project. However, due to time and schedule constraints, the draft FWCAR Planning Aid Letter (PAL) has not yet been completed and is absent from this draft EA. When the District receives the FWS PAL it will be given full consideration and its recommendations where applicable, will be incorporated into the final EA/FONSI.

2.7.2 Sea Turtles

All species of sea turtles in U.S. waters are protected under the Endangered Species Act of 1973. There are four species of marine turtle that may occur within the Atlantic waters around the project site including the SBBA. They include the Northwest Distinct Population Segment (DPS) of the loggerhead (*Caretta caretta*), the Kemp's ridley (*Lepidochelys kempi*), the green (*Chelonia mydas*) and the leatherback (*Dermochelys coriacea*) turtles. In a New Jersey waters the loggerhead is the most abundant species observed. The green turtle is relatively rare. The loggerhead and Kemp's Ridley forage on shellfish including crabs, shrimps and bivalves. The green turtle feeds almost exclusively on vegetation. All three species are benthic feeders. The leatherback feeds in the water column on jelly fish.

March 16, 2010, NOAA published a proposed rule to list two DPS of loggerhead sea turtles as threatened and seven DPS of loggerhead sea turtles as endangered. On September 16, 2011, a final listing determination was made designating the Northwest Atlantic Ocean DPS, South Atlantic Ocean DPS, Southeast Indo-Pacific Ocean DPS, and the Southwest Indian Ocean DPS as threatened. The Northeast Atlantic Ocean DPS, Mediterranean Sea DPS, North Indian Ocean DPS, North Pacific Ocean DPS, and South Pacific Ocean DPS have been designated as endangered (76 FR 58868). The listing became effective October 24, 2011.

Sea turtles are seasonally distributed along the east coast of the U.S. migrating to and from favorable habitats extending from Florida to New England. Seasonal water temperature cues induce migratory behaviors. As water temperatures rise in the spring, migrating turtles begin to move northward and reside in relatively shallow inshore waters to take advantage of abundant forage. As temperatures begin to decline rapidly in the fall, turtles in the north east Atlantic begin to migrate back to southern waters. Sea turtles can be expected to be in the

vicinity of the project borrow area when the water temperature surpasses 15° C (60° F) which generally coincides June 1. However, the window of residence for these four species is considered to be May 1 until November 30. Southern migration begins when the water drops below 15° C. Turtles are migrating out of the New York Bight by the beginning of November. Future warming ocean trends may cause this window to be expanded.

The majority of sea turtles entering coastal and nearshore northeast waters appear to be small to medium sized juveniles (Morreale and Standora 1994). The abundant prey species, low currents and warm temperatures in the large bays and estuaries like Long Island Sound, Raritan Bay and southern New Jersey appear to provide high value foraging habitat for these young turtles. Satellite acquired swimming data from tagged sea turtles revealed that when they are in inshore shallow estuarine waters and embayments their movements appear more random as they spent most of their time swimming/foraging or resting at depths between 15 and 50 feet (Morreale and Standora, 1994). When migrating in coastal waters, to and from these foraging grounds, their moves are well directed (north/south) and relatively rapid along a comparatively narrow corridor of deeper offshore water.

2.7.3 Whales

Three species of state and federally listed whales may also occur within the (offshore) project area. These species include the endangered North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), and fin or finback whale (*Balaenoptera physalus*). All are listed as endangered. Humpback whale presence in the northwestern Atlantic is variable and probably a response to the changing distribution of preferred food sources. Humpbacks are in transit through the New York area from June through September on their northward migration to summering areas in the Gulf of Maine, however, they have been observed along the coast of New Jersey in the fall as well. Finback whales occupy both deep and shallow waters and are probably the most abundant large cetacean in New York waters. They are most abundant in spring and summer, but do have some presence during the winter months. Humpback whales and finback whales primarily occur in the deep offshore waters of the continental shelf of New Jersey.

The North Atlantic Right whales are known to use the vicinity of the area as a migration route to and from southern breeding grounds primarily during the months of February through April and September through October. NOAA-Fisheries has established regulations to implement speed restrictions for vessels larger than 65 ft in Seasonal Management Areas (SMAs) where Right whales are known to occur along the east coast of the US Atlantic Seaboard at certain times of the year. From November 1 through April 30, Seasonal Management Areas are designated along the coast of New York and New Jersey and the SBBA lies within one of these (USACE 2013b). The state and federally endangered sperm whale (*Physeter catodon*) have also been noted as strandings in the region.

2.7.4 Atlantic Sturgeon

Atlantic sturgeon are anadromous, spending the majority of their adult phase in marine waters, returning to their natal freshwater rivers to spawn. Five DPS of Atlantic sturgeon were listed as threatened or endangered under the Endangered Species Act, including a New York Bight

DPS. Known spawning populations for the New York Bight DPS exist in two rivers: the Hudson and Delaware Rivers. In the Hudson River estuary, spawning, rearing, and overwintering habitats were reported to be intact by Bain (1997), supporting the largest remaining Atlantic sturgeon stock in the U.S., however, a population decline from overfishing has also been observed for this area (Bain 1997, Bain 2001). General factors that may impact Atlantic sturgeon include: dam construction and operation; dredging and disposal; and water quality modifications such as changes in levels of dissolved oxygen (DO), water temperature and contaminants (ASSRT, 2007). Other threats to the species include vessel strikes. Many authors have cited commercial over-harvesting as the single greatest cause of the decline in abundance of Atlantic sturgeon. Although little is known about natural predators of Atlantic sturgeon, there are several documented fish and mammal predators, such as sea lampreys, striped bass, common carp, minnow, smallmouth bass, walleye, grey seal, and fallfish (ASSRT 2007).

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

In regard to the New York Bight, knowledge of Atlantic sturgeon oceanic habitat is generally limited to information regarding broad-scale marine migrations and an exchange of populations among river systems based on tag recaptures and commercial fisheries data. Satellite tag and fisheries-dependent data indicate that most oceanic Atlantic sturgeon inhabit shallow inshore areas of the continental shelf and are largely confined to depths of less than 65 ft. Concentrations of Atlantic sturgeon appear to occur during the fall and spring correlated to the mouths of large bays and estuaries, including those that are the outlets of known spawning rivers such as the Hudson. Sturgeon from the NY Bight disperse south throughout the Mid-Atlantic Bight during the winter. In general, migrations are northerly during summer and southerly during winter. Regional temperatures along the coast likely influence sturgeon movements and migration patterns, thus affecting the length of time sturgeon spend in a particular area of the marine environment.

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Recent fisheries studies have revealed that sturgeon capture within the near shore of the NY Bight was greatest in the fall and spring, somewhat decreased in the summer and lowest during the winter. Most of the sturgeon captured (trawl) were caught on the western end of Long Island which acknowledges the previous statements referring to areas of seasonal aggregation correlated to spawning estuaries etc.

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

2.7.5 State Species of Concern

There are several listed state species known to exist in the vicinity of the project area. Those of which are highly mobile may occasionally move through the site area. As stated previously the project site beaches are severely eroded and what remains (bluffs, revetment etc.) offers little in the way of viable beach (nesting) habitat. The only area of viable beach is situated seaward of the Casino Beach Club in Deal and is heavily used by members rendering it unsuitable as well. Species which might be seen foraging in or around the project site include three state-listed endangered species, the least tern, piping plover, red knot and the osprey. Several species of herons including the listed yellow crowned and black crowned night herons may forage in the shallows or marshy areas of the two lakes or upstream on Poplar Brook.

Based on the habitat and the location of the study area, seven state-listed plant species that are known to occur in Monmouth County may possibly occur in the vicinity of the project area. However, only Sea Beach Amaranth and Sea Beach Knot Weed are known to exist regionally with in areas similar to the project area (beach). Table 2 identifies state-listed species that can occur within the region of the project area.

Table 2: State Listed Rare, Threatened, and Endangered Species Possibly Occurring in the Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I – Sea Bright to Ocean Township Project Area

Common Name	Scientific Name	State Status	General Habitat
Vertebrates			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Endangered	seacoasts
Black Skimmer	<i>Rynchops niger</i>	Endangered	coastal waters
Black Crowned Night Heron	<i>Nycticorax nycticorax</i>	Threatened	marsh
Cooper’s Hawk ¹	<i>Accipiter cooperii</i>	Endangered	deciduous woodland
Great Blue Heron ^{1,2}	<i>Ardea herodias</i>	Threatened	brackish marshes

Least Tern	<i>Sterna antillarum</i>	Endangered	seacoasts and estuaries
Northern Harrier ^{1,2}	<i>Circus cyaneus</i>	Endangered	marshes
Osprey	<i>Pandion haliaetus</i>	Threatened	seacoasts
Pied-Billed Grebe	<i>Podilymbus podiceps</i>	Endangered	estuaries
Piping Plover	<i>Charadrius melodus</i>	Endangered	sandy beaches
Red Knot	<i>Calidris canutus</i>	Endangered	Sandy beaches/sea coasts
Roseate Tern	<i>Sterna dougallii</i>	Endangered	Sandy beaches
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Threatened	salt marshes
Vesper Sparrow ¹	<i>Pooecetes gramineus</i>	Endangered	marshes and grasslands
Yellow-crowned Night-Heron ¹	<i>Nyctanassa violacea</i>	Threatened	marshes
Invertebrates			
Northeastern Beach Tiger Beetle	<i>Cicindela dorsalis dorsalis</i>	Endangered	sandy beaches
Vascular Plants			
Coast Flatsedge	<i>Cyperus polystachyos</i>	Endangered	damp sands, peats, shores and clearings
Mudweed	<i>Limosella subulata</i>	Endangered	brackish sand and mud
Salt Marsh Bulrush	<i>Scirpus maritimus</i>	Endangered	salt marsh
Sea-beach Amaranth	<i>Amaranthus pumilus</i>	Endangered	dunes, beaches, and overwash areas
Sea-beach Knotweed	<i>Polygonum glaucum</i>	Endangered	beaches and salt marsh margins
Sea-beach Milkwort	<i>Glaux maritima</i>	Endangered	irregularly flooded salt marshes, pannes, and beaches
Sea-side Arrow-Grass	<i>Triglochin maritimum</i>	Endangered	salt, brackish, or fresh marshes
Sea-side Crowfoot	<i>Ranunculus cymbalaria</i>	Endangered	saline or brackish shores

2.8 Essential Fish Habitat

The regional fisheries management councils, with assistance from NOAA-Fisheries, are required under the 1996 amendments to Magnuson-Stevens Fishery Management and Conservation Act to delineate Essential Fish Habitat (EFH) for all managed species, to minimize to the extent practicable adverse effects on EFH, and to identify other actions to encourage the conservation and enhancement of EFH. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (NOAA-Fisheries 2004). In addition, the presence of adequate prey species is one of the biological properties that can define EFH. The regulations further clarify EFH by defining “waters” to include aquatic areas that are used by fish (either currently or historically) and their associated physical, chemical, and biological properties: “substrate” to include sediment, hard bottom, and structures underlying the water; areas used for “spawning, breeding, feeding, and growth to maturity” to cover a species’ full life cycle; “prey species” as being a food source for one or more designated fish species (NOAA-Fisheries 2004).

In regard to EFH for this project, 29 species of finfish (various life stages) were identified within the two actions areas of the project that are applicable to EFH. One zone encompasses the SBBA and the second consists of the intertidal and nearshore area of the placement site. Each project “action” area falls within a separate but adjacent (N/S) EFH quadrant. The SBBA is located within EFH quadrant # 40207350, Sandy Hook peninsula Sea Bright Boundary (40° 30.0’ N; East Boundary 73° 50’.0 W; South Boundary 40° 20.0’ N; West Boundary 74° 00.0’ W), the Elberon to Loch Arbour Reach falls with the Monmouth to Asbury quadrant # 40107350 (Boundary 40° 20.0’ N; East Boundary 73° 50’.0 W; South Boundary 40° 10.0’ N; West Boundary 74° 00.0’ W).

The NOAA listed EFH species for each quadrant are all but identical as they differ by one species (SBBA has the potential for Sand Tiger Shark larvae whereas this species, any life stage, is not found in the quadrant to the south). There are also several other individual life stage differences within identical species found in each quadrant. (See Appendix H EFH). However, since these are adjacent to open ocean areas it is reasonable to assume that any of the species/stages has the potential to be found in each quadrant. Therefore, for the purpose of this EA as well as the focus of the EFH evaluation on which this EA section is based, the SBBA quadrant with 29 species is the representative quadrant.

During the preparation of this EA, NOAA-Fisheries were consulted regarding the documentation of EFH within the project site. Detailed EFH evaluations are found in Appendix H.

2.9 Socioeconomics

Elberon is a neighborhood located in the southern portion of the City of Long Branch. Based on the 2010 Census, the population of the City of Long Branch is 30,719 with a racial composition of 65.3% white, 14.2% black, and 2.1% Asian. Hispanics of any race comprise 28.1% of the population (U.S. Census Bureau 2010a). The U.S. Census Bureau’s 2007-2011 American Community Survey indicates that the median age of the population is 34.3 (margin of error +/- 1.5 years) and the median per capita income is \$30,433 (margin of error +/- \$2,244). Approximately 11.4% (margin of error +/-2.7%) of families and 14.4% (margin of error +/-

2.7%) of individuals live below the poverty line. The highest areas of employment were service occupations at 27.6%, management and business at 25.7%, sales and office occupations at 21.0% and natural resources, construction and maintenance occupations at 17.8% (U.S. Census Bureau 2011a). Socioeconomic data specific to the Elberon neighborhood, based on the 2010 Census, is not available.

According to the 2010 Census, the population of the Borough of Deal is 750 with a racial makeup consisting of 91.6% white, 1.6% black, and 3.5% Asian. Hispanics of any race comprised 7.3% of the population (U.S. Census 2010b). The Census Bureau's 2007-2011 American Community Survey indicates that the median age is 49.5 (margin of error +/-5.2 years) and the median per capita personal income is \$56,666 (+/- 13,178) (U.S. Census Bureau, 2011b). Approximately 5.0% (margin of error +/- 3.2%) of all families and 8.1% (margin of error +/- 4.4%) of all individuals live below the poverty line. The highest areas of employment were sales and office occupations at 32.8%, management and business occupations at 32.5% and service occupations at 22.7% (U.S. Census Bureau 2011b).

Based on the 2010 Census, the population of the Borough of Allenhurst is 496 with a racial composition of 94.8% white, 1% black, and 1% are Asian. Hispanics of any race comprise 4.4% of the population (U.S. Census Bureau 2010c). The Census Bureau's 2007-2011 ACS for the Borough indicates a median age is 47.6 (margin of error +/- 6.5 years) and the median per capita personal income is \$59,807 (margin of error +/-13,860). Approximately 0.4% of all individuals live below the poverty line (margin of error +/-0.6%). Families living below the poverty line was zero with a +/-25.6% margin of error. The highest areas of employment were sales and office occupations at 36.3%, management and business occupations at 35.1% and service occupations at 19.4% (U.S. Census Bureau, 2011c).

Based on the 2010 Census, the population of the Village of Loch Arbour is 194 with a racial composition of 94.8% White; 1.5% black, 1.5% Asian. Hispanics of any race comprised 3.6% of the population (U.S. Census Bureau, 2010d). The Census Bureau's 2007-2011 ACS indicates that the median age is 47.2 (+/-7.3 years) and the median per capita personal income is \$66,391 (margin of error +/- \$15,344). No families or individuals were noted as living below the poverty line (margin of error +/-41.1% families; 14.4% margin of error for individuals) (U.S. Census Bureau, 2011d).

In general, the Borough of Allenhurst, the Township of Deal and the Village of Loch Arbour have each experienced about a 30% reduction in population when comparing the 2000 Census estimate to the 2010 Census estimate. The population of Long Branch decreased by about 2%. Because socioeconomic data specific to the Elberon neighborhood is not available, a comparison of the change in population within Elberon cannot be made

2.10 Cultural Resources

As a federal agency the Corps has certain responsibilities for the identification, protection and preservation of historic properties that may be located within the Area of Potential Effect (APE) associated with the proposed Elberon to Loch Arbour Reach. Present statutes and regulations governing the identification, protection and preservation of these resources include the National Historic Preservation Act of 1966 (NHPA), as amended; the National Environmental Policy Act

of 1969; Executive Order 11593; the regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties) and the Abandoned Shipwreck Act of 1987. Significant Cultural Resources include any material remains of human activity eligible for inclusion on the National Register of Historic Places (NRHP).

2.10.1 Near Shore Investigations

A cultural resources study was conducted in 1985 for Sandy Hook to Barnegat Inlet Section I, which extends for 12 miles from Sea Bright to Ocean Township and included the segment from Elberon to Loch Arbour (Heritage Studies 1985). This study documented no significant shoreline structures or onshore prehistoric or historic archaeological sites within the project area. It was noted however that there was a high probability for the occurrence of inundated prehistoric and shipwreck sites within the near shore beach fill zone. The project plans as then proposed called for adding as much as 10 feet of sand to the beach and near shore areas which would result in the burial of shipwrecks should they be present. It was not known if the burial of wrecks would constitute an adverse effect as such impacts had not been studied or observed in other similar projects. To address this question the New York District (District) carried out numerous investigations within the project's boundaries to identify shipwrecks and assess their NRHP Eligibility (Alpine Ocean Seismic Survey 1989; Alpine Ocean Seismic Survey and Ebasco Environmental 1990, 1991). All work was coordinated with the New Jersey Historic Preservation Office (NJHPO). A cultural resources study was conducted in 1988 for Sandy Hook to Barnegat Inlet Section II which extends nine miles from Asbury Park to Manasquan (Pickman 1988).

The District, the NJHPO and the Advisory Council on Historic Preservation (ACHP) executed two Memoranda of Agreement (MOA) for the Sandy Hook to Barnegat Inlet project; one in 1991 for Section I and one in 1993 for Section II. The Elberon to Loch Arbour Reach lies within Section I. Both MOAs required the District to survey the near shore area to assess the NRHP eligibility of all possible wrecks identified in the sand placement area. Those properties deemed eligible for listing were to be recorded and a monitoring plan was to be prepared and carried out in order to assess the effects of the undertaking on historic properties. Following execution of the MOAs for Sections I and II, the District conducted a series of surveys to identify and evaluate the wrecks in the near shore area (Reiss 1995, Alpine Ocean Seismic Survey and Panamerican 1991; Greeley-Polhemus and Dolan Research 1996; Panamerican Consultants, Inc. 1996). The Section I near shore area was not subject to a comprehensive remote sensing survey as the Corps at that time made a decision that the background data was sufficient to determine locations of wrecks. Only those areas determined sensitive for wrecks as per the research were surveyed.

The remote sensing and dive surveys resulted in the identification of two eligible wrecks in Section I; the *Adonis/Rusland* and the *Chauncey Jerome, Jr.* and three wrecks in Section II; the *Rjukan*, *Malta*, and *Western World*. The *Adonis/Rusland* consists of two wrecks; the *Adonis*, a NRHP eligible wreck and the *Rusland*, which while not eligible, is resting atop the *Adonis* so together they are being considered one archaeological complex. The *Amity* was originally thought to be eligible but was ultimately determined not eligible however was of considerable value to local divers and historians. The *Rjukan* and the *Malta*, although found to be within the

sand placement area and eligible for the NRHP, lay underneath a significant amount of sand overburden and were not considered at risk of impacts from further burial. Therefore, the conclusion of the evaluations was that there were three eligible wrecks within the area of potential effect for sand placement, the *Chauncey Jerome, Jr.*, the *Adonis/Rusland*, and the *Western World*. Following the determination of eligibility of these resources for the NRHP the District carried out the construction project, placing sand along the beach and near-shore, including on top of the wrecks, though avoiding the eligible wrecks when laying sand pumping lines and conducting surveys.

In 2000 a report entitled *Compilation of Four Shipwreck Recordations and Development of a Public Outreach Program for the Atlantic Coast of New Jersey Cultural Resource Monitoring Program* was completed (Panamerican Consultants, Inc. 2000). Its purpose was to lay out a monitoring program for the project whereby the District could assess whether the project's undertaking has no effect on the historic properties, is an appropriate measure to ensure preservation-in-place, or constitutes an adverse effect to the sites. In order to make a determination of effect the report outlined a uniform set of requirements for subsequent site recordings so that the degree of impact could be accurately determined. The recordings were carried out on the *Chauncey Jerome Jr.*, the *Western World*, the *Adonis/Rusland*, and the *Amity*, and the wrecks were fully documented prior to sand placement. No direct impacts were documented during the process of sand placement. The *Amity*, while determined not eligible for the NRHP and lying just outside the project's APE was documented to serve as a control site for this monitoring effort.

The District conducted monitoring of the vessels in the summer of 2013 through a comprehensive remote sensing survey of each wreck site using magnetometer, side-scan sonar and subbottom profiler which was followed by an extensive archaeological diver investigation (Panamerican 2014a). Diver relocation and reevaluation activities included water probing, jetting, and induction dredge excavations to locate datum, and expose and evaluate and record dimensions and scantlings for each wreck with hand-held measuring tapes, as well as video photography, all based on the each site's measurable parameters. Portions of *Amity*, *Western World*, and *Chauncey-Jerome* were buried between three and five feet, the limit that dredging or jetting equipment was able to penetrate fluid sands on the wrecks.

After an extensive review and analysis of the data, the work concluded that all of the four wrecks remain *in situ* according to their original map record with no movement, although the positions have been refined. Several site components, such as the bow concretion on the *Amity* and a boiler on the *Rusland*, have been moved by storm action, but the major hull sections or concretions have not moved. This movement of select components is a natural process and should not be attributed to project activities of the District as these two wrecks lie outside of previous construction areas.

The majority of on-wreck datums are no longer extant, thought to be due in part to sport diver activity (i.e., removal as a suspected artifact) and possibly storm action. Several datums were replaced during the current investigation and other types of datums recorded (i.e., prominent recognizable and easily located prominent wreck points or components). Additionally, numerous shore-based datum locations were destroyed during Hurricane Sandy. With no-longer

present datum and shore-based stations, re-acquiring accurate comparable on-site data was problematic at best. These factors have resulted in a reevaluation of the positioning methods.

Burial of the wrecks by sand is much more extensive than originally documented in past studies, in some instances with burial by five feet or more of overburden. A natural occurrence based on either storm or seasonal migration of sand, the coverage argues that beach renourishment will mimic natural coverage and serve to protect the resource. It is suggested that burial by sand should be viewed as preservation in place. It protects the wreck from storm damage as well as the effects of sport diving activity.

Within the Elberon to Loch Arbour Reach the *Adonis/Rusland* wreck site was the only known significant resource. As this reach was never built, any changes in the vessel location and condition could not be attributable to the project. The wrecks of *Adonis* and *Rusland* were dived over five days. It was found that datum markers are no longer present which may be the result of sport diver activity as this wreck is frequently visited by divers. Substantial portions and features of both wrecks were observed and recorded. The trapezoidal stern end of *Adonis* and previously identified mill stones and wood wreckage were found buried in one to two feet of sand. The drive shaft, spare props, donkey engine, and scantlings of the *Rusland* were also located. These wrecks were in the same alignment as previously mapped and did not appear to have been buried as deeply as at the other three wreck sites. The boiler at the bow, the north end of *Rusland*, has been removed from port to starboard side and is now apparently upright, possibly as a result of Hurricane Sandy. Another boiler remains 75 feet to the north of the *Rusland* wreck. Extensive probing and excavations were conducted, all measurable parameters were recorded, and dimensions were taken on the wreck. Recognizable features were shot in as datum positions in the field with DGPS. Georeferencing of the original site plan with the sidescan image shows the *Adonis/Rusland* site has not moved other than boiler displacement.

As the near shore area within Section I was not previously subject to a comprehensive remote sensing survey the District conducted a survey of the Elberon to Loch Arbor Reach (Panamerican 2014b). After an extensive review of previous investigations and analysis of the remote sensing data there are fifteen anomaly clusters and two single anomalies within this reach that have the potential to represent historically significant resources. Three of the clusters represent shipwreck sites that have been previously investigated and do not require additional work. The remaining twelve clusters and two single anomalies are located in areas that have not been previously surveyed or archaeologically investigated. Investigations indicate that there are no landforms within the near shore of this reach sensitive for inundated prehistoric sites

2.10.2 Sea Bright Borrow Area

The Sea Bright Borrow Area (SBBA) has been the primary source of sand for the Sandy Hook to Barnegat Inlet Project. Each project segment constructed has used just portions of the overall SBBA, which was first subject to remote sensing surveys for cultural resources in the 1980s (Alpine Ocean Seismic Survey, Inc. 1986, 1988; Alpine Ocean Seismic Survey, Envirosphere & Tidewater Atlantic Research 1990). The survey included side scan sonar, magnetometer, and subbottom profiling. The survey resulted in the detection of three anomalies, an anchor, a field of modern debris dumped from a barge, and a sewer outfall. No significant cultural resources of any kind were identified as a result of the surveys. Review of vibrocore data from the area

suggested that there are recent (roughly 4000-6000 years ago) lagoonal clay deposits within the boundaries of the SBBA which may represent the relict river channels that existed behind barrier islands that were located further east at a time of lower sea level. These deposits were believed to have potential for submerged cultural deposits, however, these clayey deposits were also considered unsuitable for beach placement and therefore dredging was not be expected to impact potential offshore archaeological sites.

In 1989-1990 a remote sensing survey was carried out for the “1989 Borrow Area”, which was an expansion area adjacent to the original SBBA (Alpine Ocean Seismic Survey 1990). The survey identified 25 targets of possible historic significance through magnetometer survey. These areas comprised a small amount of the overall borrow area and the decision was made to avoid these targets rather than pursue identification of the anomalies. In sum, 7-10 percent of the total borrow area was reduced by avoidance of these anomalies. Areas of suitable versus unsuitable material were identified from geophysical investigations leaving the areas with potential for submerged prehistoric sites protected from dredging impacts. No further remote sensing studies were carried out within the SBBA for cultural resources. Since initial construction the District has awarded four limited renourishment contracts in areas of Monmouth Beach, Sea Bright, Long Branch, and a very small portion of Spring Lake which have all used the SBBA for sand.

In 1995, following construction of the first project segment at Monmouth Beach, roughly 200 prehistoric artifacts were recovered from a 300-foot stretch of newly placed sand by a local resident. The exact location of the sand source is not known but it is believed that the sand was dredged from a rectangular area in the northern end of the SBBA measuring 1000 by 9000 feet at water depths of 30 – 40 feet below the water surface. The collection consisted of 40 projectile points classified as Archaic period, 59 other bifacially worked tools, 3 cores, and 107 flakes or possible flakes. The find was understood at the time to represent an archaeological assemblage that was preserved under rare and unique circumstances within a highly disturbed matrix of sandy sediment at the time of marine transgression. The site was also believed to have been destroyed by the dredge at the time of construction. The likelihood of encountering another deposit within the location of the borrow area under use was considered extremely low based on the remote sensing surveys conducted previously for the project. Another challenge faced at the time was that combing the beach after sand placement was an inadequate method for locating archaeological deposits due to the high volume of sand being deposited and minimal visibility. Based on this reasoning further investigations were not recommended for the area of SBBA then under use and monitoring of the sand placement activities from the beach was also not recommended. The project was constructed without additional unanticipated finds being reported.

In 2009, the District received funding for beach replenishment in Long Branch. Because of the potential for Unexploded Ordnance (UXO) the District began retrofitting cages with 0.75-inch screens at the discharge end of the pipelines to prevent large rocks, rubble or ordnance from being excavated and placed on the beach. Screens with a 1.25-inch mesh were already being used and continued to be fitted onto the drag intake head to prevent ordnance and large objects from the sea floor from being sucked into the dredge. The cages allowed UXO inspectors to look through the debris and collect the ordnance material for proper disposal. The fitting of the

cages onto the discharge end afforded a unique opportunity for the archaeological staff at the District to inspect the cages for cultural materials and potentially detect archaeological sites where the opportunity had not existed previously.

A monitoring plan was therefore implemented in 2009 whereby the archaeologist could inspect the debris once or twice a week for the length of the project. This monitoring was carried out for three renourishment contracts between 2008 and 2013. During dredging operations the dredging operator was required to record the location of the work on each day and the location where sand and debris was placed during the day's operations. The cages at the discharge end were dumped two or three times a week and the contractor placed the dumped material at a predetermined location for inspection by the project archaeologist. The archaeologist raked through and sometimes screened the material from the cages through a ¼ mesh screen to sift through smaller material that would collect in the screen. No archaeological remains were collected during the monitoring efforts however some modern artifacts were recovered when the materials were screened. These included leather straps, rubber shoe soles, fishing weights, iron rivets and pins likely from the dredge itself, and small munitions including modern bullets and roughly forty 0.75 caliber lead shot pieces which were possibly World War I or II era.

The SBBA was resurveyed in the summer of 2013 as decades have elapsed since the previous work and technology has improved significantly which allowed for a more thorough study to identify potential resources (Panamerican 2014b). Out of the 317 magnetic anomalies and 22 sidescan sonar targets there are nine anomaly clusters and three single anomalies that have the potential to represent historical resources. It is possible that many of these are associated with dredging debris given the history of the area. There were several truncated paleo-landforms observed in the subbottom data but none are potentially significant. There were 73 areas of rock scatter or concentrations recorded in the sonar record. It is suggested that these scatters are too numerous to represent exposed paleo-features, and a lack of corresponding subbottom return at their locations argues this supposition. Furthermore, many are uniformly circular in nature suggesting a disposal episode (i.e., offshore dumping, see Alpine Ocean Seismic Survey 1986:10), while several are truncated by dredge scars. These rock scatter locations are present throughout the offshore area.

2.11 Coastal Zone Management

The Coastal Zone Management Act (CZM) of 1972 (16 U.S.C. §§1451-1464) was enacted by Congress in an effort to balance the often competing demands of growth and development with the protection of coastal resources. Its stated purpose is to "...preserve, protect, develop, where possible, to restore or enhance, the resources of the nation's coastal zone...". The Act established the framework for achieving this balance by encouraging the states to develop CZM programs, consistent with minimum federal standards, designed to regulate land use activities that could impact coastal resources. The Coastal Zone Act Reauthorization Act Amendments of 1990 further strengthened the act by requiring the state programs to focus more on controlling land use activities and the cumulative effects of activities within designated coastal zones.

CZM policies protect and maintain significant coastal resources including, water and air quality, fish and wild life and scenic beauty. The CZM policies also provide protection from the

discharge of pollutants and the degradation of flood protection capacity, thus protecting and enhancing human life and property. CZM policies also function to promote and enhance water dependent activities including both active and passive recreation.

The State of New Jersey administers its federally approved coastal zone program through the Department of Environmental Protection, Land Use Regulation Program (NJDEP LURP). Pursuant to the federal CZMA, New Jersey has defined its coastal zone boundaries and developed policies to be utilized to evaluate projects within the designated coastal zone, as set forth in New Jersey's Rules on CZM (N.J.A.C. 7:7, 7:7E, dated July 18, 1994 and addendum to 7:7E-5 and 7:7E-8.7, dated August 19, 1996). The Waterfront Development Law (N.J.S.A. 12:5-3) and related requirements (N.J.A.C. 7:7-23) provide the authority for issuance of permits for, among other activities, the placement or construction of structures, pilings, or other obstructions in any tidal waterway.

As a Federally funded project within the coastal zone of New Jersey, the Elberon to Loch Arbour Reach must be reviewed by the NJDEP for consistency with the policies of the New Jersey State CZM Plan. Thirty (30) state CZM policies were determined to be applicable for the proposed project alternatives. These applicable policies, along with an impact analysis and consistency determination are discussed within the environmental consequences section of this report as well as CZM consistency review (state and local) that is presented in Appendix G .

2.12 Hazardous, Toxic and Radioactive Waste

For the Elberon to Loch Arbour Reach, a data search was conducted to determine if any listed sites/properties with contaminated soil were present within the reach. The area of search is almost entirely residential with small pockets of commercial and retail establishments. The area has historically been residential, first as seasonal (summer) housing and evolving to year round housing and retail businesses.

Review of previous report on beach replenishment contained no references to impacted sites. Review of USEPA data bases (CERCLIS, NPL, RCRIS) had no mention of sites in the area of interest. Review of the NJ-DEP data bases shown on the Known Contaminated Sites List (KCS), revealed there were no KCS in Deal, Loch Arbour and Elberon. There were four sites in Allenhurst, these four are inland from the beach, away from the proposed work and not at issue with any project actions. Within the project site are two lakes; Lake Takanassee in Elberon, and Deal Lake, located on the south border of Loch Arbour and Asbury Park. Both lakes flow directly into the ocean and are subject to daily tidal exchange. These lakes receive run-off from the surrounding residential neighborhoods and commercial areas. This run-off is untreated.

Within the project site there may be as many as ten storm sewer outfalls leading directly into the water. These storm sewers carry untreated run-off from residential and commercial areas. There is currently no plan to direct the run-off to be treated at local sewerage treatment plants.

Various pollutants present in the Hudson Raritan Estuary, can include heavy metals, PAHs, PCBs, and DDT as well as excessive nutrients such as carbon, nitrogen, phosphorous (USACE 1989). Pathogenic bacteria and viruses are also present. Hudson-Raritan Bay complex sediments contain the following sediment contamination: antimony, arsenic, cadmium, chromium, copper,

mercury, lead, silver, tin, zinc, total chlorinated pesticides, total DDT, total PCBs, and total PAHs in concentrations that rank in the top 20 contaminated estuaries in the country (Squibb *et al.* 1991). The contaminants listed previously are associated with sediments that contain significant amounts of fine organic particulates which are not found in the SBBA sands. The fill material to be dredged at the SBBA has been tested and found to be 90% or greater sand and does not contain any significant amounts of any contaminant.

2.13 Aesthetics and Scenic Resources

In general the Elberon to Loch Arbour Reach is characterized by severely eroded shorelines with little beach, scoured bluffs and armor stone in various locations. The project area has a long history of erosion including recent damage left by Hurricane Sandy. Though dominated by erosional processes, the project area remains a scenic location as almost any coastal shoreline is, especially from the higher elevations that exist there. However, the general lack of beach and berm especially in combination with the existing armored areas has decreased certain aspects of the aesthetic value of the shore line and, in some cases, presents safety issues during periods of high tide and/or high wind on shore winds.

2.14 Recreation

The shoreline of the Elberon to Loch Arbour Reach is considered a prime surfing and fishing area by the local residents. The local surfers believe that the existing unmodified rock groins and the sand bars that form adjacent to them are responsible for the favorable wave conditions that form in locations within the reach. Similarly, the surf fisherman view the existing groins as beneficial as they enable them to fish further offshore by standing on the groins, allowing them access to the fishery that would not be available from the edge of the shoreline.

2.15 Air Quality

In accordance with the Clean Air Act of 1977, as amended, the USEPA developed National Ambient Air Quality Standards (NAAQS) to establish the maximum allowable atmospheric concentrations of pollutants that may occur while ensuring protection of public health and welfare, and with a reasonable margin of safety.

The USEPA measures community-wide air quality based on daily measured concentrations of six criteria air pollutants; carbon monoxide, sulfur dioxide, respirable particulate matter, lead, nitrogen dioxide, and ozone. Based on these measurements of air quality, the USEPA designates attainment areas and non-attainment areas nationwide. Non-attainment areas are designated in areas where air pollution levels persistently exceed the national ambient air quality standards.

Based on the NAAQS, Monmouth County is located in the New York, Northern New Jersey, Long Island, Connecticut, nonattainment area, which is currently classified as "marginal" nonattainment for the 2008 8-hour ozone standard. The nonattainment area is part of the Ozone Transport Region. Ozone is controlled through the regulation of its precursor emissions, which include oxides of nitrogen (NO_x) and volatile organic compounds (VOCs).

2.16 Noise

Noise is generally defined as unwanted sound. Humans are most sensitive to frequencies in the 1,000 to 5,000 Hz range. Since ambient sound contains many different frequencies, measures of human response to sound assign more weight to frequencies in this range. This is known as the A-weighted sound level.

Noise criteria and the descriptors used to evaluate project noise are dependent on the type of land use in the vicinity of the proposed project. In general, land uses near the project site include residences and businesses.

Although noise levels for the project area have not been measured, they can be approximated based on existing land use, which is primarily residential, recreational and open space. Typical noise levels in residential areas range from 39 to 59 dBA (decibels on the A weighted scale; (USEPA 1978).

3. Future Without-Project Conditions / No Action Alternative

The Future Without Project Conditions (FWOPC) is a forecast based upon what has actually occurred, is currently occurring or is expected to occur in the Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I - Sea Bright to Ocean Township: Elberon to Loch Arbour Reach (“Elberon to Loch Arbour Reach”) if no federal action is taken related to coastal storm risk management. The FWOPC is the same as the No Action Plan that is required by the implementing regulations under the NEPA and serves as the base conditions for all the alternative analyses, including the engineering design, economic evaluation of alternatives, comparison of alternatives, as well as environmental, social and cultural impact assessment.

In the without project future condition, it is anticipated that the placement project area will be subject to the same erosive forces and other storm effects which have been experienced in the past. Coastal storms of various frequencies will continue to occur and inundation, wave attack, and erosion will continue unabated resulting in further reduction in beach width.

Such erosion would further diminish the coastal storm risk management capability of the beach and bluffs where they exist, therefore making the land forms and any structures increasingly more vulnerable to storm damage from inundation, wave attack and erosion. Increased water levels due to sea level rise will contribute to greater damages in the future.

In the absence of a federal coastal storm damage risk management project, it is likely that the local authorities would take remedial action at some point in the future to stabilize the shoreline and potentially restore the beach. Based on past efforts, it is assumed shoreline stabilization would be accomplished utilizing hard structures like sheet piling and revetments. An assessment of FWOPC on selected resources is further described in the following sections.

3.1 Land Use and Zoning

The project area is public and private beach. Direct impacts related to the FWOPC would be a continuing loss of beach and shore line area with the possibility of infrastructure and property damage and loss. Indirect impacts may include changes to traffic patterns and loss of commercial productivity as well as loss of recreational opportunities.

3.2 Topography, Geology and Soils

Direct impacts to topography and soils related to the FWOPC alternative include the continuation of existing long term and episodic erosion of the beach and shoreline as well as continued undermining of existing armor or similarly purposed structures. Though erosion will be the dominant characteristic during a period of sea level rise, there will be areas where accretion occurs. These would include the south side of existing spits or groins that interrupt the south to north long shore transportation of sediment.

With erosion, sediments will be introduced into the ocean where they will be redistributed in direct relationship to their relative mass, and the speed and direction of water movement. Changes to existing volume of sediments comprising the shore line will be most noticeable as alterations to topography of the beach and shoreline profiles both laterally and in elevation.

3.3 Water Resources

The FWOPC will not have any direct or indirect impacts to the geo-physical parameters controlling groundwater. Direct impacts of the FWOPC will have minor affects on (ocean) surface waters via ongoing erosion of the shore line causing localized increases in nearshore total suspended sediments and turbidity during storm events. Erosion and continuing deterioration of constructed drainage infrastructure may result from the FWOPC, affecting certain aspects of surface flow including impacts to Deal Lake and Lake Takanassee. Erosion may increase nutrient and organic matter inputs into the Atlantic Ocean but no significant direct or indirect impacts to surface waters would be expected from events such as these.

3.4 Vegetation

Direct impacts to vegetation from the FWOPC alternative would be the potential (direct) loss of vegetation via loss of substrate as well as loss due to the effects of inundation by salt water. Most vegetative loss would be observed in those areas still maintaining vegetation but highly susceptible to erosion such as the base and slopes of elevated shoreline areas. Indirect impacts to vegetation may include changes to more salt tolerant types, including the potential for the replacement by and proliferation of salt tolerant invasive species.

3.5 Fish and Wildlife

3.5.1 Finfish

3.5.1.1 Intertidal and Nearshore

Erosion will continue to cause fine sediments to wash into the surf and nearshore zones with increased concentrations during a storm; this would not constitute a significant adverse impact to finfish.

3.5.1.2 Sea Bright Borrow Area

No direct or indirect impacts to fish within the delineated project area of the SBBA are anticipated via implementation of the FWOPC alternative.

3.5.2 Benthic Resources

3.5.2.1 Intertidal and Nearshore

No significant direct or indirect impacts to intertidal or nearshore benthic invertebrates are anticipated from the FWOPC alternative. There is a potential for deposition of fine sediments to cause respiratory stress to sessile benthic species during storm events.

3.5.2.2 Sea Bright Borrow Area

No significant direct or indirect impacts to SBBA benthic invertebrates are anticipated from the FWOPC alternative.

3.5.3 Reptiles and Amphibians

The project placement site offers little in the way of terrestrial habitat for reptiles and amphibians as previously discussed in the existing conditions section. The FWOPC is unlikely to change these conditions. Sea turtles are discussed in Section 3.6, Threatened and Endangered Species.

3.5.4 Birds

Presently, because of the severe erosion and remaining (post-Hurricane Sandy) protection measures/structures along the project reach of shoreline, there is no adequate nesting habitat available for either beach or dune nesting bird species. Gulls and sandpipers along with other common shorebirds and crows will continue to roost and forage along the existing beach and shoreline. Continued erosion may necessitate locally implemented protection measures by methods such as sand bags, armor or sheet pile that could indirectly impact shorebird species by covering beach used for foraging and resting. No significant impact to the previously listed avian species is expected from the FWOPC alternative.

Continued erosion and the potential loss of woody vegetation existing at present at higher elevations could indirectly impact common perching species such as robins, sparrows, blue jays

and starlings etc.) through loss of available nesting, perching and foraging locations/habitats. This would not constitute a significant impact either.

3.5.5 Mammals

3.5.5.1 Terrestrial Mammals

Continuing erosion and further loss of any grasses or other beach vegetation will further reduce the project sites suitability for small common mammals, which in general would consist of local rodent species. Loss of habitat represents an indirect impact to these species. An opposing positive potential indirect impact to small mammals might arise from any FWOPC small scale local protection efforts such as installation of sand bags or similar protection methods which can provide refuge for such species, generally considered undesirable.

3.5.5.2 Marine Mammals

Seal species (see Existing Conditions) are known to seasonally inhabit project site waters, both near shore as well as the waters of the SBBA. Harbor seals, and less frequently grey seals, use the jetties, groins and beaches as haul out areas (USFWS 1997). These species may use the project beaches as haul outs in winter. Further loss existing beach due to erosion may make those areas less useful as haul outs. . No significant direct or indirect impacts to seals would be expected at the placement from the FWOPC alternative. Seals within the SBBA are expected to continue to seasonally inhabit those waters where they will continue to experience the presence of commercial vessels. They are expected to avoid serious direct impacts due to their awareness and mobility.

3.6 Threatened and Endangered Species

3.6.1 Terrestrial Species

With the exception of occasional transient individuals, no State or Federal endangered, threatened or special concern faunal species are known to nest or reside in the Elberon to Loch Arbour Reach. Future nesting under the existing and assumed to be further eroded future conditions is not expected.

Adult piping plover or newly fledged piping plovers may forage at the project site during seasonal residency during migration stopovers. No FWOPC impacts are expected for piping plovers or any other state or federal listed avian species that may be temporarily present at the project site.

No state or federally listed plants are known to exist at the project site. Existing conditions and assumed continuation of severe erosional conditions including wave run-up, preclude the establishment of sea beach amaranth and sea beach knot weed.

3.6.2 Sea Turtles

Four species of sea turtles are known to seasonally (May – November) inhabit regional New Jersey coastal waters including those of the SBBA. Three of these species (Kemp's Ridley,

green and loggerhead) may be present in the project area as they migrate to and from area inland estuaries. The leatherback may be more likely to be present in the region of the SBBA throughout the “turtle season”, and because of its tolerance to colder temperatures may be present in the region for a longer window of time. During the FWOPC turtles will remain vulnerable to commercial and recreational vessel strikes that can result in serious injury or mortality from May through November. FWOPC (seasonal) direct impacts to all four species may also include drowning due to various commercial fishing gear including trawl nets. The potential for all of these direct impacts will exist under any alternative.

3.6.3 Whales

The three species of state and federally endangered whales previously discussed in the existing conditions section will remain susceptible to commercial or recreational vessel strikes and general disturbance from shipping traffic within the region. These potential impacts will exist for any alternative.

3.6.4 Atlantic Sturgeon

Within and around the SBBA Atlantic sturgeon would have multiple sources of potential direct impact during the FWOPC alternative. Since the SBBA is within the area where many ocean going vessels pass going to and from NY Harbor, potential impacts from vessel strikes exist year round but this is probably extremely rare due to the benthic orientation of sturgeon, and depth of unconstricted open water at the SBBA.

During the FWOPC by catch captures of Atlantic sturgeon by commercial and recreational fishermen as by catch may occur, with the potential to cause serious injury or death to this species. This direct impact has the potential to occur for with any alternative.

3.7 Essential Fish Habitat

During the FWOPC various EFH species at the SBBA will be vulnerable to both commercial and recreational fishing. Within the SBBA project dredge footprint, EFH will not be impacted by the FWOPC. EFH species within nearshore waters adjacent to the placement area will be vulnerable to recreational fishing, most likely from surf fisherman. Nearshore and intertidal EHF's will be affected by natural events such as wind and storms, however the magnitude of direct and indirect impacts (turbidity/accretion of fine sediments) are not expected to be significant adverse impacts to either EFH species or habitats.

As there will be no placement of sand at the project shoreline during the FWOPC, significant direct and indirect impacts to EFH or related species at the intertidal and nearshore are not anticipated.

3.8 Socioeconomics

Implementation of the FWOPC is not anticipated to significantly alter the racial composition, income, age distribution or division of employment of the project area population. However, in the FWOPC erosion of the shoreline may negatively impact adjacent infrastructure including

roadways and utilities, as well as property and residences. Existing conditions showed a decline in population of the area in recent years. This trend may continue if the threat of storm damage is not checked .

3.9 Coastal Zone Management

FWOPC impacts to state CZM policy issues include the following: Continued loss of shorefront causing siltation which can degrade intertidal areas; loss of flood protection capacity impacts safety and property, as well as, the potential loss or damage infrastructure including roadways; and loss of access to public recreation areas.

Continued erosion will further decrease scenic and aesthetic value of the shore front. Continuing erosion may also decrease natural habitat values. The project site is along the Atlantic flyway. Areas of sandy beach provide rest areas as well as habitat to many prey species that are essential to various shorebirds both residents and seasonal migrants, both may include state and federal listed species. The detailed assessment related to 30 applicable state coastal zone policies can be found in Appendix G. It is important to note, however, that because of long-term and episodic storm events and sea level rise, long-term planning activities are recommended to be undertaken by the appropriate agencies to investigate the need for and implementation of appropriate actions to combat these threats, including possibly raising or relocating infrastructure that has the potential to be adversely affected by storm induced high water levels.

3.10 Hazardous, Toxic, and Radioactive Waste

Infrastructure adjacent to the project placement site includes surface water drainage system pipes and sewerage outfalls. Continued erosion could cause disruption of these systems and might result in increased flooding, standing water and release of sewerage. There are storm water sewer outfalls within the sand placement areas. Sand placement upon these structures will not impede its function. Sanitary sewer outfalls are not visible on the beach and extend offshore several hundred yards from the beaches. Sand placement will not impact these outfalls.

3.11 Aesthetics and Scenic Resources

The expected continuation of erosion including further loss of beach and retreat of the shoreline will act to decrease aesthetic and scenic resources related to the shoreline.

3.12 Recreation

Persistent shore line erosion will further decrease the utility of the beach along the Elberon to Loch Arbour Reach as a sunbathing and swimming beach. However, these same conditions will maintain or possibly improve the areas functionality as a surf fishing, surf riding, and kayaking locale.

3.13 Air Quality

FWOPC conditions will not alter air quality in the project area.

3.14 Noise

There are no known expected direct or indirect impacts to noise in regard to the FWOPC. Typical ambient noise levels from local residential and commercial activities including traffic are expected to remain the same. In water noise from motorboats and other personal craft would also remain. There is a potential for short-term noise increases if non-Federal construction is required to install new erosion protection structures, beach fill, or implementing repairs to existing structures. This could include the installation of metal sheet pile or structural piles which might, depending on the method of installation and the location, become a source of significant noise on land and/or underwater.

3.15 Cultural Resources

The *Adonis/Rusland* archaeological complex (shipwrecks) will continue to experience deterioration and/or protection from storms and sands shifting over the site. Monitoring of the site as per the Programmatic Agreement (PA) will not occur under this alternative.

4. Plan Formulation

A complete alternative analysis for Sandy Hook to Barnegat Inlet Section I, which includes the Elberon to Loch Harbour Reach, was completed in the 1989 GDM. Alternatives evaluated in the 1989 GDM included the following:

- No Action
- Buy-outs
- Revetments
- Revetments and beach restoration
- Breakwaters
- Breakwaters with beach restoration
- Seawalls
- Seawalls with beach restoration
- Perched beach with beach restoration
- Beach restoration
- Groins
- Groins with beach restoration

Ultimately, the National Economic Plan (NED) identified for the Sandy Hook to Barnegat Inlet Section I included a 100 ft wide berm at elevation of +7.3 ft NAVD88 with an onshore slope of 1V:10H and offshore slope of 1V:35H. A 2 ft storm berm cap would be placed on the onshore portion of the berm. The NED Plan for Sandy Hook to Barnegat Inlet Section I required an initial construction quantity of 17,705,000 cy, with a six year renourishment quantity of 3,522,000 cy during the 50-year period of analysis.

This HSLRR does not reanalyze alternatives, but updates the economic analysis of the recommended plan, reaffirms the economic justification of the plan, and documents compliance with P.L. 113-2.

4.1 Planning Objectives & Constraints

The following discussions identify critical objectives, constraints, and assumptions used to evaluate the recommended plan.

4.1.1 Planning Objectives

The Federal objectives in making investments in coastal storm risk management projects (formerly called storm damage reduction projects) are to contribute to National Economic Development (NED). The pursuit of planning objectives must be consistent with Federal, State and local laws and policies, and technical, economic, environmental, regional, social, and institutional considerations. Recommended plans should avoid, minimize, and then mitigate, if necessary, adverse project impacts to the environment. They should also maximize net economic benefit, avoid adverse social impacts, and meet local preferences to the fullest extent possible.

Based on the problems and opportunities within the project area, local desires, and the intent of the current authorization, the planning objectives of this study have been identified as follows:

- Reduce the threat of potential future damages due to the effects of storms, with an emphasis on inundation, wave impacts, and shoreline recession.
- Manage the risk of the long term erosion that is currently experienced.
- Provide an economically justified plan.
- Preserve and maintain existing environmental resources and habitats to fish and wildlife, where possible.
- Preserve cultural resources within the project area.

4.1.2 Planning Constraints

Planning constraints are technical, environmental, economic, regional, social and institutional considerations that act as impediments to successful response to the planning objectives or reduce the range of possible solutions.

- Technical constraints include the need for plans to be: (1) sound, safe, and acceptable engineering solutions; (2) in compliance with USACE engineering regulations; (3) realistic and state-of-the-art; (4) consistent with existing local plans; and (5) complete and not dependent on future projects.
- Economic constraints include: (1) the need for coastal storm risk management measures to be efficient (*i.e.*, average annual benefits exceed average annual costs); and (2) the requirement to select the coastal storm risk management plan that maximizes net excess benefits (*i.e.*, the NED plan) associated with storm damage reduction.
- Environmental constraints affecting the formulation and selection of coastal storm risk management plans include the need to: (1) avoid unreasonable impacts to environmental resources; and (2) first consider avoidance followed by minimization, mitigation, and replacement.
- Regional and social constraints include the need for plans to: (1) weigh the interests of State and local public institutions and the public at large; and (2) consider the potential impacts of the project on other areas and groups.

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- Institutional constraints include the need for plans to: (1) be consistent with existing Federal, State and local laws; (2) be locally supported; (3) provide public access to the beach in accordance with Federal and State laws and regulations; and (4) find overall support in the region and state.

4.2 Recommended Plan

The HSLRR project purpose remains the same as presented in the 1989 GDM, which is to provide for coastal storm risk management along the shoreline of the Elberon to Loch Arbour Reach. In addition, there are no changes in project scope. The recommended plan continues to include construction of a 100 ft wide beach berm, groin modifications and outfall modifications. Each project feature is described in a greater level of detail in the following sections. Design Plans can be found in Appendix A.

Beach Fill Placement: The authorized plan includes a 100 ft wide beach berm at an elevation of +7.3 ft NAVD88. A 2 ft high storm berm cap designed at an elevation of +9.3 ft NAVD88 will be included on the berm to manage risk of overtopping and erosion. Slopes of the proposed design profile include an onshore slope of 1V:10H from elevation +9.3 ft NAVD88 to -2.7 ft NAVD88 and an offshore slope of 1V:35H from elevation -2.7 ft NAVD88 to -25 ft NAVD88. The 4,450,000 cy of sand will be dredged from the SBBA to construct the berm. The dredging, transport and pumping of the material will be performed using a hopper dredge equipped with UXO screening.

A beach renourishment cycle of every six years for 32 years at an expected volume of 660,000 cy of sand per cycle specifically for the Elberon to Loch Arbour Reach is included in the recommended plan presented in this HSLRR. A renourishment quantity of 2,600,000 cy of sand (which includes the 660,000 cy mentioned previously) per cycle specifically for Sandy Hook to Barnegat Inlet Section I serves as the basis for the fully funded renourishment cost for the PPA.

Groin Modifications: Six groins within the project area will exceed the proposed berm width which increases the potential of sand impoundment on the updrift side of the groin and a sand starved condition on the downdrift side of the groin, which could result in a less stable and less uniform berm width. As this situation impacts the objective of the project, the groins will be modified to allow sediment to pass through to the downdrift side of the groin.

One method such as notching will entail removal of a 100 ft section of each groin by removing the top layer of armor stone. Side slopes of 1V:3H will be constructed at the landward and seaward edge of the existing groin to tie the notch into the existing groin. The bottom slope of the groin notch will match the design offshore slope of the beach fill. Stone will be excavated and sorted for reuse in construction of the notch. Once stone is excavated to create the slope, a 2 ft layer of bedding stone will be placed to create a base layer, with armor stone then replaced to create the top layer.

The groin notches will be placed sufficiently landward so that they are located within the swash zone under all but extreme wave conditions and will be constructed after beach fill placement. A containment zone will have to be created so that the work can occur in a no wave environment.

The zone will be created 40 ft north and south of the groin, using the stone that will not be reused in the notch, with a steel plate placed seaward of the stone for stability.

Outfall Modifications: Based on site investigations, consultations with municipal engineers, review of previous design documents and a survey, there are 39 outfalls within Sandy Hook to Barnegat Inlet Section I, ranging from 6” to 72” in diameter. An analysis was conducted to evaluate the need to modify the existing outfalls to comply with drainage and safety requirements. The results of the analysis concluded that the invert elevations of 16 outfalls will be below the new beach elevation thus requiring modifications to ensure they remain operational once the proposed project is constructed and to prevent damage to the new beach.

Ten of the 16 outfalls will be extended to the edge of the construction template. Outfall extensions for pipes 30” diameter or less will be supported using timber crib structures. Outfall extensions for pipes greater than 30” diameter will be supported using a composite cribbing structure.

Extending the remaining seven outfalls was deemed impractical due to high initial construction costs and high maintenance costs. Rather, in order to maintain the function of these outfalls, five will receive retention systems and two outfalls will be reset.

Post Construction Beach Fill Monitoring: Beach profiles will be surveyed twice per year (spring and fall) following initial construction and throughout the remaining life of the project (32 years). A total of 25 long range profiles will be surveyed throughout the project area. Repetitive surveys of these profiles will track the movement of placed beach fill alongshore and offshore and will provide estimates of subsequent erosion and accretion. The survey will capture characteristics of the post-winter and post-summer beach. The frequency of beach profile surveys has increased from once per year in the Authorized Plan to twice per year in this HSLRR based upon the best available engineering techniques and the lessons accomplished through Flood Control and Coastal Emergencies (FCCE) Program. The experience following Hurricane Sandy demonstrated the importance of having the best available pre-storm condition to compile accurate FCCE funding requests in a timely manner.

4.3 Sea Level Rise

The Department of the Army Engineering Circular EC-1165-2-212 (October 2011) requires that future sea level rise (SLR) projections must be incorporated into the planning, engineering design, construction and operation of all civil works projects. This recommends evaluating structural and non-structural components of the proposed alternatives in consideration of the “low,” “intermediate” and “high” potential rates of future SLR for both “with” and “without project” conditions. This range of potential rates of SLR is based on findings by the National Research Council (NRC, 1987) and the Intergovernmental Panel for Climate Change (IPCC, 2007).

Sea level rise considers the effects of the global average of the annual increase in water surface elevation due to the global warming trend and the regional rate of vertical land movement that can result from localized geological processes. The reach is located in an area that experiences positive land subsistence due to geological processes. Therefore when land within the reach

subsides as water surface elevation increases, the net local SLR is greater in the reach than at a location experiencing an increase in water surface elevation only.

The plan for the Elberon to Loch Arbour Reach consists of a beach berm cross section, which is adaptable to changes in sea level. Adaptations to the beach berm would include an increase in berm elevation to compensate for increasing still water levels. Regular renourishment operations are part of the recommended plan. Each renourishment cycle provides an opportunity to recalculate storm impacts to the design section and to modify the section to account for deeper water and larger waves. The berm design can be modified to adapt to other potential impacts from climate change including changes to storm frequency and intensity.

Outfall extensions within the project area will be designed for 30-year period of analysis and will take into account the intermediate projections of sea level rise, for design of invert elevations.

More detailed information regarding SLR and how the project considers it can be found in Appendix A of this report.

4.4 Real Estate Requirements

The proposed beach berm will be constructed on existing beachfront owned by private owners, and public properties owned by the City of Long Branch, the Borough of Deal, the Borough of Allenhurst, the Village of Loch Arbour, the City of Asbury Park, and the state of New Jersey. A Perpetual Beach Storm Damage Reduction Easement will be acquired and will serve as a long term easement to allow for construction operation, maintenance and inspection of the project. The purpose of the Project and the easement being estimated herein is to provide coastal storm risk management. The construction associated with the Project will provide the General Benefit of coastal storm risk management to the entirety of the communities in the Elberon to Loch Arbour Reach, not just the parcels involved with the project and under analysis herein. In addition, as described in the Memorandum dated 16 October 2013 and titled “NAD Regional Real Estate Policy Guidance – Hurricane Sandy Coastal Restoration Program Easement Valuation” within Section 5.c.(4)(a), the benefit should be considered general in the Reconnaissance/Cost Estimate. As a result a General Benefit cannot offset the value of the taking and therefore the appraiser has estimated that the value of the required “interests” that are to be “acquired” for both municipal owned property and privately owned lands is \$602,000.

For work and/or staging areas, a standard Temporary Work Area Easement will be acquired specifically for storage areas associated with the construction of the project. Storage areas as delineated in the engineering and design for the project will be located on the beach along side of the construction as it progresses through the reach. The temporary Work Area Easement is assumed for a two year period on one acre of land owned by the Borough of Deal. Other storage areas may be required, but they will be located within the Perpetual Beach Storm Damage Reduction Easement area which will have been previously acquired, as described in use and circulation on and over municipally owned uplands which abut the project. This will provide sufficient ingress and egress for accessing the project for construction, renourishment, rehabilitation and operation and maintenance of all project features. Table 3 summarizes the permanent and temporary easement acreage required to construct the proposed project.

Table 3: Summary of Easement Acreage Needed for the Elberon to Loch Arbour Reach

Perpetual Beach Storm Damage Reduction Easement	
Total Acres of Publicly Owned Lands	15.25 acres
Total Acres of Privately Owned Lands	22.35 acres
Total	37.6 acres
Temporary Work Area Easement	1.0 acre
Total	38.6 acres

A value of \$1,148,000 is estimated as the total real estate cost for the project. The breakdown of the real estate cost estimate is described in Table 4. The lands, easements, rights of way, relocation and disposal requirements over private properties in the project are to be acquired by each of the local non-Federal sponsors with the non-Federal sponsor, NJDEP, providing its eminent domain authority, if necessary, to acquire the real estate.

The municipal entities owning lands in the project will provide representations and warranties stating that they own the lands for use in the project and are legally capable to grant an easement to the sponsor. By way of the processes discussed previously, the sponsor has the resources to accomplish the acquisition of interests in the real estate necessary for the construction, rehabilitation and operation and maintenance of the project. Further discussion on the real estate requirements and project costs can be found in Appendix D of this report.

Table 4: Summary of Anticipated Project Real Estate Costs

Perpetual Beach Coastal Storm Risk Management Easement	\$602,000
Non-Federal Sponsor Administrative Costs	\$219,000
Appraisal (by non-Federal sponsor)	\$307,000
Federal Administrative Costs	\$ 20,000
TOTAL	\$1,148,000

4.5 Cost Estimate

This section presents a detailed cost estimate for initial construction, renourishment and maintenance resulting in total and annualized project costs for the recommended plan. The recommended plan provides for periodic renourishment at 6-year intervals, maintenance of outfalls and groins, monitoring and major rehabilitation to restore the design beach profile damaged by significant storm events beyond that designed for in the renourishment cycle volumes. Further details regarding the cost estimate can be found in Appendix B.

Estimated First Cost: The estimated project first cost for initial construction of the recommended plan for the Elberon to Loch Arbour Reach includes real estate administration costs and pertinent contingency, engineering and design and construction management costs. The estimated project first cost is \$134,638,000. Details for the first cost estimate are shown in Table 5. The fully funded project first cost, escalated to the midpoint of construction, is included in Section 7 of this HSLRR to support the PPA.

Engineering and Design and Construction Management: Engineering and design costs include preparation of the subsequent project design memorandum, plans and specifications, cultural, coastal and environmental pre-construction monitoring and the development of the PPA. Engineering and design costs are based on roughly 18% of the direct construction costs. Construction management costs are based on roughly 8% of the direct construction costs.

Contingency: Per Cost Engineering Regulations, an Abbreviated Risk Analysis (ARA) was performed for this project. The major risks for this project are associated with the method of groin modification and quantities of material to be removed and outfall modification costs. As a result of the analysis, a value of 26.62 was determined for contingency. The results portion of the ARA can be found in Appendix B.

Annualized Costs: Annualized costs are based on a period of analysis of 32 years and an interest rate of 3-1/2%. The period of analysis is typically 50 years; however, this reach is the final reach of a project which was first constructed 18 years ago. Therefore, 32 years is the remaining period over which the costs of maintenance and renourishment related to this reach will be relevant. The annual costs include the annualized first costs along with periodic renourishment every 6 years, coastal monitoring, federal inspection cost, dune, groin, and outfall maintenance and were only calculated for Sandy Hook to Barnegat Inlet Section I, not the Elberon to Loch Arbour Reach. Total annual costs for Sandy Hook to Barnegat Inlet Section I are \$8,412,000, deflated to FY88 price levels to serve as the basis of costs in the economic analysis.

Periodic Renourishment: The periodic renourishment volume to be placed at 6-year cycle subsequent to commencement of construction and throughout the 32-year period of analysis for the Elberon to Loch Arbour Reach is 660,000 cy, which includes overfill and tolerance at a total cost per operation for the reach of \$17,124,000. The periodic renourishment quantity for Sandy Hook to Barnegat Inlet Section I and associated fully funded cost are included in Section 7 of this HSLRR to support the PPA.

Major Rehabilitation Costs: Major rehabilitation costs are included in the annualized cost for significant storm events beyond those that were designed for in the renourishment cycle to restore the design profile. The threshold at which major rehabilitation costs are incurred is based on the storm event that causes the erosion volume to exceed 15 cy/linear feet along the beach front. This is the average renourishment volume anticipated to be available at the midpoint of the renourishment cycle because the significant storm event has a 50% chance of occurring earlier or later than the cycle midpoint.

Monitoring Costs. Post-construction monitoring costs for this reach include coastal monitoring over the 32-year period of analysis and environmental monitoring related to Endangered and Threatened Species as described in Section 5.6.

Table 5: First Cost Summary

Total First Cost							
Sandy Hook to Barnegat Inlet, Elberon to Loch Arbour Reach, NJ							
October 2013 Price Level							
Coastal Storm Risk Management Report Cost Estimate Summary							
Feat. Acct.	Description	Qty	UoM	Subtotal	Cont. %	Cont \$\$	Total Cost
Contract 1							
10	10 - Breakwaters and Seawalls						
	Groins	1	LS	\$ 896,433	26.73%	\$ 239,617	\$ 1,136,049
	TOTAL BREAKWATERS & SEAWALLS			\$ 896,433		\$ 239,617	\$ 1,136,049
17	17 - Beach Replenishment						
	Outfalls	1	LS	\$ 3,928,044	26.73%	\$ 1,049,966	\$ 4,978,011
	Hydraulic Beach Fill	1	LS	\$ 24,523,678	26.73%	\$ 6,555,179	\$ 31,078,857
	TOTAL BEACH REPLENISHMENT			\$ 28,451,722		\$ 7,605,145	\$ 36,056,868
	01 - Land & Damages	1	LS	\$ 318,778	20%	\$ 63,756	\$ 382,533
	30 - Planning, Engineering & Design	1	LS	\$ 5,354,000	15%	\$ 785,967	\$ 6,139,967
	31 - Construction Management	1	LS	\$ 2,235,766	18%	\$ 407,133	\$ 2,642,899
	TOTAL FIRST COST CONTRACT 1			\$ 37,256,699		\$ 9,101,618	\$ 46,358,317
Contract 2							
10	10 - Breakwaters and Seawalls						
	Groins	1	LS	\$ 969,037	26.73%	\$ 259,023	\$ 1,228,060
	TOTAL BREAKWATERS & SEAWALLS			\$ 969,037		\$ 259,023	\$ 1,228,060
17	17 - Beach Replenishment						
	Outfalls	1	LS	\$ 9,206,656	26.73%	\$ 2,460,939	\$ 11,667,595
	Hydraulic Beach Fill	1	LS	\$ 45,935,681	26.73%	\$ 12,278,608	\$ 58,214,289
	TOTAL BEACH REPLENISHMENT			\$ 55,142,337		\$ 14,739,547	\$ 69,881,884
01	01 - Land & Damages	1	LS	\$ 637,556	20.00%	\$ 127,511	\$ 765,067
30	30 - Planning, Engineering & Design	1	LS	\$ 10,240,000	14.68%	\$ 1,503,232	\$ 11,743,232
31	31 - Construction Management	1	LS	\$ 3,942,942	18.21%	\$ 718,010	\$ 4,660,952
	TOTAL FIRST COST CONTRACT 2			\$ 70,931,872		\$ 17,347,323	\$ 88,279,195
	TOTAL FIRST COST			\$ 108,188,571		\$ 26,448,941	\$ 134,637,511

Note: For presentation throughout the report, the total first cost has been rounded to \$134,638,000.

4.6 Economic Analysis

4.6.1 Reach as a Component of the Entire Authorized Project

The Elberon to Loch Arbour Reach, proposed for construction according to this HSLRR, is a reach within Sandy Hook to Barnegat Inlet Section I and should not be incrementally justified. Accordingly, the economic analysis evaluates this reach as the most recent component of the Sandy Hook to Barnegat Inlet Section I and is based upon the initial construction and renourishment costs for Section I. The analysis confirms that Sandy Hook to Barnegat Inlet Section I, which was designed to function as a system, remains economically justified once this reach is constructed.

The update of the project costs for this analysis parallels the approach of a Level I economic budget update by combining expended cost with projected costs to derive the total project cost estimate. The actual construction and nourishment costs incurred for the completed portions are added to the initial project cost estimate for this reach and anticipated renourishment dates and costs to establish a lifecycle project cost. This total project cost, adjusted to the price level of the authorizing document with the Civil Works Construction Cost Index (CWCCIS) quarterly index for beach replenishment, is compared to the benefits from the 1989 GDM to generate a benefit cost ratio to demonstrate the entire project is economically justified.

4.6.2 Benefits

The benefit stream described in the authorizing document was revisited to confirm that benefit categories are defensible. The structure inventory was compared to the current project area condition, which confirmed the structure inventory data base for the project area is applicable. Density in the area is consistent with original condition. Structures damaged during Hurricane Sandy are assumed to be a temporary condition, and that a majority will be rebuilt for the remainder of the period of analysis. Consultation with local officials confirmed that building permit applications are for restoration to prior conditions and that no significant change to the existing building stock occurred. Consistent with the future without project condition assumptions, few additional structures have been built in the study area, and any changes from teardowns/new construction have had minimal impact on composition of total structural data base. Storm damage reduction benefits from the authorizing document are still reasonable. Benefits for reduced damages accrue from three potential storm damage categories: erosion, wave attack, and inundation.

Recreation is a secondary purpose; the magnitude of benefits is still reasonable, if not conservative. Seasonal demographic demand for the recreational beach experience in the project area continues to increase over time.

The annual benefit stream, as estimated in the authorizing document price level of FY88 is \$36,900,000.

The economic analysis reflects that, for the first 18 years of the project, only the benefits which accrue from construction of the completed portions are applicable. The analysis reflects the

entire benefit stream of all three reaches only from the time that this third reach is completed in FY16. Benefits for each constructed reach, as presented in the authorizing document are estimated at \$30,100,000 to reflect the two reaches constructed from 1998 through present. Total project benefits of \$36,900,000 were assumed to accrue from 2016 through the remainder of 50-year period of analysis. Average annual benefits reflecting this tiered accrual are \$34,450,000 over the 50-year period of analysis at a 3.5% discount rate.

4.6.3 Costs

Total project cost is a composite of the actual construction costs and nourishment costs incurred for the reaches which were built in FY1998. These portions were also renourished in FY02, FY08, FY12 and FY13. Actual costs are presented in Table 6. The cost estimate for the Elberon to Loch Arbour Reach, which is described fully in Section 4.5, was added to the actual costs incurred to derive the total project cost for use in the economic analysis.

Once initial construction costs, interest during construction, design and construction and management costs are included in the total project cost estimate of this remaining portion, this reach is estimated to cost \$141,080,000 in FY14 price level.

Renourishment, also in the FY 14 price level is estimated to cost \$54,676,000 per 6-year cycle for Sandy Hook to Barnegat Inlet Section I, and is combined with the actual renourishment expenditures to estimate the total project cost.

The economic analysis reflects that, for the first 18 years of the project, only operations, maintenance, repair and rehabilitation (OMR&R) costs which accrue from construction of the completed portions are applicable. The analysis reflects the OMR&R costs of all three reaches only from the time that this third reach is completed in FY16. OMR&R costs include dune and groin maintenance, coastal monitoring and outfall maintenance.

The total project cost for Sandy Hook to Barnegat Inlet Section I is \$425,944,000 in FY14 price level and for the economic analysis is deflated to the price level of the authorizing document with the CWCCIS quarterly index for beach replenishment, and amounts to \$197,299,000 in FY88 price level.

Table 6: Lifecycle Costs of Sandy Hook to Barnegat Inlet Section I

Year	IDC	Initial Construction	First Cost 2014 PL	O&M Costs FY14 PL	Total Project Cost FY14	Present Value Factor	Present Value FY88 PL (3.5%)	Present Value FY14 PL (3.5%)
1998	0	5,216,677	73,491,732	169,878,488	169,878,488	1	78,708,409	169,878,488
1999	1			498,086	498,086	0.966184	212,220	481,243
2000	2			498,086	498,086	0.933511	205,044	464,969
2001	3			498,086	498,086	0.901943	198,110	449,245
2002	4	15,435,833	22,530,164	498,086	23,028,250	0.871442	9,288,149	20,067,790
2003	5			498,086	498,086	0.841973	184,938	419,375
2004	6			498,086	498,086	0.813501	178,684	405,193
2005	7			498,086	498,086	0.785991	172,641	391,491
2006	8			498,086	498,086	0.759412	166,803	378,252
2007	9			498,086	498,086	0.733731	161,163	365,461
2008	10	13,427,693	15,668,765	498,086	16,166,851	0.708919	5,302,237	11,460,985
2009	11			498,086	498,086	0.684946	150,447	341,162
2010	12			498,086	498,086	0.661783	145,359	329,625

2011	13				498,086	498,086	0.639404	140,444	318,478
2012	14		15,145,644	15,636,809	498,086	16,134,895	0.617782	4,611,446	9,967,845
2013	15		17,280,000	17,436,727	498,086	17,934,813	0.596891	4,953,275	10,705,122
2014	16				498,086	498,086	0.576706	126,672	287,249
2015	17			0	498,086	498,086	0.557204	122,389	277,536
2016	18	2,010,863	134,637,511	141,079,808	1,997,000	143,076,808	0.538361	35,692,804	77,026,993
2017	19			0	1,997,000	1,997,000	0.520156	485,641	1,038,751
2018	20			0	1,997,000	1,997,000	0.502566	469,218	1,003,624
2019	21		54,675,700	54,675,700	1,997,000	56,672,700	0.485571	12,754,049	27,518,614
2020	22			0	1,997,000	1,997,000	0.469151	438,020	936,894
2021	23			0	1,997,000	1,997,000	0.453286	423,208	905,211
2022	24			0	1,997,000	1,997,000	0.437957	408,897	874,600
2023	25			0	1,997,000	1,997,000	0.423147	395,069	845,025
2024	26			0	1,997,000	1,997,000	0.408838	381,709	816,449
2025	27		54,675,700	54,675,700	1,997,000	56,672,700	0.395012	10,375,427	22,386,410
2026	28			0	1,997,000	1,997,000	0.381654	356,330	762,164
2027	29			0	1,997,000	1,997,000	0.368748	344,280	736,390
2028	30			0	1,997,000	1,997,000	0.356278	332,638	711,488
2029	31			0	1,997,000	1,997,000	0.34423	321,389	687,428
2030	32			0	1,997,000	1,997,000	0.33259	310,521	664,182
2031	33		54,675,700	54,675,700	1,997,000	56,672,700	0.321343	8,440,417	18,211,359
2032	34			0	1,997,000	1,997,000	0.310476	289,875	620,021
2033	35			0	1,997,000	1,997,000	0.299977	280,072	599,054
2034	36			0	1,997,000	1,997,000	0.289833	270,601	578,796
2035	37			0	1,997,000	1,997,000	0.280032	261,450	559,223
2036	38			0	1,997,000	1,997,000	0.270562	252,609	540,312
2037	39		54,675,700	54,675,700	1,997,000	56,672,700	0.261413	6,866,284	14,814,952
2038	40			0	1,997,000	1,997,000	0.252572	235,813	504,387
2039	41			0	1,997,000	1,997,000	0.244031	227,839	487,331
2040	42			0	1,997,000	1,997,000	0.235779	220,134	470,851
2041	43			0	1,997,000	1,997,000	0.227806	212,690	454,928
2042	44			0	1,997,000	1,997,000	0.220102	205,498	439,544
2043	45		54,675,700	54,675,700	1,997,000	56,672,700	0.212659	5,585,727	12,051,973
2044	46			0	1,997,000	1,997,000	0.205468	191,834	410,319
2045	47			0	1,997,000	1,997,000	0.19852	185,347	396,444
2046	48			0	1,997,000	1,997,000	0.191806	179,079	383,037
2047	49			0	1,997,000	1,997,000	0.18532	173,023	370,085
2048	50		54,675,700	54,675,700	1,997,000	56,672,700	0.179053	4,703,032	10,147,438
								197,298,957	425,943,788
							ANNUAL	8,411,586	18,159,564

*CWCCIS, Beach Replenishment Index used to deflate current estimates to authorizing document price levels.

4.6.4 Benefit Cost Ratio

As described previously, this HSLRR addresses the Elberon to Loch Arbour Reach; however it's Sandy Hook to Barnegat Inlet Section I that must be economically justified. Since some initial construction and renourishment has been completed for Sandy Hook to Barnegat Inlet Section I, and future expenditures are scheduled, the entire project cost is presented in the price level of the 1989 GDM and the benefit cost ratio is calculated for Sandy Hook to Barnegat Inlet Section I. This facilitates comparison of benefits and costs and is consistent with the Level I budget update approach.

The average annual benefits for the 50-year period of analysis are \$34,450,000. The average annual cost of the project is \$8,412,000. The benefit cost ratio of the entire project, inclusive of the expended costs and the estimated costs of the Elberon to Loch Arbour Reach, is 4.1,

representing an economically justified project. Further discussion on the economic analysis can be found in Appendix C.

Table 7: Economic Analysis Parameters – Sandy Hook to Barnegat Inlet Section I

	GDM FY88 PL	FY88 PL*	FY14 PL
Discount Rate	8 7/8%	3.5%	3.5%
Initial Construction Cost	\$87,106,000	\$144,074,000	\$310,958,000
Total Annual Equivalent Cost	\$20,806,000	\$8,412,000	\$18,160,000
Renourishment Cost per Cycle	N/A	25,332,000	\$54,676,000
Renourishment Annual Cost	\$ 679,000* 50 years	\$3,730,000 32 years	\$8,051,000 32 years
Annual Benefit	\$36,900,000	\$34,450,000	NA
BCR	1.8	4.1	NA

*CWCCIS, Beach Replenishment Index used to deflate current estimates to authorizing document price levels.

4.7 Comparison of Authorized Plan and 2014 HSLRR Plan

Table 8: Comparison of Plans Presented in 1989 GDM and 2014 HSLRR

1989 GDM Plan for the Elberon to Loch Arbour Reach	2014 HSLRR Plan	Differences Between the Two Plans
The plan included 16,753 linear feet of beachfill and generally extended from the Deal Lake outfall in the south to Lake Takanassee in the north. The plan consisted of:	The plan includes 16,753 linear feet of beachfill and generally extends from the Deal Lake outfall in the south to Lake Takanassee in the north. The plan consists of:	No change.
A beach berm extending 100 ft from the reference line at an elevation of +7.3' NAVD 88 with a 2 ft berm cap. The offshore slope is 1V:10H from elevation +9.3' NAVD 88 to elevation -2.7' NAVD 88 and 1V:35H from elevation -2.7' NAVD 88 to depth of closure.	A beach berm extending 100 ft from the reference line at an elevation of +7.3' NAVD 88 with a 2 ft berm cap. The offshore slope is 1V:10H from elevation +9.3' NAVD 88 to elevation -2.7' NAVD 88 and 1V:35H from elevation -2.7' NAVD 88 to depth of closure.	No change.
A total beach fill quantity of 3,523,000 cy for the initial fill placement, including tolerance and advanced nourishment.	A total beach fill quantity of 4,450,000 cy for the initial fill placement, including tolerance and advanced nourishment.	The quantity has increased by 927,000 to reflect the existing, more severely eroded condition.
6 groins to be notched within the reach to support sediment transport.	6 groins to be notched within the reach to support sediment transport.	No change.
Extension of 22 outfalls beyond the beach berm to prevent upland flooding.	Extension of 9 outfalls, resetting of 2 outfalls at higher invert elevations, and construction of 5 retention systems to prevent upland flooding.	The outfall modification component has been updated to incorporate changes to the existing storm water conditions within the municipalities and lessons learned from previously constructed reaches of the project. Overall, the 2014 HSLRR Plan includes the modification of 6 less outfalls.
Advanced nourishment to ensure the integrity of the initial fill design and periodic renourishment of approximately 1,489,560 cy of fill material at 6 year intervals for the 50 year life of the project.	Advanced nourishment to ensure the integrity of the initial fill design and periodic renourishment of approximately 660,000 cy of fill material at 6 year intervals for the remaining 33 years of the project life.	The GDM included a feeder beach in Reach 3 as part of the renourishment plan that is no longer necessary due to the construction of Sandy Hook to Barnegat Inlet Section II to the south.
Borrow Area: a total of 57.5 million yards is available in the Sea Bright offshore borrow area, which exceeds the initial fill and periodic renourishment fill operations. Additional beach fill	Borrow Area: a total of 57.5 million yards is available in the Sea Bright offshore borrow area, which exceeds the initial fill and periodic renourishment fill operations. Belmar offshore	The Sea Bright offshore borrow area will be used for initial construction of the Elberon to Loch Arbour Reach, instead of using Belmar offshore borrow areas for initial construction.

5. Environmental Consequences*

5.1 Land Use

The will be no long term or significant impacts to land use. Temporary changes/impacts such as the need for mobilization/storage areas and access roads will occur, but will be removed at the completion of each particular project section. The proposed project will not change Federal Emergency Management Agency flood zone designations within the Elberon to Loch Arbour Reach.

5.2 Topography, Geology and Soils

Impacts to topography from the proposed plan will consist of a change of depth within the dredge footprint at SBBA coinciding with the concurrent increase in elevation specific to the accepted beach fill plans and specifications. The SBBA is roughly 3,719 acres in size. Its bottom elevation ranges in depths from -24 ft to -63 ft National Geodetic Vertical Datum (NGVD), that slope from northwest to deeper water at its southeastern boundary. Approximately 4,450,000 cy. will be dredged from SBBA for the proposed project and will not make a cut deeper than 20 ft in the ocean floor. The material within the SBBA is 90% sand and therefore contains no more than a minute level of fine grain sediments, thus there is a very low association with the typical regional contaminants of concern that are generally linked to high concentrations of organic materials found in fine sediments such as muds and silts, but not in sand (USACE 1989).

There will be transportation of sand from the sea bed at SBBA to the placement area on the beach and into the intertidal zone of the placement area. The removal of sand from SBBA and the changes to the topography of the placement area are each direct impacts to their respective areas. At the placement site there will be a significant addition of sand which will create a berm and beach front changing the existing topography and adding elevation to these areas. Only suitable, clean sand will be used for the beach fill, and structure, nutrient status, and organic matter content is not expected to be significantly altered at the placement site. Indirect impacts to geology from the proposed project will consist of initial winnowing of finer grain sizes into the nearshore, decreasing as the project beach “settles” in. Another indirect impact will be the renewal of long shore transport and re-deposition of sand due to modification of the six groins. Renourishment will be scheduled at intervals of about 6 years, but frequency and amount of renourishment will be dependent the rate of change to project specifications.

5.3 Water Resources

5.3.1 Regional Hydrogeology and Groundwater Resources

The proposed project is not expected to adversely impact local or regional surface drainage or groundwater resources.

5.3.2 Surface Waters, Water Quality and Tidal Influence

Direct impacts to (ocean) surface waters will include a temporary localized increase in turbidity and total suspended sediments during filling, regrading, and groin modification and pipe extension activities. Effects of beach fill operations on total suspended sediments appear to be limited to a narrow swath of beach front with a lateral extent of several hundred feet (USACE 2001). Because the fill material consists of 90% or greater sand, concentrations of re-suspended sediments decay rapidly after the surf zone. With the exception of the surf zone, elevations of total suspended sediments above typical ambient concentrations are negligible as observed during the District's Asbury Park to Manasquan total suspended sediments monitoring program 1994-2000. Observations and measurements of total suspended sediments taken during moderate coastal storms revealed regional total suspended sediments concentrations may times greater (in some cases orders of magnitude) than those recorded during fill operations (USACE 2001).

Since the SBBA is located near land, another potential indirect impact of dredging is change in wave refraction. The lowering of the ocean bottom can alter wave height, direction and angle potentially modifying the habitat of the nearby shoreline and intertidal zone. An analysis was performed using a numerical model that was subjected to various scenarios with respect to depth of dredging, frequency of wave occurrence and angle/direction of wave. The results showed that dredging at the SBBA altered wave refraction, but only nominally. Accordingly, significantly greater wave impacts to the nearby shoreline and intertidal zone are not expected (USACE 1989).

Review of activities pursuant to 404 of the Clean Water Act (CWA) will include application of the guidelines under the authority of the Section 404 (b) and a Water Quality Certificate will be obtained from the NJDEP in accordance with Section 401 of the CWA.

5.4 Vegetation

Much of the area of the placement site consists of severely eroded beach that is devoid of vegetation. However, there may be some areas where common beach vegetation remains that would be buried by the fill. There are no known occurrences of any Federal or State listed plant species occurring at the placement site. In the unlikely event that a Federal or State listed plant species is found (in season) to be within the project area of operation, the appropriate agencies will be contacted and all proper protection procedures under NEPA will be followed.

Within the littoral zone of the fill and upon the areas of the groins that lie within the intertidal or the littoral, seaweed/algae may exist. Seaweed that will be covered by the "toe" of the fill and algae existing on the portion of the groins that will be covered with sand will constitute a loss of this marine vegetation. Loss will also occur should any "notched" portion of the groins support attached algal growth. These direct losses will be insignificant.

Beach nourishment will create a large berm area that will be well above high tide creating significant areas capable of supporting natural recolonization common beach grasses and other plants common to area beaches. This recolonization will help to stabilize the beach as well as supply habitat to many types of beach dwelling organisms.

5.5 Fish and Wildlife Resources

5.5.1 Finfish

5.5.1.1 Intertidal and Near Shore

Approximately 450 million cy of fill will be placed along the project beach. The pumping of the sand slurry onto the beach in conjunction with the ambient wave climate will cause a noticeable increase in total suspended sediments within the swash zone and within a limited area of the near shore. Prior total suspended sediments monitoring at active nourishment sites along the New Jersey coast (USACE BMP 2001) has shown that increases in total suspended sediments are limited to a scale of 100s of feet from the point of dispersion on the beach, and, these elevations are not incompatible with total suspended sediment levels of many northeast estuaries and are well below the ambient total suspended sediment levels that are produced on a regional scale by coastal storms of even moderate strength (USACE 2001). However, increased total suspended sediment and turbidity levels may temporarily displace fish from nearshore areas and inhibit feeding by predators dependent on visual cues. Gill abrasion and impacts to respiration may also be a concern in these areas if fish are not displaced to nearby unaffected waters.

The fill used to create the beach berm will bury most if not all of what were the existing intertidal area as well as a portion of the landward extent of the shallow littoral zone. Most of the invertebrate infauna and much of the epifauna common to these newly buried areas will no longer be accessible forage areas to fish species that inhabit and feed in those areas. Though these areas have been buried, a new intertidal community will quickly develop due to the very nature of this extremely dynamic environment. Another factor that will compensate for this temporary loss is that the sand slurry that is placed as fill contains organisms similar to those that were buried. During placement of sand from the SBBA many small invertebrates are released from the sediments which appear to be an attractant to benthic feeding nearshore shallow water species such as the northern kingfish. This was observed during capture studies implemented adjacent to active fill sites.

5.5.1.2 Sea Bright Borrow Area

Direct Impacts

As the SBBA is an offshore oceanic borrow area adjacent to a major estuary it is to be expected that many species of fish including multiple life stages may be found there. Fish presence within the waters of SBBA is spatially and temporally variable. Some of the species are strictly offshore, while others may occupy both nearshore and offshore waters. In addition, some species are suited to mid or surface pelagic waters, while other species are more oriented to the bottom or near bottom demersal waters. Seasonal abundances are highly variable, as many species are highly migratory, especially those anadromous species which follow specific seasonal cues associated with individual spawning runs. The latter would include the herrings, striped bass and the Atlantic sturgeon, all of which utilize the Hudson River and its estuary as spawning grounds.

The direct impacts to fin fish as a result of dredging of the SBBA for the proposed project may include impingement, or other dredge/draghead contact injuries as well as disturbance and displacement adults and juveniles of species present. Eggs, larvae and very early juveniles that are present may be much more susceptible to impingement but this has not been studied and may not be measurable.

Because the dredge is working in course sands and the draghead and sediments are being drawn into the dredge there is very little dispersion of the bottom sediments and impacts to fish from this temporary and highly localized increase in suspended sediments will not be significant. No other (direct) water quality issues are expected. Generally speaking entrainment and resulting mortality is the most serious potential issue regarding the use of hopper dredges. This is most likely to occur to demersal species, especially resident flatfish and skate species, most of which are EFH species. Adult and older juveniles life stages of demersal fish can be found at SBBA throughout much of the year. These life stages are highly mobile and with the addition of the deflector device on the draghead avoidance of the dredge is the expected response of most individuals. However, some mortality is likely to occur.

Eggs, larvae and early stage juveniles are highly susceptible to a hopper dredge even with a deflector shield if they are found in near bottom environments. However, these life stages may only be present and are susceptible for a short period of time at the bottom or in near bottom waters. As the fish matures it will be more capable of avoidance. Only those species with demersal post larval stages such as summer and winter flounder, windowpane flounder, and the skates would remain at risk at the SBBA.

Species (and their life stages) that spend their time in the water column and not directly on or near the bottom have a very low potential for entrainment impacts or other contact injury (ship strike) with a dredge or associated project vessel.

Fish larvae are known to occur in New Jersey waters regionally adjacent to the SBBA. The District (USACE 2001) collected larval fish which documented a diverse assemblage of fishes representing 33 families. However, the majority of larval capture was observed to take place in the upper portion of the water column, away from the impacted sea floor. In general, although entrainment of ichthyoplankton is likely, is not expected to have a detectable effect to finfish species. (BMP USACE 2001).

Finfish species, including flat fishes, are expected to be disturbed by the approaching draghead of the dredge and capable of avoiding entrainment. All of the hopper dredges working at SBBA will be equipped with deflector type apparatus (turtle/sturgeon) which will facilitate this reaction and help prevent fish from being entrained or otherwise injured. Dredging operations at the SBBA for the proposed project is not expected to have a significant direct impact on finfish species.

Indirect Impacts

There is potential for indirect adverse impacts to finfish to occur stemming from alterations of the bottom habitat, as a result of dredging in the SBBA. Indirect impacts would include

changes to bathymetry, the potential for temporary or moderate long term changes to sediment character, and the temporarily azoic benthic surface conditions equating to the temporary loss of forage for finfish. Due to the nature of the dredging plan, which includes a relatively shallow, gently sloping cut below surrounding depths, and the nature of the SBBA sediments (90% >, coarse sand with very low organic content) no significant adverse indirect impacts to salinity, temperature, dissolved oxygen or any other water quality parameter are expected as result of the dredging action.

The most apparent potential impact to finfish will be the loss of benthic invertebrate forage species that will be entrained with the sediment. This is a temporary, indirect impact. During the time it takes for the dredged footprint to recover its benthic resources, finfish will prey in areas of compatible forage that surround the SBBA on a regional scale (Ray 2010, NOAA 92 Bight Apex). The project footprint is expected to fully recover within 1 to 2.5 years depending on type of benthic community that existed prior to dredging according studies conducted in similar New Jersey borrow area habitats (Wilber et al 2007, USACE 2001).

In 1989, the District conducted an investigation to compare and characterize the infauna and epifauna resources at the SBBA and those collected at the offshore borrow areas near Belmar, NJ, approximately 10 miles south of SBBA. The results of this study (USACE 1991) and in consultation with the USACE's Engineering and Design Research Center (ERDC) concluded that the infauna communities at the SBBA and at the offshore borrow areas that were evaluated as a component of the District's NJBMP (2001) are very similar. Since these offshore infauna resources are very similar, it was acknowledged that impacts to the SBBA fauna community and their subsequent recovery and recolonization rates are comparable to the results of the study. The results of the NJBMP offshore study and follow up analysis were:

- In terms of abundance, diversity and biomass, the infauna resources are expected to recover and recolonize to pre-dredge condition in approximately 8 months, except for sand dollars biomass, which takes about 2 to 2.5 years to recover.
- Borrow area fish showed no detectable changes in abundance, species composition, or feeding habits.
- Important bottom-feeding fish, such as summer and winter flounder, did not appear to rely on the borrow area in particular for food.
- Post dredging grain size was smaller/finer due to dredging.

5.5.2 Benthic Resources

Placement of fill will bury many sessile and less mobile invertebrates. Those not directly buried but within close proximity to the fill activity may be adversely impacted by increased total suspended sediment which could include respiratory stress with suffocation possible. Some bivalves may be able to avoid these impacts by sealing up their shells assuming they are not buried beyond their ability to move toward the new benthic surface. There will be an

immediate change in benthic diversity and abundance in the surf/swash zones and the immediately adjacent near shore benthic community. However, this will be temporary direct impact and because of this area's extremely dynamic character, full recovery to preconstruction conditions is expected with 6 months to a year dependent on time of placement (USACE 2001).

The proposed project will have direct impacts to benthic species within a localized area along the shoreline, and within the footprints of the groins. Placement of sand will bury invertebrates and groin modification may eliminate fouling organisms attached to rocks that are being manipulated. However, the impact to open areas will be temporary as the organisms are expected to re-colonize the placement site from nearby communities and should re-establish to a similar pre-construction community (abundance and diversity) relatively quickly. Fill sand will provide clean, coarse, near shore and intertidal sediments that will be rapidly colonized by many benthic species providing a diversity of prey items. Given the small size of the project in relation to the amount of similar habitat of the surrounding bay waters, no direct or indirect impacts are expected to be significant. The footprint of the hard surfaces added to the intertidal area of project site (groins) will permanently cover more existing sediments than the fill only alternative one but the groins will provide a variety of habitats for many species of sessile organisms, fish, crustaceans and intertidal animals all resulting in secondary impacts increasing overall productivity and species diversity. During high tides, the submerged sections of the groin will also provide foraging and refuge habitats for many species of fin fish especially smaller species and juveniles. And as with fish, the reduced nourishment cycles will decrease the frequency of any short-term construction impacts over the sand only alternative.

Pilings, cribs and other structures associated with the ten outfalls being repaired/extended will have very little (direct) adverse affect on the intertidal and nearshore benthic habitats. These insignificant direct impacts also include the effluents which were present prior to hurricane Sandy. Beneficial indirect impacts will be produced from the new attachment surfaces being supplied by the new outfall structures. Organisms that will eventually colonize these hard surfaces would likely include barnacles, blue mussels, limpets and various species of algae.

5.5.3 Reptiles and Amphibians

No significant adverse impacts to terrestrial reptile or amphibian species are expected from implementation of the proposed project.

5.5.4 Birds

There are no known recent occurrences of beach nesting at the Elberon to Loch Arbour Reach. Birds that are in the area may be directly affected by construction activities which may extend over 12 month duration. During construction, heavy machinery activity, increased noise levels, clearing, grading, sand and stone moving and pipe extension activities may cause displacement of individuals. Birds that may be temporarily disturbed by the construction activity are expected to be common species, already acclimated to a certain noise and activity levels typical to this residential/commercial area. No significant impacts are expected. Avian species are highly mobile and are expected to avoid any serious direct impacts, such as contact with machinery. No beach nesting birds have occurred on the project site for many years and

no nesting is expected. All birds in the area are expected to be adults or fledged chicks. However, within the construction period, new sand will be in place during one or more nesting seasons. Beach nesting birds often nest on newly created areas and this scenario is possible during and after project construction. Should a listed species set up within the project site prior to completion, the appropriate State and Federal agencies will be contacted and all required endangered species regulations for the situation will be followed. Consideration of threatened and endangered species following initial construction of the Elberon to Loch Arbour Reach is discussed in Section 5.6.

Indirect impacts may include loss of remaining resting/loafing areas utilized by various shore birds as well as loss of foraging areas of the exposed intertidal which provides prey for species such as various sand pipers, oyster catchers and gulls etc. On the other hand, the pump out area where new sand is being placed at the beach provides a concentrated area of prey items for many shore birds and other avian species. Gulls, sandpipers and crows have been observed actively foraging upon the newly pumped sand during pump out.

5.5.5 Mammals

During construction, heavy machinery activity and increased noise levels may cause the displacement of small mammals (rodents and/or insectivores) in close proximity to the construction site. However, because of the paucity of usable habitat few mammals would be expected in or near the placement site. There is the possibility that small mammals such as common rodents might be utilizing sheltered habitats within the spaces of armor stone, or other structures that are located well above high tide. In the event that these structures are removed or buried there is possibility that some animals may prefer to hide in place rather than escape the disturbance and mortality may result via burial or another direct impact. Any of these species would be common and displacement or mortality would not be considered a significant impact.

Four species of seals seasonally occur within the nearshore and offshore habitats of the proposed project area. Harp seals and hooded seals are rarely encountered. The grey seal and the harbor seal may be found both off shore and on shore in the project region during the winter. Both seal species may haul up on the beach or groins when they are seasonally present. Construction on the beach may dissuade them from doing so at a particular location. In general having to move to a nearby suitable haul out area would represent a insignificant direct impact. During the winter months but potentially year round, the harbor porpoise can be found in regional waters while the common dolphin is more common during periods of warmer water.

All of these species are agile swimmers that will easily avoid the relatively slow moving dredges. The harbor porpoise and common dolphin are not benthic feeders and are not expected to be in the vicinity of the working draghead. Both species of seals may include benthic fish and invertebrates, such as crabs or shrimp in their diets (Wynne and Schwartz 1999) therefore there is a possibility that they may be in the vicinity of an active draghead. However, as previously discussed their ability to easily avoid the draghead generally eliminates any related impacts.

As previously discussed dredging will remove much of the benthic prey resources available to various organisms including these species of seals. Like the other predator species discussed, while the dredge footprint re-colonizes seals would seek prey in the surrounding compatible benthic habitats.

5.6 Threatened and Endangered Species

Section 7 of the ESA requires that a Biological Assessment (BA) be prepared for all major Federal actions when a federally listed or proposed endangered or threatened species may be affected. In 1995, a BA for whales and sea turtles was completed for similar beach nourishment projects on the South Shore of Long Island and the northern New Jersey shore, including the Elberon to Loch Arbour Reach. In 2013, a BA (Appendix I) was completed to address potential impacts to the Atlantic sturgeon, which was recently listed under the ESA (Federal Register Vol 77, No. 24, Monday February 6, 2012; 50 CFR Part 224); to update the existing beach nourishment consultations to include the Elberon to Loch Arbour Reach, for listed sea turtles and whales; and to acknowledge the change to the listing of loggerhead sea turtles.

The following Conservation Measures will be implemented annually to ensure protection of endangered species. Elements include surveys, monitoring, as well as sign posting and buffer establishment of both species. Beginning on 1 April during the years that the construction project is underway, and continuing through the breeding season (1 September) or the date of the last fledging, the USACE in cooperation with the USFWS will survey and monitor the project area and identify plover territorial, courtship, and nesting areas; and for the plant, seabeach amaranth on a weekly basis from 15 September to 30 October to determine the presence of any plants. The District will also work with the USFWS to develop a USFWS/Municipal Beach Management Plan for the area recognizing that the constructed beach may attract threatened and endangered species.

5.6.1 Terrestrial Species

The existing proposed project site conditions do not provide suitable habitat for any state or federal listed species. No listed plant or animal species have been recorded there within recent years. However, the presence of several bird species is possible. Presence of piping plovers or least terns would be transient and generally related to either migration or foraging during nesting season when these species may be residing at nearby locations such as Monmouth Beach or Seven Presidents Park. Adults or yearlings that may be present at the project site are highly mobile and would avoid any related impacts other than disturbance if their presence and construction occurred concurrently. Also, because previous coordination with the USFWS has established disturbance buffers of 3,200 ft it is possible that during nesting season construction at either end of the project could fall within a neighboring buffer should nesting occur north or south of the project boundaries. Although this is an unlikely scenario, should such circumstances arise, all the appropriate NEPA procedures would be followed including consulting the FWS and the NJ DEP. No construction would take place inside the 3,200 ft buffer zones.

No listed state or federally listed plants have been observed at the ELA project site. Should sea beach amaranth or sea beach knot weed be observed on site prior to or during construction all the appropriate NEPA procedures including coordinating with New Jersey Fish and Wildlife

Service (NJFWS) and NJDEP would be followed. Actions to be taken would likely be fencing off any plants or moving them to a protected location under agency guidance.

5.6.2 Sea Turtles

5.6.2.1 Project Area

Sea turtles are not expected to be in the shallow waters adjacent to the placement site, therefore no direct or indirect impacts will occur.

5.6.2.2 Sea Bright Borrow Area

Direct Impacts

Sea turtles are seasonally distributed along the east coast of the U.S. migrating to and from favorable habitats extending from Florida to New England. As water temperatures rise in the spring, migrating turtles begin to move northward and reside in relatively shallow inshore waters to take advantage of abundant forage. As temperatures begin to decline rapidly in the fall, turtles in the north east Atlantic begin to migrate back to southern waters. Sea turtles can be expected to be in the vicinity of the project borrow area (Sea Bright, NJ) when the water temperature surpasses 15° C (60° F) which generally coincides June 1. However, the window of residence for these 4 species is considered to be May 1 until November 30.

Three of the turtle species (Kemp's ridley, green and loggerhead) would most likely be present in the project area as they migrate to and from area estuaries (spring and fall respectively) to feed on the abundant benthic resources from approximately mid June through mid October. The leatherback turtle is not considered a benthic feeder and spends most of its time in the water column. The three benthic feeding species may be vulnerable to direct impacts via entrainment and draghead contact injury. However, the green turtle is primarily a vegetarian and the least abundant migrant in the region. Impacts to this species are highly unlikely. All four species may be vulnerable to surface or near surface vessel strikes.

The majority sea turtle dredge impacts, "takes", have occurred in southern waters where turtles are in general much more abundant, and, had congregated in somewhat spatially restricted areas such navigation channels, shipping berths and shallow embayments. None of these circumstances apply to sea turtles seasonally migrating through open coastal waters in this north Atlantic project site. Though turtle impacts are considered highly unlikely due to these differences and only one take has been recorded in regard many millions of cy dredged, NOAA-Fisheries and the ESA regulations still require special procedures to be implemented to protect sea turtles. Generally this would include placing special turtle observers on board to look for evidence of entrainment into the hopper. However because of the potential unexploded ordinance at the borrow site, a special screen must be placed over the draghead opening.

Indirect impacts

Dredging sand for the project will temporarily remove much of the suitable prey base for loggerhead and Kemp's ridley sea turtles. However, the dredged area represents a tiny fraction of available benthic resources in and around the SBBA, and a benthic feeding turtle

would be able to easily locate adequate prey by swimming through a recently dredged area to an adjacent, undisturbed benthic habitat.

5.6.3 Whales

5.6.3.1 Project Area

Extensions of the ten project outfalls will reach to the end of the fill used to create the beach berm in order to prevent sand from impounding the pipe opening. In order to do this at the various outfall locations extension length from mean high tide will range from 180 ft to 634 ft with an average pipe length of 360 ft. Setting piles to support the cribbing can be accomplished by several methods, but is usually done by pile driving. If this technique is used, it has the potential to adversely impact whales, if the activity produces sound that reaches a whale at, or greater than the established impact threshold of 182 db. (USACE 2013)

5.6.3.2 Sea Bright Borrow Area

The North Atlantic right whales are known to use the action area as a migration route to and from southern breeding grounds primarily during the months of February through April and September through October. The other two species of whales are not expected to be in or near the action area. NOAA-Fisheries has established regulations to implement speed restrictions for vessels larger than 65 ft in Seasonal Management Areas (SMAs) where Right whales are known to occur along the east coast of the US Atlantic Seaboard at certain times of the year. From November 1 through April 30, SMAs are designated along the coast of New York and New Jersey and the SBBA lies within one of these. Contract specifications as governed by consultation with NOAA-Fisheries requires on board observers to watch and record all whale sightings and any potential disturbance during all vessel activities (dredging and transit). If whales are sighted within 1600 ft of said activity work will stop until the whale(s) are no longer with the prescribed buffer. Vessels will have a suggested transit speed of 10 knots a speed slow enough to allow whales and the vessel to avoid any potential collision. Because of the potential for multiple dredging projects to be active concurrently at the SBBA (both dredging and transit actions), dredging activities for the proposed project may have a greater risk of impact to right whales during the period of April 2014 through November 2014.

In general impacts to listed species of whales during sand mining are unlikely because the hopper dredge would move very slowly at no more than 2.6 knots, a speed at which whales can avoid contact with the dredge. At speeds below 11.8 knots, the probability decreases to less than 50%, and at ten knots or less, the probability is further reduced to approximately 30%. The speed of the dredge in the proposed projects is not expected to exceed 2.6 knots while dredging and 10 knots while transiting to/from the SBBA and shoreline, thereby reducing the likelihood and magnitude of vessel collision impacts.

5.6.4 Atlantic Sturgeon

5.6.4.1 Project Area

Direct Impacts

Although Atlantic sturgeon are not expected to be found in the surf zone or shallow near shore their presence there within the “action area” of the placement operation is possible. Direct impacts such as physical injury are highly unlikely. Physical injury due to the various components of the construction is unlikely because majority of the construction activities takes place on land or in very shallow surf or swash zone areas, and the equipment moves very slowly. Depending on how piles will be set for the outfall extensions, noise disturbance from pile driving or jetting in the piles may also displace fish to an adjacent area. Disturbance/avoidance due to increases in turbidity due to placement sediment dispersion is also possible.

Increases to turbidity total suspended sediment is limited to a scale of 100s of feet from the point of dispersion on the beach (USACE 2001) Increases in total suspended sediment levels may temporarily displace fish from nearshore areas and inhibit feeding by predators dependent on visual cues. Nearshore areas will only be affected temporarily as the project continuously moves along the shore. The maximum total suspended sediment values measured near the fill operations were not outside the range that organisms would be exposed to during periods of high wave energies. With the exception of swash zone samples, the magnitude of elevation above ambient total suspended sediment conditions appears to be negligible. Measured total suspended sediment concentrations outside the swash zone seldom exceeded 25 mg/l, which can be considered the low end of the range of ambient total suspended sediment concentrations that many marine/estuarine species of the northern New Jersey shore, including Atlantic sturgeon, experience in estuaries including the Hudson-Raritan estuary.

Indirect Impacts

Any sturgeon in the near shore or intertidal waters over recently deposited fill may not find a suitable abundance of prey items to feed on following a placement operation. Fish seeking forage prior to the beginning of recovery (< 6 months depending on when the dredging has been completed) will find it by moving out of the affected areas. However, observations of near shore fish species observed during placement operations strongly indicated that prey species are re-introduced into the near shore waters during placement operation.

5.6.4.2 Sea Bright Borrow Area

Within and around the SBBA Atlantic sturgeon may be present year round, including individuals from any of the east coast sturgeon populations. Concentrations of Atlantic sturgeon appear to occur during the fall and spring correlated to the mouths of large bays and estuaries including those that are the outlets of known spawning rivers such as the Hudson. Sturgeon from the NY Bight disperse south throughout the Mid-Atlantic Bight during the winter. Most of the sturgeon captured (trawl) in the N.Y. Bight were caught on the western end of Long Island which acknowledges the previous statements referring to areas of seasonal aggregation correlated to spawning estuaries etc. Recent surveys have also shown

that along the eastern side of Sandy Hook, New Jersey, which is in the regional vicinity of SBBA, a “hotspot “ for juvenile (migratory) Atlantic sturgeon may exist (Dunton et al 2010).

Direct Impacts

Direct impacts including impingement and mortality or other serious contact injury would have the potential to occur during periods when dredges and associated vessels were working at the SBBA. This potential for direct impact may increase during seasonal periods when adult and sub -adult sturgeon are congregating or actively migrating to or from the Hudson estuary. Direct impacts from entrainment (and other contact) appear to be rare occurrences. Sturgeon entrainment rates derived from USACE screening of dredged material from hopper dredging operations along the Atlantic coast (Virginia, New York and New England) between 1990 and 2005 resulted in an observed take of 0.6 sturgeon per year (USACE-NYD 2006, as cited by ASSRT 2007). Capturing sturgeon by trawl (seemingly a much more effective method) also appears to be difficult as the sturgeon survey conducted by Dunton et al. 2010 demonstrated low (net) capture rates of sturgeon within the NY Bight. Fish caught per tow ranged from a high of about 0.3 in spring, summer, and fall, to a low 0.07 sturgeon per tow during winter. Additionally, there will be a turtle/sturgeon deflector on any hopper dredge working at the SBBA.

Vessel strikes also appear to be rare and the few that have been noted have occurred in situations where there was minimum depth in relation to draft of the vessel. Sturgeon are generally demersal and dredging and transit at SBBA will be occurring in unconfined open water. Impacts to sturgeon in the upper reaches of the water column due to vessel strikes are seem unlikely. General disturbance resulting in avoidance behavior may occur to resident or migrating sturgeon at the SBBA. Nevertheless, since this is open water without any depth or channel restrictions and the SBBA is outside the estuary a minor displacement regarding swimming direction or behavior should not significantly impact any migratory journey.

No significant impacts to water quality area expected from the actions of the dredge. There may be a minor, localized increase in total suspended sediment along the path that the draghead takes as it entrains sediment. At most this might cause an avoidance reaction from a sturgeon which has already been described as a minor affect.

Direct Impacts

Direct impacts to sturgeon resulting from construction actions of the proposed project are not expected to significantly affect or jeopardize an Atlantic sturgeon population. However, requirements for protecting endangered Atlantic sturgeon during construction of the proposed project are essentially identical to that of the previously discussed sea turtles in that NOAA-Fisheries and the ESA regulations require special procedures to be implemented including those pertaining to necessity of utilizing the UXO screen on the draghead and the monitoring issues that arise. The Biological Opinion (BO) requirements for Atlantic sturgeon will require on board (top side) observers to watch for any signs of sturgeon in the hopper and scrutinize the UXO screen for any signs of sturgeon impact.

Indirect Impacts

Oceanic Atlantic sturgeon feed on polychaetes, oligochaetes, amphipods, isopods, mollusks, shrimp, gastropods, and fish (Johnson et al. 1997, Haley 1998). These benthic species will be lost along with the sand during dredging. The area of the SBBA utilized for the beach fill of the proposed project will be lost as a foraging area to sturgeon until it can recover which is expected to take from 1 to 2.5 years. However, the areas adjacent to the SBBA (not including other locations recently dredged within the borrow area) are regional in size and offer similar types of prey. A study of benthic invertebrate monitoring of the SBBA revealed that it provides suitable habitat for preferred sturgeon prey species and that these species are common there (Clarke et al 1991, Cerrato and Wiggins 1990, 1991). A comparison to regionally contiguous, benthic habitats that extend north and south of SBBA revealed these regional areas also support comparable species numbers and diversity of suitable sturgeon prey resources (ERDC DOTR 2010). Sturgeon will be able to find prey outside the SBBA therefore this temporary loss of forage is not a significant indirect impact to regional sturgeon.

5.7 Essential Fish Habitat

5.7.1 Project Area

Direct Impacts

EFH species susceptible to direct impacts in the near shore and intertidal areas of the placement site would be limited. EFH species would likely include, winter and summer flounder, windowpane flounder, scup, and bluefish (USACE 2001). Direct impacts to finfish from placement operations would largely consist of displacement from localized due to increases in turbidity or noise disturbance from equipment. Physical injury to fish due to the various components of the construction is highly unlikely because majority of the construction activities takes place on land or in very shallow surf or swash zone areas, and the equipment moves very slowly. Depending on how piles will be set for the outfall extensions, noise disturbance from pile driving or jetting in the piles may also displace fish to an adjacent area.

Increase to turbidity is limited to a scale of 100s of feet from the point of dispersion on the beach (USACE 2001). Increases in turbidity levels may temporarily displace fish from nearshore areas and inhibit feeding by predators dependent on visual cues. Nearshore areas will only be affected temporarily as the project continuously moves along the shore.

Indirect Impacts

EFH species that forage in the near shore or intertidal may not have a suitable abundance of prey items to feed on following a placement operation. Fish seeking forage prior to the beginning of recovery (less than six months depending on when the dredging has been completed) will find it by moving out of the affected areas. However, observations of near shore fish species observed during placement operations strongly indicated that prey species are re-introduced into the near shore waters during placement operation.

5.7.2 Sea Bright Borrow Area

Some EFH species may be directly impacted by the proposed project operations which could include entrainment, contact injury and displacement. All adult EFH species except the ocean quahog (*Artica islandica*), a bivalve, have the mobility to avoid impingement or contact impacts from single or multiple dredges active at the SBBA. It is expected that some individuals will be entrained into the dredge but the numbers are not anticipated to be significant. Use of the rigid deflector greatly decreases the potential for impingement into the dredge. Of the 27 EFH fish species potentially existing at the project site, those which are considered highly demersal may be at greater risk from dredge related direct impacts in comparison to those which spend most of their time higher in the water column. Specialized demersal species which spend most of their time at or in contact with the bottom such as flounder, skates, and the goose fish, a lie in wait predator may be at greater risk of entrainment or draghead contact injury at the bottom. The SBBA EFH species potentially at higher risk of direct impact from hopper dredging include : Whiting (*Merluccius bilinearis*), Red hake (*Urophycis chuss*), Witch flounder (*Glyptocephalus cynoglossus*), Winter flounder (*Pleuronectes americanus*), Yellowtail flounder (*Pleuronectes ferruginea*), Windowpane flounder (*Scopthalmus aquosus*), Monkfish (*Lophius americanus*), Summer flounder (*Paralichthys dentatus*), Clearnose skate (*Raja eglanteria*), Little skate (*Leucoraja erinacea*) and Winter skate (*Leucoraja ocellata*).

The presence of particular life stages of various EFH species at the SBBA is governed by specific seasonal behavior, habitat requirements and physical factors that drive water movement. Abundances are highly variable, as most early life stages are planktonic in nature and are carried with the prevailing currents or dominant weather events. Eggs, larvae and early stage juveniles are highly susceptible to a hopper dredge even with a deflector shield if they are found in near bottom environments. Those species with demersal eggs and post larval stages such as flounder species and skates would at risk at the SBBA. Dredging activity to construct the proposed project is expected last for about 1 year thus occurring throughout all spawning seasons. Entrainment of some EFH early life stages is expected to occur. However, because of the vast numbers of eggs and larvae etc. produced, even when relatively large numbers of these early life stages are entrained no resulting significant impacts to any EFH population is expected.

Water quality impacts including turbidity, salinity, temperature, dissolved oxygen or any other to water quality parameter will not be significant as discussed in the analogous FWOPC dredge transit analysis. Once loaded the hopper dredge will transit to the pump out station. Significant direct or indirect impacts to EFH species from transit operations are not anticipated. Dredging will alter the topography and bathymetry and sediment character with of EFH habitat as well as remove most of the benthic organisms within the area dredged. The first two changes represent direct impacts to EFH while all three represent indirect impacts to EFH finfish species.

Indirect Impacts

There will be indirect adverse impacts to EFH species stemming from alterations of the bottom habitat, as a result of dredging in the SBBA. The most apparent impact to fin fish will be the loss of benthic invertebrate forage species that will be entrained with the sediment. This is a

temporary, indirect impact. This loss is considered minimal because of SBBA is surrounded by areas of compatible forage of a regional scale. (USACE 2010, NOAA 92 Bight Apex). The project footprint is expected to fully recover within 1 to 2.5 years depending on the type of community and dominant species, according studies conducted in similar New Jersey borrow area habitats (USACE 2001, USACE 2010). Resident EFH species will disperse to surrounding areas to forage, species migrating through will simply continue on to forage elsewhere when required.

Indirect EFH impacts to fish species will also include changes to bathymetry and bottom characteristics. These differences may change the dredged areas functional capacity regarding how it can be utilized for a particular EFH species. For example, temporary changes to sediment type from coarse to fine may make it incompatible for the ocean quahog but make a good foraging area for summer flounder.

5.8 Socioeconomics

The coastal storm risk management offered by implementation of the recommended plan will yield highly significant benefits to the population of the project area that will include protection from catastrophic damage to property, infrastructure and local economics as well as serve to protect life. These benefits will increase the desirability of remaining in this area and will improve the generally quality of life. The selected alternative is not expected to significantly impact racial composition, age distribution, employment division or income of the population of the Elberon to Loch Arbour Reach.

5.8.1 Environmental Justice

Executive Order 12898, Federal Actions to address Environmental Justice in Minority and Low Income Populations mandates that each federal agency will identify and address potential disproportionately high and adverse human health or environmental effects of its activities on minority populations and low income populations.

A cursory analysis was conducted to determine the potential applicability of Environmental Justice issues. The analysis took into account a comparison of the percentage of minority and low income populations between the municipalities where the project is proposed and Monmouth County and used the most currently available census data; the 2010 Census data for determining the minority population and 2007-2011 American Community Survey for the low income populations.

Based on a review of the census data, Monmouth County has a combined minority population of 22.30% with 6.5% of the total County population living below the poverty line. Although the City of Long Branch has combined minority population less than 50%, the City has a higher percentage of minority population (45%) and a higher percentage of residents living below the poverty line (14.40%) than Monmouth County. The Township of Deal has a combined minority population of 22.4% with 8.10% total residents living below the poverty line. The Borough of Allenhurst has a combined minority population of 6% with 0.40% of total residents living below the poverty line. The Village of Loch Arbour has a combined minority population of 6.6% with no residents living below the poverty line.

Given that Elberon is a neighborhood within the City of Long Branch, a comparison was made between the minority and low income populations within the Census Tract in which Elberon is located and the City of Long Branch. The Elberon neighborhood is located within Monmouth County Census Tract 8061. Based on a review of the census data, this census tract has a combined minority population that is less than 50% and less than the City of Long Branch (13.6% Census Tract, 45% City). The percentage of individuals living below the poverty threshold in the Census Tract is 12.7% compared to the 14.4% of all people in the City.

In general, the proposed project serves to manage risk from coastal storms, including lost off life and property damage due to flooding from coastal storms. In addition, the Elberon to Loch Arbour Reach is the final reach of Sandy Hook to Barnegat Inlet Section I to be constructed. Completion of this section will provide coastal storm risk management. In addition, the project will provide benefits to the entire community. Therefore, a disproportionate negative impact on minority or low-income groups in the community is not anticipated and a full evaluation of Environmental Justice issues is not required.

5.9 Cultural Resources

5.9.1 Nearshore

Recent observations of the previously identified NRHP-eligible wrecks indicate that they have not moved (Panamerican 2014a). Most are more deeply buried under sand than when originally recorded even in locations that were not constructed by the District. It was observed through the study of wrecks both within and outside of areas already constructed that there is little way of differentiating the effects of coverage by sand between project activities or natural events. Logic argues that it is the major storm events such as Hurricane Sandy that erode the timbers, displace the datums, and move dislocated wreck components, as well as cover or uncover the wrecks in sand, and not the comparably benign burial by beach renourishment. Current observation suggests that beach renourishment protects the wreck sites and in part mimics natural burial events.

While no changes have been observed on the wrecks the monitoring program will be continued to document the effects of the project for at least two more renourishment cycles at which time the need for further monitoring will be reevaluated. The District will employ a combination of methods using elements that were previously proposed coupled with new technologies such as multibeam surveys or equivalent method standard at the time of survey (Panamerican 2000, 2014a). The current method of monitoring allows for a large amount of locational error and in some respects is not achievable. A multibeam survey of each site, while only recording visible elements, makes an almost photographic record that is accurate to within several centimeters, all positioning satellite-based and repeatable regardless of missing datum. Cost efficient and safer than a diving investigation, it is a proven technology that has been employed on numerous historic wrecks, and a technology that is extremely useful in determining and comparing change and/or movement to a site. And while one might argue that the multibeam does not record buried components, it should be pointed out that during the current monitoring study, components were not recordable on many of the wrecks because they were too deeply

buried. Furthermore, the use of multibeam technology makes the placement of on-site datum and the use of shore-based triangulation stations unnecessary.

The remote sensing targets identified in the near shore area from Elberon to Loch Arbour will be further investigated to determine if they do represent cultural resources. If determined to be cultural resources, an assessment of the integrity of the sites and their historic significance, based on NRHP nomination eligibility criteria will be conducted. Following that evaluation a determination will be made as to the need for further work, such as being included in the on-going monitoring program.

5.9.2 Borrow Area

Investigations indicate that there are no landforms within the SBBA sensitive for now inundated prehistoric sites (Panamerican 2014b). Pending concurrence by the NJHPO and other interested parties, no work will be conducted to further study this area. No further observations of material collected in the UXO screens will be undertaken. The project archaeologist will however continue to educate the UXO specialists at the beginning of each renourishment cycle on the types of archaeological materials that could be encountered so that they will be more likely to identify these items when, or if, they are pumped onto the beach. Should any materials be identified early detection would allow the archaeologist time to halt the pumping operation, inspect the debris, and consult with the NJHPO to make a determination for cultural resources monitoring or for moving the dredge operation elsewhere so that archaeological investigations can be carried out if deemed necessary.

As implemented previously with use of the SBBA potential shipwreck sites will be avoided by designating a buffer zone around each resource. Such zones will be developed with the NJHPO and detailed on construction contract plans. The exact location of shipwrecks is protected information and will not be released to the public. Further study of targets will be undertaken if a potential resource cannot be avoided through buffering.

5.9.3 Section 106 Coordination

All work on Sandy Hook to Barnegat Inlet Section I as a whole has to date been coordinated with the NJHPO and all cultural resources work on the Elberon to Loch Arbour Reach will continue to be coordinated with them. The existing MOAs for Sections I and II are over 20 years old and will be superseded by a PA that includes both sections of the overall Sandy Hook to Barnegat Inlet project as well as the SBBA. The draft PA will be provided to the Advisory Council on Historic Preservation, the Delaware Nation and the Delaware Tribe of Indians for their review and participation. The draft PA is available for public review as Appendix M of this draft Environmental Assessment. Additional public involvement will be conducted as part of the public review of this document under NEPA and will serve as the District's Section 106 public coordination. The final PA will incorporate comments received on the draft document, as appropriate.

5.10 Coastal Zone Management

The proposed project was reviewed and analyzed to determine its consistency with the New Jersey Coastal Management Rules (NJAC 7:7E). An evaluation of the project's consistency with applicable policies is provided in Appendix G.

The proposed plan has potential for both adverse and beneficial impacts to state and local Coastal Zone Management (CZM) policy issues that may include the following. Beach fill dredging and deposition will cause mortality sessile and slow moving organisms within the dredging and placement footprints. These organisms are common and widespread expected to re-colonize relatively quickly. Placement, groin modification, and outfall extension operations will cause temporary, localized increases in turbidity that may cause mobile benthic organisms and fish to move away from the activity area. Groin modification will reduce those structures utility as surf casting platforms. During the construction public use/recreation/aesthetics of the coastline will be disrupted, including the view shed normally offered by the site. These impacts are all temporary and not significant.

Beneficially, the proposed project will promote CZM policies by providing improved future coastal storm risk management, as well as better access to the shoreline and more utility of the site for various activities. The viewshed will be improved, replacing the eroded shoreline. Modification of the groins will significantly increase long shore transport of sand helping to maintain the beach and decreasing the frequency of renourishment.

The restored beach will improve the habitat for certain types of intertidal organisms such as mole crabs, gema (clams) and other small invertebrates. The re-established beach will provide foraging and possibly nesting areas for many species of shore birds. The detailed assessment related to applicable state coastal zone policies can be found in Appendix G.

In conformance with the established policies of New Jersey's CZM Program, the District has determined that the proposed modification to the Elberon to Loch Arbour shoreline and the changes to the SBBA benthic environment are consistent with New Jersey's Rules on CZM.

5.11 Hazardous, Toxic and Radioactive Waste

Construction plans will include protecting/avoiding any potential hazardous infrastructure therefore there will be no impacts to Hazardous, Toxic, and Radioactive Waste (HTRW). The area planned for sand replenishment is open beach with no infrastructure upon it other than groins and rock covering the storm sewer outfalls. These rock features will be covered by the sand placement.

5.12 Aesthetics and Scenic Resources

Implementation of the proposed plan will result in project wide benefits to aesthetic and scenic resources by replacing the eroded shore line including many groins in disrepair with a pristine berm and beach.

5.13 Recreation

The proposed project provides opportunities to the public for passive and active recreation. The beach berm will offer a wider area for sun bathing and other passive activities. However, loss of numerous groins due to burial by the beach fill will offer fewer landward extensions from which surf fishermen could formerly cast from. Burial of the groins by beach fill may also alter the wave regime initially making conditions less conducive for surfing, but impacts should be temporary and dependent upon storm frequency following construction of the project.

5.14 Air Quality

The General Conformity Rule of the Clean Air Act requires federal agencies to ensure that any federal actions occurring in areas designated as nonattainment or maintenance for any of the NAAQS do not interfere with a state's plans to meet national standards for air quality.

Work in the Elberon to Loch Arbour Reach will comply with the General Conformity requirement (40 CFR§90.153) through the following options that have been coordinated with the NJDEP; statutory exemption, emission reduction opportunities, Surplus NO_x Emission Offsets generated by the Harbor Deepening Project, purchase of USEPA Clean Air Interstate Rule ozone season NO_x allowances and State Implementation Plan accommodation. This project, as scheduled, is not de minimus under 40 CFR§90.153, therefore one or a combination of these options will be used to meet the GC requirements. The project specific option(s) for meeting GC will be detailed in the Statement of Conformity, which is required under 40 CFR§90.158. The GC analyses that supports the GC Determination, correspondence with NJDEP and the draft Statement of Conformity (SOC) are provided for review in Appendix E.

5.15 Noise

There will be a minor increase in noise levels in the immediate project area due to operation of equipment during construction. However these impacts are expected to be of minimal consequence due to the already high level of ambient noise related to traffic on route.

6. Cumulative Impacts*

The purpose of accounting for cumulative impacts is to analyze the incremental affects from *all* recent, current or future projects that occur within the same functional ecological area as the Elberon to Loch Arbour Reach. In this regard the potential cumulative dredging impacts and placement projects relating to the proposed project will include seven other projects, all requiring sand from the Sea Bright Offshore Borrow Area. Of these seven projects, four will have Atlantic coast placement actions similar to proposed project that must be taken into account for that aspect of cumulative impact analysis. The three excluded (placement site) projects, Keansburg and East Keansburg Union Beach and Port Monmouth, are FCCE and ABU coastal storm risk management projects that are located on the New Jersey shoreline of Raritan Bay, therefore it is the NY District's position that these project construction locations and are located in an environment distinct and isolated from the Atlantic coast of New Jersey projects. Thus, the Port Monmouth, Keansburg and East Keansburg and Union Beach project construction sites are not

being considered within the aforementioned cumulative functional geographic resource placement impact analysis.

In regard to dredging and transit activities in and around the SBBA, Hurricane Sandy actions have been in progress since July of 2013 and project operations will be continuous and largely concurrent until about December of 2015. Sequence and periods of concurrent construction can be viewed via the schedules in Table 9. In regard to the projected continuous dredging activity at SBBA, after the completion of the Elberon to Loch Arbour Reach, the Union Beach project will continue on as the sole dredging project at SBBA until it's completion in December 2015.

Table 9: Schedule of Dredging Operations within the Sea Bright Borrow Area

Location of Placement	Approximate Duration	Volume	Acres
Sea Bright to Monmouth Beach	July 2013 - November 2013	2.2 mcy*	138
Belmar to Manasquan	November 2013-March 2014	1.5 mcy	133
Keansburg	February 2014 – June 2014	1.1 mcy	120
Long Branch	November 2013-March 2014	3.5 mcy	181
Asbury Park to Avon	January 2014 – April 2014	1.0 mcy	115
Port Monmouth	August 2014- September 2014	400 kcy	46
Elberon to Loch Arbour	October 2014 – November 2015	4.5 mcy	307
Union Beach	October 2015 – December 2015	700 kcy	130

*mcy – million cubic yards; kcy – thousand cubic yards

6.1 Land Use and Zoning

Other than the temporary and sequential staging, set up and movement of equipment as implementation of each work plan progresses, no permanent impacts to land use or zoning are expected.

6.2 Topography and Soils

Assuming that all eight of the projects listed in Table 9 will be completed as planned, a cumulative dredging footprint of approximately 1,170 acres of the 3,700 acre SBBA will be affected. This represents about 32% of the delineated previously sanctioned borrow area, of which, Elberon to Loch Arbour Reach (307 acres) corresponds to about 8%. As noted in the 1989 GDM EIS, the entire borrow area (3,700 acres) is regarded as only a small fraction of the available region wide, comparable benthic habitat resource (USACE ERDC 2010 report).

In the corresponding, but converse action of placement, the sand dredged from SBBA and placed along the Atlantic coast of New Jersey will cover approximately 618 acres of intertidal and sub-tidal bottom. This too represents only a fraction of this type of coastal habitat. Both dredging and placement activities for the Elberon to Loch Arbour Reach will be take place incrementally over a period of approximately one year and are not expected to result in any long term significant adverse impacts to soils or topography cumulatively or individually.

6.3 Water Resources: Groundwater, Surface Water, Water Quality

No groundwater impacts (direct or indirect) are predicted when considering possible cumulative impacts from the 5 previously described Atlantic coast projects. Direct impacts to (ocean) surface waters including water quality will consist of continuous localized increases in nearshore turbidity and total suspended sediments total suspended sediment which will be correlated to each placement operation according to the schedule displayed by Table 9. Activities including filling, regrading, groin modification and pipe extension activities will contribute to this impact. Another impact of the placement operation will be the movement ocean-ward of the high tide demarcation by the increase in beach width. All elements of the beach and intertidal morphology will adjust to this new alignment. At the SBBA, other than minimal, very localized increases of turbidity due to the draghead moving across the bottom, adverse direct water quality impacts are not expected. Under the proposed gently graded slope of the dredging plan, no cumulative adverse indirect changes to DO, temperature or salinity gradients are expected.

6.4 Vegetation

Significant cumulative adverse direct impacts to vegetation either terrestrial or submerged aquatic vegetation (SAV) are not expected. Terrestrial vegetation on the sections of that will be nourished were scoured by Sandy, and most of the vegetation was lost. Little, if any, dune grass or similar berm vegetation will be adversely affected. Areas that retain vegetation do so because the width of the berm in those areas was sufficient to protect the plants from wave run up and scouring. Areas such as these will be landward of the western edge of the beach berm. Because sand placement will be reconstructing the berm, it is likely that it will be re-colonized by various common seaside plants. Thus the secondary impacts to vegetation as a result of the placement would include proliferation of berm vegetation which in turn will help stabilize the beach.

There will little direct impact to any SAV. There are no areas of eel grass within any of the project placement sites, including the proposed project. Due to the depth of the offshore borrow area, ambient turbidity attenuates the sunlight, inhibiting photosynthesis, and plant growth. Because there is little in the way of SAV at the borrow area any direct adverse direct impact including loss of vegetation is considered insignificant. No significant cumulative indirect impacts to SAV are expected in regard dredging at the borrow site.

6.5 Fish and Wildlife

6.5.1 Finfish

6.5.1.1 Intertidal and Near Shore

No significant cumulative adverse direct impacts to common species frequenting nearshore and surf zone are expected from placement operations. Near shore species adults and juveniles are expected to avoid direct impacts including burial, contact with equipment or respiration impacts by redistributing to unaffected areas. Eggs and larvae may be more susceptible to adverse impacts including burial and respiratory stress and mortality. February through June 2014 may represent the period of highest risk to eggs and larvae along the nearshore during placement operations because this period represents the concurrent construction of three Atlantic Coast of NJ reaches (Belmar to Manasquan, Asbury to Avon and Longbranch) that also coincide with winter and spring spawning seasons. These losses are not expected to be significant due to the extremely high natural mortality of the early life stages of fish.

Approximately 762 acres of potential intertidal to nearshore foraging habitat will be sequentially altered, and may be temporarily unavailable to common surfzone and nearshore species such as silversides and the northern kingfish (USACE 2001). The magnitude of indirect impact is offset by the invertebrate species released into the nearshore during placement and the naturally quick recovery time of surf zone and its adjacent areas.

6.5.1.2 Sea Bright Borrow Area

Eight dredging projects will utilize the SBBA sediments for coastal storm risk management measures and are expected to move forward having started in 2013 and continuing into 2015 (see Table 9). Each of these projects has a beach nourishment element and the volume of sand required and related area dredged SBBA. Most adult fin fish are expected to avoid direct impact with the dredge (draghead) due to their mobility, the relatively slow movement of the draghead (at 2.5 mph), and the use of the deflector head. Highly adapted demersal species which spend most of their time in contact with or very close to the bottom such as the various flounder species, skates, and lie in wait predators such as the goose fish may be at greater risk of entrainment or draghead contact injuries than those species constantly swimming in the water column.

The most apparent impact to fin fish will be the loss of benthic invertebrate prey species that will be entrained into the dredge with the sediment. This is a temporary, indirect impact. Assuming all of the projects in Table 9 will be completed within the time frame presented, a reduction in benthic resources within 842 acres of the 3,700 acre SBBA or about 23 % of the SBBS benthic surface. The type of benthic habitat impacted by these projects is common and available adjacent to SBBA on regional scale. This impact is not considered significant. Each project footprint is expected to fully recover within 1 to 2.5 years according to studies conducted in similar New Jersey borrow area habitats (USACE 2001). Fish seeking forage prior to the beginning of recovery will find it by swimming out of the affected areas. The 1 to 2.5 year recovery time is dependent on the time of year during which the dredging was

implemented and completed and, type of benthic community that existed prior to dredging (USACE 2001).

6.5.2 Benthic Resources

6.5.2.1 Intertidal and Nearshore

Approximately 762 acres of intertidal and nearshore (placement sites) will be covered with sand from the SBBA. Some of the more active benthic invertebrates such as the swimming crabs may escape the draghead. No significant water quality impacts are anticipated due to the low content of fine sediments and associated organic materials within the sand to be dredged. The areas to be dredged are typical benthic habitats available outside the SBBA on a regional scale.

Secondary impacts relating to benthic community recovery may include initial accretion within the dredge footprint of sediments finer than those removed by the dredge resulting changes in the benthic community. Early benthic recovery will be characterized decreased biomass of the dominant sessile forms (sand dollars, surf clams etc) and increased abundance and biomass pioneering species of marine worms such as the spionid polychaete *Spiophanes bombyx*. Previous monitoring studies (USACE 2001) have shown that abundance, biomass and taxa richness recovered within about 1 year while recovery of assemblage biomass composition may take from 1.5 to 2.5 years.

The intertidal and near shore zones of the Atlantic Coast of New Jersey project sites are highly dynamic environments which have the capacity to quickly recover from extremely powerful and destructive regional natural events such as hurricanes and other coastal storms. These same regenerative capacity, documented by the District NJBMP (2001), is expected to allow the “new” intertidal and near shore zones formed by the fill to recover to pre-placement conditions within six months to a year depending on the time of completion. From mean high water to the toe of each project fill area there will be significant temporary declines in abundance, biomass and species richness due to burial.

Total construction time for the five Atlantic Coast of New Jersey projects ranges from 2 to 2.5 years, having started in July of 2013 and with final completion expected by December 2015. As the project schedules progress, intertidal and near shore recovery will occur sequentially within each project site as each localized section is completed. Thus, individual projects may have partially recovered prior to the stated completion date depending on duration of the project.

6.5.2.1 Sea Bright Borrow Area

Regarding the information previously discussed, direct impacts to the benthic community will consist of mortality to most of the slow moving or sessile benthic invertebrates within each projects site’s dredging footprint. Benthic fauna will be drawn into the dredge and lost to the placement site beach fill location. There will be an immediate, highly significant decrease in abundance, biomass, and taxa richness (USACE 2001).

Secondary impacts relating to benthic invertebrates may include initial deposition within dredge footprint of sediments finer than those removed by the dredge resulting in initial recolonization by species adapted to finer sediments. The extent of accretion and duration of the layer of finer surface sediments will be dependent on the depth of the dredge foot print, tidal currents and frequency of weather events that are capable of causing significant sediment movement. Early benthic recovery will be characterized decreased biomass of the dominant sessile forms (sand dollars, bivalve clams etc) and increased abundance and biomass pioneering species of marine worms such as the *spionid polychaetes*. Previous monitoring studies (USACE 2001) have shown that abundance, biomass and taxa richness recovered within about 1 year while recovery of assemblage biomass composition may take from 1.5 to 2.5 years.

6.5.3 Reptiles and Amphibians

No significant cumulative impacts to terrestrial reptiles or amphibians are anticipated for the reasons previously discussed in section 5.5.3.

6.5.4 Birds

No significant cumulative direct or indirect impacts to birds are expected to occur at the SBBA.

The most frequent cumulative direct impact to birds will be disturbance of shorebirds foraging or loafing on the beach due to the movement of equipment and construction activity related to placement procedures, groin modification or outfall pipe restoration. Birds most commonly disturbed will consist of various species of gulls and other common shorebirds. Since it will take approximately two years to complete all of the projects, migrating transients may also experience disturbance by the land based coastal storm risk management activities. All adult and fledged juvenile birds will move off to suitable, “undisturbed” areas. There would be no significant adverse impacts adult birds.

Atlantic Coast of New Jersey projects will be under construction from July 2013 through the December 2015. There is the potential for adverse impacts to productivity of (non-listed) beach nesting birds during spring and summer. However because the NJDEP and USACE have been monitoring beach nesting activity along the entire cumulative project it is likely that any potential project impacts to nesting activity would be noted during continuing monitoring efforts and the appropriate procedures would be taken to protect the nesting birds. No significant adverse impacts to beach nesting birds are expected.

Indirect impacts may occur to shorebirds dependent on intertidal prey species. Newly placed sand will cover the existing intertidal foraging areas and bird may need to move on to areas of more abundant prey. This would not be a significant cumulative impact as birds will easily find new stretches of beach to forage on. This would not be the case for unfledged chicks and this impact could be more deleterious. However, birds congregating at dredge outfall pipes to forage is a common phenomenon and it suggests that newly placed sand slurry actually supplies an abundant source of prey items although they may be of different than what were

the existing intertidal invertebrates. Similarly, expansion of the berm area for each project site will greatly enlarge the areas for resident and migratory birds to roost on.

The expected proliferation of vegetation on the berm will offer habitat for many insects and thus will become potential foraging habitat for common resident perching species such as sparrows, blue jays and robins etc. This will be a beneficial cumulative indirect impact.

6.5.5 Mammals

6.5.5.1 Terrestrial Mammals

Loss of berm and associated vegetation has greatly decreased small foraging and refuge habitats and this has likely reduced the numbers of animals in the placement area. Any remaining small mammals would be expected avoid impacts from typical project construction equipment and activities. Direct impacts to small, mammals on the beach would consist of disturbance by construction activities which would result in their dispersal to an undisturbed area. There will be no significant direct cumulative project impacts to small mammals at placement sites. There will be a positive cumulative indirect impact to small mammals from the placement of the expansion of berm habitat and eventual proliferation of berm vegetation.

6.5.5.2 Marine Mammals

Seals are not abundant at either the placement sites or the borrow area. However, four seal species may seasonally inhabit near shore areas as well as the waters of the SBBA. Most commonly harbor seals, and less frequently grey seals, will during the winter, use the jetties, groins and beaches as haul out areas (USFWS 1997). Harp seals and hooded seals may be in project waters at other times of year but their occurrence is relatively rare. During dredging Seals in the waters of the SBBA and would potentially be susceptible to direct impacts from working dredges or various project vessels including dredges, transiting the SBBA area. However, the relatively slow speeds of working vessels and seal's wariness and exceptional agility would serve to prevent a healthy seal suffering these types of impacts. Cumulative direct impacts to any of the 4 species of seals would most likely consist of animals having to move off of a haul out site if construction activities (including vehicle movement) approached that location. Seals may also prefer to avoid high turbidity surf zones or near shore areas during pumping and would be expected to disperse less disturbed areas. No pipe extensions requiring pile installation will occur other than at Elberon to Loch Arbour therefore any related impacts are not included in the cumulative analysis.

In analogous scenario, dolphins are expected to avoid working or transiting dredges at the SBBA as well as avoid any impacts from land base activities in the near shore.

6.6 Threatened and Endangered Species

6.6.1 Terrestrial Species

The nesting locations of piping plovers and least terns along the entire cumulative project area are well established. Through coordination via Section 7 of the Endangered Species act the

District has consulted with the NJFWS and a Hurricane Sandy associated Streamlined Biological Opinion (SBO) was developed for each of the four cumulative projects within Sandy Hook to Barnegat Inlet Section I and II. These same two species are also protected under NJDEP Rare, Threatened and Endangered Species regulations and fall under the protection of both agencies. USACE, NJFWS and the NJDEP share coordination and responsibility for regulatory responsibility and protection. Protection procedures under the SBOs will protect these species from any direct impacts. Should any adverse direct impacts occur the USFWS and the State of New Jersey will be contacted and the appropriate consultation procedures will be implemented.

New areas of berm will have been completed for the nesting season of 2014. There is the potential for these new areas to be suitable nesting habitat for these two species. This represents a potentially large beneficial indirect impact for both species. Any such nesting would automatically fall under the protection of the SBO's.

The red knot (*Calidris canutus*) a migratory species that is listed as endangered by the state of New Jersey and is under consideration as a federally listed species. It is known to utilize the Atlantic coast beaches of New Jersey as stop-over sites during its seasonal flights. The restoration of the entire Sea Bright to Manasquan shoreline may be a highly significant beneficial impact to this species.

6.6.2 Vegetation

The state and federally protected plants, Sea Beach Amaranth and Sea Beach Knotweed, have been found within many areas of the Sea Bright to Manasquan shoreline and seasonal monitoring for each occurs within the cumulative project shoreline annually. These plant species are also covered in the previously described SBO's and monitoring will continue to be conducted in season to locate any plants in any active project areas or newly restored reaches. Analogous protective state and federal regulations will implemented to protect the species from any direct impacts.

Newly established beaches may provide productive habitat for these plant species. After the initial nourishment of Sandy Hook to Barnegat Inlet Section I and II sea beach amaranth proliferated possibly due to an offshore seed source pumped to the beach during nourishment. It is possible that a similar positive indirect impact may again occur.

6.6.3 Marine Species

For this cumulative impact section Federally listed species under the jurisdiction of the NMFS potentially affected by the Port Monmouth and Union Beach projects are covered under Section 7 of the ESA by the NOAA 2013 Biological Opinion. The other five projects will be in compliance with Section 7 under Emergency Consultation procedures pertaining to P.L. 84-99.

6.6.3.1 Sea Turtles

Project Area

No significant cumulative direct or indirect impacts are expected for sea turtles regarding placement site operations. Sea turtles are not expected to enter these very shallow nearshore waters.

Sea Bright Borrow Area

Large areas of potential forage for loggerhead and Kemp's ridley sea turtles will be removed by dredging. This would represent a decrease in available prey resources inclusive of all the project dredge footprints. However, the cumulative dredged areas still represent a tiny fraction of available benthic resources adjacent to the SBBA and a turtle would be able to swim past a recently dredged area in a matter of minutes. Therefore these are not significant indirect impacts to sea turtles.

Of the four species of sea turtles known to seasonally inhabit the SBBS action area, the benthic feeding habits of the loggerhead, Kemp's Ridley, may put them at higher relative risk than the leatherback which is more pelagic and, generally feeds in the water column and the green turtle which is primarily a vegetarian feeding on types of shallow water sea grasses and algae, which is not found in abundance at the SBBA. The risk of direct impact due to entrainment or collision, would be correlated to the frequency of dredge and vessel operations during the period of time sea turtles are passing through the SBBA, May through November, with the possibility of greatest number sea turtles in the SBBA during the beginning and end of the migratory window.

In general the risk of entrainment in the District's Atlantic coastal waters is rare as evidenced by District monitoring records which have recorded only one turtle take while dredging 17 mcy of fill material (USACE, 2013b). Current scheduling for all dredging project being considered for their cumulative impacts places the majority of concurrent, multi project dredging activity outside the NY District seasonal turtle window. Furthermore all dredges in the SBBA will be utilizing a deflector device to minimize the potential of direct impacts to turtles from the drag head.

The loss of benthic forage within multiple cuts at SBBA will be an indirect impact to migrating sea turtles. However, because they are migrating through, as well as being highly mobile (Morreale and Standora 1994), the loss of potential benthic prey is insignificant because turtles easily by-pass the entire SBBA in a relatively short time period (minutes) allowing them to forage elsewhere in adjacent undisturbed benthic habitats.

6.6.3.2 Whales

Project Area

No significant cumulative direct or indirect impacts are expected for endangered whales regarding placement site operations.

Sea Bright Borrow Area

At or near the SBBA, all three species of whales previously described in the Affected Environment Section will continue to be susceptible to vessel strikes. Vessels and dredges traveling through or near the SBBA may also result in “disturbances” to whales by causing a change in whale behavior such as swimming direction. Because of the potential for multiple dredging projects being concurrently active at the SBBA (both dredging and transit actions), the periods from November 2013 through May 2014 may represent a period of increased potential for interactions between whales and vessels or dredges.

Direct impact injuries from hopper dredges dredging or transiting to or from SBBA are possible, but recommended protocols for vessel speeds as recommended in the 2013 NOAA Biological Opinion will range from about 2.6 and to about 10 mph which is considered slow enough for whales to evade collisions. Other NOAA recommendations include observers on board watching for whale activity who will implement with dredge procedures for avoiding and protecting any whales within 1,600 ft. The greatest potential for direct impacts to whales would be due to various “disturbance” factors including the presence, movement, noise etc., of ocean going equipment. Pilings for outfall repair/extension are only planned for the Elberon to Loch Arbour Reach and are not being considered in this cumulative assessment.

6.3.3.3. Atlantic Sturgeon

Project Area

No significant cumulative direct or indirect impacts are expected for the endangered federally endangered Atlantic sturgeon regarding placement site operations.

Sea Bright Borrow Area

The SBBA falls within an area that may harbor Atlantic sturgeon year round, including individuals from any of the east coast sturgeon DSPs. Duration of dredging and related vessel activities, excluding Elberon to Loch Arbour will last for approximately 18 months (June 2013 through January 2015) with the potential direct impacts of impingement or other contact injury.

Potential for direct impact may increase during seasonal periods when adult and sub adult sturgeon are actively migrating to or from the Hudson estuary or congregating in the vicinity. In accordance with the cumulative projects schedule, risk of direct impact to sturgeon may be greatest from March through July of 2014 (spring-4 concurrent projects) followed by August through November 2014 (late summer/fall-2 concurrent projects).

Use of the deflector head, slow draghead speed, and past monitoring records showing a very low probability of entrainment, provide methods and evidence respectively that this type of impact will be kept to a minimum. The Atlantic sturgeons generally demersal behavior and the depth open ocean environment of the borrow area and transit routes make dredge or vessel strikes highly unlikely. Project interference with migration routes are also improbable due to the open ocean situation.

During the cumulative project dredging of sand from SBBA surface sediments including benthic invertebrates will be removed along with the fill sand. As sturgeon feed on many of

these types of organisms this loss of forage would be considered a secondary impact, but would not be considered significant because of the proximity of adjacent coast wide areas of compatible forage which sturgeon can easily reach. Recovery of the benthic populations is expected in 1-2.5 years.

6.7 Essential Fish Habitat

6.7.1 Intertidal and Nearshore

Approximately 762 acres of intertidal and nearshore EFH will be sequentially altered by burial and localized increases in turbidity. EFH alteration impacts also includes temporary loss of most benthic fauna as each worksite reach is covered. Benthic recovery of each completed reach will begin almost immediately and follow in that same sequence as construction. Complete placement site recovery can occur as quickly as three to six months, but may take up to a year depending on the date of fill. Recovery may be enhanced by recruitment of organisms introduced by the placement operation.

Near shore species adults and juveniles are expected to avoid direct impacts including burial, contact with equipment or turbidity related respiration impacts by redistributing to unaffected areas. Juvenile bluefish have been noted as the most common EFH species in the surf and nearshore zones.

Eggs, larvae may be more susceptible to adverse impacts including burial and respiratory stress. February through June 2014 may represent the period of highest risk to eggs and larvae along the nearshore during placement operations.

6.7.2 Sea Bright Borrow Area

Approximately 1,170 acres of offshore EFH will be sequentially dredged and altered. Alteration includes deepening, and loss of benthic forage species. Significant adverse water quality impacts are not expected. Recovery of the benthic ecosystem is anticipated to occur within 1- 2.5 years.

Adult EFH species on or near the bottom at the SBBA are expected to avoid direct impacts by avoiding the draghead which will include a deflector device. Some adult mortality is likely to occur. EFH species including winter, summer, and windowpane flounder along with little, winter and clearnose skates may be most susceptible. October 2014 through May 2014 will be the period of most activity and possibly highest risk to these species. Any EFH species early life stages at or near the bottom will be highly susceptible to entrainment by the dredge.

The SBBA has been subject to regular dredging disturbances since 1994. The SBBA is not unique habitat, and it surrounded by areas of similar ecological function regional in dimension. EFH species are expected to leave any areas that are disturbed or temporarily depleted of abundant prey resources and move to undisturbed adjacent forage rich habitats. No significant adverse cumulative long term direct or indirect adverse impacts are expected to occur to EFH or associated species.

6.8 Socioeconomics

Cumulative impacts to socioeconomics will include region wide (Sea Bright to Manasquan) improved protection against catastrophic damages to life, property, infrastructure and economic stability. These in turn should increase the property values and the desirability of living in these areas.

6.9 Coastal Zone Management

Because all of the project included in the cumulative actions will have been evaluated and found consistent with their appropriate state and local CZM policies, not adverse impacts to related CZM issues are anticipated. Because the all of the projects were implemented to preserve and protect life, property, and environmental resources, the cumulative impact of completing these actions will result in promoting the beneficial aspects of CZM.

6.10 Hazardous, Toxic, and Radioactive Waste

Infrastructure adjacent to the project placement site includes surface water drainage system pipes and sewerage outfalls. Continued erosion could cause disruption of these systems and might result in increased flooding, standing water and release of sewerage.

6.11 Aesthetics and Scenic Resources

Completion of the five Atlantic coast of New Jersey coastal storm risk management projects will result in region wide cumulative beneficial direct and indirect impacts to aesthetic and scenic coastal resources.

6.12 Recreation

In regard to recreation, the overwhelming results of the cumulative project actions will be increased benefits, greatly due to an enlarged berm and beach area. This will include passive activities such as sunbathing and walking to more active past times including fishing, windsurfing, kayaking. Depending on the location wave surfing may be adversely impacted temporarily or long term.

6.13 Air Quality

Heavy equipment used during construction at each of the aforementioned project placement sites will contribute minor amounts of carbon monoxide or other pollutants in the immediate vicinity of the Project. There will be a cumulative small increase of these pollutant constituents within the Sea Bright to Manasquan area. However, total construction duration is relatively limited and no long term or additive adverse impacts to air quality are anticipated. Emission calculations based upon the equipment inventory developed for construction of each project were previously determined and collective emissions resulting from the all the projects discussed are expect to remain under NAAQS criteria thresholds for these emergency repairs.

6.14 Noise

There will be negligible increases in noise levels in the immediate vicinity of each project placement site for each of the project locations evaluated for the cumulative impacts. The increase of noise will be produced by heavy equipment and construction activities. Most of these impacts are expected to be of minimal consequence due to the already high level of ambient noise generated by the noise of traffic along Ocean Avenue. Because these projects are isolated geographically from one another, collective/additive noise impacts from concurrently operating projects is not expected. Increased noise levels will last only as long as each project's construction duration. Construction elements that require pile driving will cause greater noise impacts on land and in water, dependent on the location of the installation. No long term noise impacts anticipated.

6.15 Cultural Resources

Anticipated future projects are not within the near shore area of the Elberon to Loch Arbour Reach so there will be no cumulative effect on the historic resources in this reach. The use of the SBBA by multiple projects will however increase the likelihood that a significant resource may be impacted by dredging. The PA stipulates that potentially significant wrecks will be buffered. Buffer zones will be included on construction plans.

6.16 Environmental Mitigation Requirements*

There are no environmental mitigation requirements for this project, however cultural resources mitigation, as stipulated in the project's PA, will consist of monitoring the effects of the project on the *Adonis/Rusland* archaeological complex with each renourishment cycle. Wrecks within the SBBA will be buffered to prevent impacts from dredging. In addition, the following measures will be taken to minimize and avoid adverse environmental impacts:

- Draghead deflector device to avoid entrainment of sea turtles and Atlantic sturgeon.
- Dredging speed of 2.6 mph, transit speed of 10 mph to decrease likelihood of contact impacts of whales, turtles or sturgeon.
- On board observers (whales, turtles, sturgeon) to notify captain and crew, USACE POC and the appropriate agency if an ESA species have been observed in the vicinity of the dredge or project area.
- An agency coordinated and approved plan of action to take the proper measures avoid impacts if ESA species are noted.
- Relatively shallow cut at borrow area with low grade slopes to promote flushing and prevent hypoxia and other deleterious water quality changes.
- Seasonal monitoring for plovers, terns and listed plants with an appropriate protection plan including no action buffers and fencing.
- A Programmatic Agreement will be executed to mitigate impacts on the near shore *Adonis/Rusland* archaeological complex. Wrecks in the SBBA will be avoided with buffer zones outlined on construction plans.
- The CAA SOC will commit USACE to fully mitigate for impacts to air quality related to construction activities.

7. Plan Implementation

The implementation process will carry the updated plan through preconstruction engineering and design (PED), including development of Plans and Specifications (P&S), and construction.

7.1 General

The Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet Beach Erosion Control Project, Section I – Sea Bright to Ocean Township: Elberon to Loch Arbour Reach (Elberon to Loch Arbour Reach) is authorized to provide coastal storm risk management for the Elberon neighborhood of the City of Long Branch, the Township of Deal, the Borough of Allenhurst and the Village of Loch Arbour. The recommended plan is consistent with the purpose of the project authorization, is within the authorized project funding limits. Therefore, in accordance with Department of the Army Engineering Regulations, ER 1105-2-100, and Section 902 of WRDA 1986, additional authorization is not required. The project is eligible for continuing construction funding under P.L. 113-2 and is consistent with the requirements set forth in P.L. 113-2 as further discussed in Section 7.4.

7.2 Local Cooperation

A fully coordinated PPA package will be prepared and will reflect the recommendations of the HSLRR. The PPA will be executed with the non-Federal sponsor, NJDEP, subsequent to the approval of the HSLRR. The original PPA signed in 1992 will be terminated and a new PPA for P.L. 113-2 work for the Elberon to Loch Arbour Reach and all future renourishments for Sandy Hook to Barnegat Inlet Section I will be executed. Upon execution of the PPA, the District will design and construct the project. The Federal Government and the State of New Jersey plan to formally enter into an agreement and execute the PPA in May 2014. NJDEP has indicated support of the recommendations presented in this HSLRR and the desire to execute a PPA for the recommended plan. A letter of support for the project can be found in Appendix E. The non-Federal sponsor shall be required to comply with all applicable Federal laws and policies and other requirements, as applicable to the beach fill, groin modifications and outfall structures selected herein, including but not limited to:

Non-Federal Project Responsibility

- Hold and save the United States free from all damages arising from the initial construction, periodic renourishment, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors.
- Assume complete financial responsibility, as between the Federal Government and the non-Federal project partner for all necessary cleanup and response costs of any Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction, operation, or maintenance of the Project.
- Operate the project for the purpose of CERCLA liability. To the maximum extent practicable, operate, maintain, repair, replace and rehabilitate the Project in a manner that will not cause liability to arise under CERCLA.

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- Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, P.L. 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (P.L. 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the construction, operation, and maintenance of the Project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.
 - Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, P.L. 88-352 (42 U.S.C. 2000d), and Department of Defense directive 5500.11 issued pursuant thereto, as well as Army regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."
 - For so long as the project remains authorized, the non-Federal Sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

Floodplain Management

- Participate in and comply with applicable Federal flood plain management and flood insurance programs and comply with the requirements in Section 402 of the WRDA of 1986, as amended.
- Publicize flood plain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with the coastal storm risk management provided by the project.

Financial & Administrative Management

- Comply with Section 221 of P.L. 91-611, Flood Control Act of 1970, as amended, and Section 103 of the WRDA of 1986, P.L. 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal project partner has entered into a written agreement to furnish its required cooperation for the project or separable element.
- Provide, during the first year of construction, any additional funds needed to cover the non-Federal share of PED costs.
- Provide, during construction, any additional funds needed to cover the non-Federal share of costs.
- Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the Project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Codes of Federal regulations (CFR) Section 33.20.
- Not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized.

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- Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement.

Inspection, Performance, and Maintenance

- For so long as the project remains authorized, operate, maintain and repair the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;
- Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the non-Federal project partner owns or controls for access to the project for the purpose of inspection and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing or rehabilitating the project.
- Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of coastal storm risk management it affords or that would hinder future periodic renourishment and/or the operation and maintenance of the project;
- Not less than once each year inform affected interests of the extent of coastal storm risk management afforded by the Project.
- Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms.
- At least twice annually and after storm events, perform surveillance of the beach to determine losses of nourishment material from the project design section and advance nourishment section and provide the results of such surveillance to the Federal Government.

7.3 Public Access

Suitable public access is required for any areas where Federal expenditure of funds will be utilized for beach restoration. Public access points must be provided within one half mile of each other to meet these requirements. Additionally, the shorefront must be open to all visitors regardless of origin or home area, and cannot be limited for use by only a segment of the public. NJDEP has committed to providing the necessary public access, and ensuring that public access points are provided every half mile. A Draft Public access Plan is included as Appendix K of this report. The Draft Public Access Plan indicates that there are 2 locations within the unconstructed project reach where these access requirements are not met, based upon the information provided to date. NJDEP is in the process of updating this information to either confirm that public access requirements are met, or identify the access points that will be established as an item of local cooperation, prior to construction.

7.4 Cost Sharing

Cost allocation and cost sharing (apportionment) between Federal and non-Federal participants is in accordance with the Disaster Relief Appropriations Act of 2013 (P.L. 113-2). The initial

construction cost of the project will be implemented at 100% Federal expense. Subsequent renourishment actions will be cost-shared at 65% Federal, 35% non-Federal. A preliminary implementation schedule was developed for the recommended plan. The schedule is based on information available to date, and is largely dependent on whether the Project continues to receive Congressionally-directed funding. The estimated implementation schedule is provided as follows:

- Report Approval – April 2014
- Project Cooperation Agreement Execution – June 2014
- Completion of Plans and Specifications – August 2014
- Construction – October 2014 to November 2015

7.4 Public Law 113-2 Considerations

This HSLRR has been prepared to address to support the implementation of the ABU project accounting for the Disaster Relief Appropriations Act of 2013 (P.L. 113-2). Specifically, this report addresses:

1. The costs and cost-sharing to support a PPA.
2. Acknowledgement of the changes in the applicability of Section 902 of WRDA 1986, as amended.
3. The requirements necessary to confirm that the project remains economically justified, technically feasible, and environmentally acceptable.
4. The specific requirements necessary to demonstrate resiliency, sustainability, and consistency with the NACCS.

7.4.1 Project Partnership Agreement Costs and Cost-Sharing

The cost-sharing of the initial construction cost in accordance with the provisions of P.L. 113-2 is shown in Table 10. P.L. 113-2 states that ‘the completion of ongoing construction projects receiving funds provided by this provision shall be at full Federal expense with respect to such funds. The fully funded initial construction cost for the Elberon to Loch Arbour Reach and the fully funded renourishment costs for Sandy Hook to Barnegat Inlet Section I will serve as the basis of the cost figure agreed to in the PPA. The fully funded initial construction costs, escalated to the midpoint of construction are shown at October 2013 price levels, with 100% Federal cost allocation, inclusive of real estate costs. The fully funded renourishment costs escalated to the midpoint of construction, for a quantity of 2,600,000 cy to be placed in 6-yr intervals throughout Sandy Hook to Barnegat Inlet Section I as shown, will be cost-shared 65% Federal and 35% non-Federal, since these costs are not covered by P.L. 113-2. The non-Federal sponsor will have OMR&R requirements consisting of beach berm, groin and outfall maintenance, amounting to an annual cost of \$860,000.

Table 10: Project Cost Allocation to Support PPA

Cost Allocation (Fully Funded First Cost; FY14 Price Levels)	
Federal (100%)	\$139,409,000
Non Federal (0%)	\$0
Total	\$139,409,000
Cost Allocation (Fully Funded Total Renourishment Cost – every 6 years; October 2013 price levels)	
Federal (65%)	\$324,285,000
Non-Federal (35%)	\$174,615,000
Total (per cycle)	\$498,900,000

7.4.2 Section 902 of WRDA 1986, as amended

P.L. 113-2 included language that changes the applicability of Section 902 of WRDA 1986, as amended, to projects funded by its appropriation. Specifically, it states in Title X, Chapter 4, “...*Provided further, That for these projects, the provisions of section 902 of the WRDA of 1986 shall not apply to these funds...*” As such, there are no Section 902 limits associated with the initial construction of the project, assuming the construction is undertaken in accordance with P.L. 113-2 funding.

It has been determined that the 902 cap limit does not apply to construction and implementation of the Elberon to Loch Arbour Reacht. This determination was made based on guidance provided by both USACE North Atlantic Division and USACE Headquarters.

The Project Authorization states the following:

"Atlantic Coast of New Jersey, Sandy Hook to Barnegat Inlet, Beach Erosion Control Project, Section 1--Sea Bright to Ocean Township, New Jersey', dated May 1988, at a total initial cost for such increment of \$91,000,000 and an annual cost of \$1,200,000 for periodic beach nourishment over the life of such increment.

In general, where the plain language of the authorization uses the term “estimate average annual cost” and not “total cost” for periodic nourishment over an extended period of time, there is no legal 902 for periodic nourishment. In other words, WRDA legislation that authorizes construction of any project that states 'estimated' OR 'annualized' costs are not subject to the 902 limits. The use of the word “annual” (and not the use of the word “total” indicates that the 902 cap does not apply.

7.4.3 Risk

This HSLRR demonstrates that the recommended plan comprising of sand placement and groin and outfall modifications, reduces coastal storm risks and contributes to improved capacity to manage such risks. The project was formulated and designed to manage risk from erosion and wave attack and not major inundation due to the existing high topography of the Elberon to Loch Arbour Reach. There were impacts to the shoreline in the project area as a result of Hurricane Sandy. These changes, as described previously, however, do not change the risk assessment or economic justification of the project. The recommended plan will remain economically justified for the remaining 32-year period of analysis.

7.4.4 Resiliency and Long Term Sustainability

Resiliency is defined in the USACE-NOAA “Infrastructures Systems Rebuilding Principles” white paper as the “ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies” (USACE-NOAA, 2013). The recommended plan for the Elberon to Loch Arbour Reach includes sand placement to increase the height and width of the berm. Engineered beaches, such as part of the recommended plan for this reach, are designed, constructed and periodically renourished specifically to manage risk of economic losses arising from coastal storms. Engineered beaches are sacrificial by nature, however, they provide coastal storm risk management that contributes significantly to the resilience of the community in which the project is located.

As documented in the Hurricane Sandy Coastal Projects Performance Evaluation Study (USACE 2013), with a project in place, storm damages will be less severe than would have been the case in the absence of the project. Fewer homes, businesses, and public infrastructure elements are damaged and destroyed, and fewer lives are disrupted or lost. Transportation and critical health and public safety assets return to full function after a storm more quickly. All of these considerations lessen the duration and reduce the costs of the recovery period, and consequently make the community more resilient than would have been the case without the project in place.

Sustainability is defined as the ability to continue (in existence or a certain state, or in force or intensity); without interruption or diminution. The project itself is physically sustainable in that sufficient sand resources exist in the nearshore waters of the project area in the SBBA for initial construction and periodic renourishment over the life of the project. The proposed project includes groin modifications to maintain the uniformity in the beach berm’s condition by reducing detrimental sand impoundment and downdrift sand losses, in addition to sand placement. Those features reduce sand losses to the berm, reduce the frequency of renourishment and therefore increase overall sustainability of the project. Periodic beachfill renourishment is included in the project in recognition of local prevailing storm and long term erosion forces and shoreline response. The estimated periodic beachfill renourishment frequency and volume quantity are specially designed to ensure project sustainability for a range of coastal event risk over the 50-year period of analysis.

7.4.5 Consistency with North Atlantic Coast Comprehensive Study

The North Atlantic Coast Comprehensive Study (NACCS) is authorized under P.L. 113-2 with the objective of addressing flood risks of vulnerable coastal populations in areas that were affected by Hurricane Sandy. The study area of the NACCS extends from New Hampshire to Virginia. The study is scheduled to be submitted to Congress in January 2015.

The goals of the NACCS are to (1) provide risk reduction strategies to manage risk to which vulnerable coastal populations are subject, and (2) promote resilient coastal communities to ensure a sustainable and robust coastal landscape system, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable population, property, ecosystems, and infrastructure.

In assessing consistency with the NACCS, it is acknowledged that the results of the study are not yet available, but that there are overriding principles which have been established that can be addressed for consistency. These principles recognize that preferred plans are those that provide coastal storm risk management with the use of sand features, which are readily adaptable, and could be modified or terminated based upon findings of the NACCS. The NACCS acknowledges that hard structures may be necessary, and can be implemented if based upon current, state-of-the-art science and planning. Additionally, it emphasizes the need for integrated land-use planning, recognizing the need for local adoption of Floodplain Management Regulations, based upon current understanding of risks.

The proposed project is consistent with the principles of the NACCS. The overall coastal storm risk management is to be provided with a beach berm system that could be readily adapted. These designs have been developed and analyzed using state of the art science and engineering. The recommended design has accounted for sea level rise through the flexibility of the beach fill design. With respect to integrated land management, the community landward and surrounded by this project is developed, which limits the focus of land management to rebuilding activities as opposed regulating new development. There are existing land use regulations that are in effect within the project area, including FEMA Floodplain Regulations and the New Jersey State Coastal Areas Facilities Act (CAFRA) Regulations which effectively address rebuilding in the project area. The project is not designed to alter the existing floodplain regulations and is not expected to have an impact on potential future development in the area.

8. Coordination and Compliance with Environmental Requirements*

Design of the proposed project was coordinated with the NJDEP as the partnering agency and with the representatives from the City of Long Branch, the Township of Deal, the Borough of Allenhurst, and the Village of Loch Arbour.

The District is currently coordinating with the NJHPO in developing a PA. The District is also coordinating with the USFWS, who have developed a Planning Aid Letter (PAL) that is included in Appendix E.

The circulation of this EA fulfills public coordination requirements in accordance with the NEPA of 1970. Table 11 identifies the primary Federal laws and regulations applicable to the construction of the Elberon to Loch Harbour Reach.

Table 11: Summary of Primary Federal Laws and Regulations Applicable to the Proposed Project

Legislative Title U.S. Code/Other		Compliance
Clean Air Act	42 U.S.C. §§ 7401-7671g	A General Conformity Rule determination and analyses and a draft Statement of Conformity are included in this Draft EA (EA) in Appendix E.
Clean Water Act	33 U.S.C. §§ 1251 et seq.	The District will be applying for a water quality permit from NJDEP to fulfill the requirements of Section 404 of this Act. A 404(b) Review is also included in this report in Appendix F.
Coastal Zone Management Act	16 U.S.C. §§ 1451-1464 N.J.A.C. 7:7 and N.J.A.C. 7:7E	A CZM Determination has been prepared and is located in Appendix G. The determination will be coordinated with the NJDEP.
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	The District is in coordination with NOAA-Fisheries and the USFWS regarding endangered species. A Biological Assessment (BA) for use of the Sea Bright Borrow Area has been prepared and submitted to NOAA-Fisheries for review. The cover letter to the BO is included in Appendix E.
Environmental Justice in Minority and Low Income Populations	Executive Order 12898	The District performed an analysis and has determined that a disproportionate negative impact on minority or low-income groups in the community is not anticipated and a full evaluation of Environmental Justice issues is not required.
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	The District is currently coordinating with the USFWS for the development of a Planning Aid Letter. A letter initiating the coordination can be found in Appendix E.
Magnuson-Stevens Act Fishery Conservation and Management Act	Section 305(b)(2) 1996 Amendments	An EFH Assessment has been prepared and will be submitted to NOAA-Fisheries as part of the Draft HSLRR/EA review. The EFH Assessment is included in Appendix H.
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347	The circulation of the Draft EA fulfills requirements of this act.

Legislative Title U.S. Code/Other		Compliance
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The District is currently coordinating with the State Historic Preservation Office to fulfill requirements of this act. Execution of the Programmatic Agreement will satisfy the District's Section 106 responsibilities.
Executive Order 11990, Protection of Wetlands	May 24, 1977	Circulation of this report for public and agency review fulfills the requirements of this order.
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	April 21, 1997	Implementation of this project will reduce environmental health risks. Circulation of this report for public and agency review fulfills the requirements of this order.

9. Conclusions

This Integrated HSLRR and EA was prepared to address the requirements of P.L. 113-2. The report demonstrates that the project is economically justified, technically feasible and environmentally acceptable. Further, there are no proposed or required revisions necessary to the 1989 GDM, nor are there any outstanding resource agency concerns with regard to this project.

The recommended plan consists of constructing a 100 ft wide beach berm at an elevation of +7.3 ft North American Vertical Datum 1988 (NAVD88) (+10 ft Mean Low Water (MLW)) that includes 2 ft high storm cap designed at an elevation of +9.3 ft NAVD88 (+12 ft MLW). Approximately 4,450,000 cubic yards (cy) of sand from the SBBA will be used to construct the beach berm. Six existing groins will be modified to allow sediment to pass through and prevent sediment impoundment. Sixteen existing outfalls will be modified as a result of the beach berm construction. Renourishment for the Elberon to Loch Arbour Reach will occur every six years for the remaining 32-year period of analysis at an expected volume of 660,000 cy per renourishment cycle.

The recommended plan has total average annual costs of \$8,412,000, and total average annual benefits of \$34,450,000. The total project first cost, which includes real estate administration costs and pertinent contingency, engineering and design and construction management costs, is \$134,638,000. Pursuant to P.L. 113-2, the initial construction cost of the project will be implemented at 100% Federal expense. The cost for each renourishment cycle for the Elberon to Loch Arbour Reach is \$17,124,000 and for each renourishment cycle for Sandy Hook to Barnegat Inlet Section I (which includes the Elberon to Loch Arbour Reach) is \$54,676,000, both to be cost-shared at 65% Federal and 35% non-Federal. The project remains economically justified, with a BCR of 4.1.

USACE has given consideration to all significant aspects in the overall public interest, including environmental, social and economic effects, engineering feasibility and compatibility of the project with the policies, desires and capabilities of the State of Jersey and other non-Federal

interests. No adverse impacts to cultural or environmental impacts will occur as a result of project implementation.

The non-Federal sponsor, NJDEP has expressed their support for the project and is committed to operation and maintenance of the project upon construction completion and project turnover.

In light of the changes provided in P.L. 113-2 in regard to the PPA, cost-sharing, Section 902 applicability, risks, sustainability, resiliency, and consistency with the NACCS, USACE recommends that the project be implemented in accordance with this HSLRR and the provisions of P.L. 113-2.

10. Recommendation

In making the following recommendations, I have given consideration to all significant aspects in the overall public interest in coastal storm risk management within the communities of Elberon in the City of Long Branch, the Borough of Deal, the Borough of Allenhurst and the Village of Loch Arbour. The aspects considered include engineering feasibility economic effects, environmental impacts, social concerns, and compatibility of the project with the policies, desires, and capabilities of the local government, City, State, Federal government, and other interested parties.

I recommend that the authorized project described herein for coastal storm risk management to the area from the Elberon neighborhood of the City of Long Branch to the Village of Loch Arbour, Monmouth County, New Jersey, be designed and constructed and that implementation funds be provided. I make this recommendation based on findings that the recommended plan constitutes engineering feasibility, economic justification, and environmental acceptability. These recommendations are made with such further modifications thereof, as in the discretion of the Major Subordinate Command may be advisable, at the estimated first cost of \$134,638,000 provided that non-Federal interests comply with all the requirements substantially in accordance with the PPA, which will be executed upon approval of this report.

The recommendations contained herein reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of the national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and/or implementation funding. However, prior to transmittal to Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Paul E. Owen
Colonel, U.S. Army
Commander

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The following individuals were primarily responsible for the preparation of this integrated HSLRR and EA.

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