Sandy Hook to Barnegat Inlet, Sea Bright to Manasquan, New Jersey Coastal Storm Risk Management General Reevaluation Study

Draft Integrated General Reevaluation Report and Environmental Assessment

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U.S. Army Corps of Engineers

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Executive Summary

The Sandy Hook to Barnegat Inlet, Sea Bright to Manasquan, New Jersey (NJ), Draft Integrated General Reevaluation Report (GRR) and Environmental Assessment (EA) documents the United States Army Corps of Engineers (USACE) general reevaluation study planning process and complies with the National Environmental Policy Act (NEPA).

The existing Sandy Hook to Barnegat Inlet Beach Erosion Control Project is authorized by the River and Harbor Act of July 3, 1958 (P.L. 86-645), in accordance with House Document No. 332, 85th Congress, second session (H. Doc. 85-332, as modified by Section 854 of the Water Resources Development Act (WRDA) of 1986 (PL 99-662) and further modified by Section 4 of the WRDA of 1988 (PL 100-676) and Section 102 (r) of the WRDA of 1992 (PL 102-580).

The Sandy Hook to Barnegat Inlet Project provides coastal storm risk management for the highly populated communities and infrastructure along the Atlantic coastline in Monmouth County and Ocean County, NJ. The Sandy Hook to Barnegat Inlet Project is divided into three sections: Section I, which extends for 12 miles from Sea Bright to Loch Arbour (formally Ocean Township); Section II, which includes the 9 miles from Asbury Park to the Manasquan Inlet; and Section III, which extends from Manasquan Inlet to Barnegat Inlet, which is managed by Philadelphia District.

Sections I and II of the existing project consists of 21 miles of shoreline from the Borough of Sea Bright to the Manasquan Inlet in Monmouth County, NJ. The construction of the existing project was initiated in 1994. Construction of Section I was completed in 1998, except for Elberon, Deal, Allenhurst, and Loch Arbour, which was completed in 2016. Construction of Section II was completed in 2000.

The existing project performs as designed and adequately manages coastal storm risk. In 2012, Hurricane Sandy showcased how much damage, and inundation can occur from an intense storm event. During Hurricane Sandy, the existing project generally performed well given the extreme storm conditions and was successful in reducing storm damages (Hurricane Sandy Coastal Projects Performance Evaluation Study, USACE, 2013). However, the project was overtopped in its entirety, revealing the opportunity to modify the project to better manage the risk of inundation.

In acknowledgement of the continued coastal storm risk, especially given the increasing vulnerability of communities due to relative sea level change (RSLC), there is an opportunity to evaluate the performance of the existing project into the future and recommend improvements so that the project can continue to be responsive to the needs of the communities it serves. This general reevaluation is the vehicle to identify those improvements.

Section 216 of the River and Harbor Act of 1970 (33 USC Sec. 549a), authorized the Secretary, acting through the Chief of Engineers to review the operation of projects whose construction was complete when found advisable due to significantly changed physical or economic conditions, and to report on the advisability of modifying the structures, or their operation, and for improving the quality of the environment in the overall public interest. A Feasibility Cost Sharing Agreement was executed on 18 October 2022 with the New Jersey Department of Environmental Protection (NJDEP) as the non-federal sponsor (NFS). This general reevaluation study is being conducted in accordance with Section 216 of the River and Harbor and Flood Control Act of 1970 and funding from the Disaster Relief Supplemental Appropriations Act 2022 (DRSAA), with DRSAA funding at 100% Federal expense.

During scoping for this study, two main problems/opportunities for improvement were identified:

- inundation risk in Section II, which leaves people and property at risk of damage, and;
- increased rates of erosion ("hot spots") in Elberon and Monmouth Beach within Section I, which demands more than anticipated renourishment to maintain project performance as designed, and redirects renourishment efforts to these locations, as opposed to other sections of the project that could benefit from sand placement.

Initial evaluation of the erosion hotspots in Section I indicated that groin modification is a potential measure for implementation to manage the risk of erosion. Groin modification could fit within the existing project authority (Section 101 of the River and Harbors Act of 1958). Given that additional authority would not be needed to construct a potential risk management measure in Section I, the investigation of Section I erosion hotspots will be pursued under an Engineering Documentation Report (EDR), as part of the ongoing renourishment project.

Therefore, the purpose of this study is to investigate and determine if there is a technically feasible, environmentally acceptable, and economically justifiable recommendation for federal participation to improve the existing project. The need for this study derives from the risk coastal storms pose to communities, infrastructure, and the economy. Potential damages are expected to increase in the future due to an increase in the extent and depth of inundation, increase in wave heights, and increased erosion caused by higher water levels and wave heights associated with a projected relative increase in the region's sea level.

The study team followed the six-step planning process described in Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the Planning Guidance Notebook (USACE, 2000b). Plan formulation considers all beneficial or adverse effects to the four accounts identified in the Principles and Guidelines (1983): National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). Utilizing the USACE Planning Process as specified in Engineer Regulation (ER) 1105-2-103 and the Planning Manual Part II: Risk-Informed Planning, the study team considered a range of nonstructural, structural, and nature-based measures that have the potential to increase coastal resiliency. Alternative plans were developed from management measures to meet planning objectives and avoid the planning constraint while reasonably maximizing net benefits. For Alternative plan comparison, the costs and benefits were calculated incrementally in order to demonstrate the net change relative to the existing project.

After careful evaluation of the alternatives and their tradeoffs, the study team and NFS, NJDEP, selected Alternative 3e as the Tentatively Selected Plan (TSP). Alternative 3e specifies a uniform design profile across all of Section II, consisting of a +16 ft North American Vertical Datum of 1988 (NAVD88) crest elevation dune and 100 ft wide berm. This design profile would be constructed during the scheduled renourishment cycle in 2031 and maintained for the remainder of the existing project's authorization, through 2049. Alternative 3e includes a total beachfill quantity of 2,155,000 CY for initial placement, and renourishment of 2,454,000 CY every six years in years 2037, 2043, and 2049. These fill volumes include the anticipated volumes per remaining renourishment cycle of the existing project. Of the 2,155,000 CY for initial placement, an estimated 1,041,000 CY is attributed to volume requirements of the existing project. Likewise, of the 2,454,000 CY in renourishment every six years, an estimated 2,299,000 CY is attributed to volume requirements of the existing project.

The TSP (Alternative 3e) has been identified as the NED Plan, the plan that reasonably maximizes total net benefits and is the least environmentally damaging practical alternative (LEDPA). The TSP will not significantly adversely impact physical and biological environmental resources; cultural resources; public health and safety; or the quality of the human environment. At current price levels (Fiscal Year 2025 price level and 3% discount rate), the TSP has an estimated incremental project first cost of $52,052,000 and provides an estimate of $2,755,000 million in Average Annual Equivalent (AAEQ) incremental benefits, $150,000 in net benefits, and has a benefit-cost ratio of 1.06. The non-federal costs for the value of lands, easements, rights-of-way, relocations, and disposals (LERRDS) are estimated to be $154,000. The cost of operation and maintenance (O&M) is estimated to cost an incremental $40,000 annually and renourishment is estimated incrementally to be $450,000. The TSP was designed to avoid and minimize environmental and cultural resource impacts while still reducing the risk of storm surge. The NFS, NJDEP, has indicated their support for releasing this report for public and agency input.

Optimization of the TSP, or plan refinement, will occur after the draft integrated report is released. This report includes a conceptual level of design, which will be improved to approximately 35% for the final report.

Pertinent Data

Tentatively Selected Plan Features

The Tentatively Selected Plan is Alternative 3e, the incremental improvements to the existing authorized project in Section II. It includes a uniform design profile across all of Section II, inclusive of the northern extent of Asbury Park through the southern extent of Manasquan Borough consisting of a +16 ft NAVD88 crest elevation dune and 100 ft wide berm.

- A dune at elevation +16 ft NAVD88 with a 25 ft dune crest width and 1V:5H side slopes;
- A 100 ft wide berm at elevation +9.3 ft NAVD88;
- A foreshore slope of 1V:10H from the seaward edge of berm to mean low water (approximately -2.7 ft NAVD88) which transitions to a 1V:40H slope past mean low water until the design profile meets the existing offshore profile;
- In addition to the anticipated renourishment quantities of the existing project, an additional beachfill quantity of 1,114,000 CY is anticipated for initial placement, and renourishment of 155,000 CY every six years in years 2037, 2043, and 2049, resulting in an estimated 1,579,000 CY total incremental project fill volume relative to the total project fill volume of the existing project, 7,938,000 CY. The total project fill volume for Alternative 3e, including the volume required to maintain the existing project, is 9,517,000 CY. Quantity estimates include feeder beach quantities, tolerance, and overfill, but not advanced fill;
- Cross-overs are designed as on-grade sand-paths. There are 89 pedestrian, 19 vehicular, and 12 Americans with Disabilities Act compliant cross-overs;
- Dune grass planted 18 inches apart and 48,000 linear feet of sand fence.
- The dimensions of the design template and necessary advanced fill for engineering performance and associated costs will be further evaluated for the final integrated report.

Construction

The project assumes the initial construction of the dune and extension of the berm will coincide with the nourishment of the existing project scheduled for 2031 with an overall duration of approximately 1 year and 9 months. Future renourishments would remain on the existing six-year nourishment cycle, taking place in 2037, 2043, and 2049. Construction years are assumed for the economics evaluation in this study and are subject to report and project approvals and funding requirements, including federal and non-federal funds. Construction will take place within the applicable environmental work windows and concurrent with periodic renourishment.

Real Estate Requirements

Federal law requires that the NFS provide the LERRDS necessary for a USACE project[1]. The TSP's lands, easements, and rights-of-way costs are $154,000, with relocation costs of $0 for a total of $154,000.

[1] Any conclusion or categorization that an item is a utility or facility relocation to be performed by the NFS as part of its lands, easements, rights-of-way, and relocations responsibilities is preliminary only. USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis and completion and approval of a Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

Project Cost

Project first cost is the constant dollar cost at the current price level and is the cost used in the authorizing document for a project. The incremental project first cost for the TSP is estimated to be $52,052,000. The continuing construction cost of $16,360,000 includes periodic renourishment approximately every six years through 2049.

TSP FIRST COST		
		Total Cost[1]
01	LANDS AND DAMAGES	$715,000
06	FISH & WILDLIFE FACILITIES	$629,000
17	BEACH REPLENISHMENT	$42,305,000
18	CULTURAL RESOURCE PRESERVATION	$224,000
30	PLANNING, ENGINEERING, AND DESIGN	$5,649,000
31	CONSTRUCTION MANAGEMENT	$2,530,000
Project First Cost		**$52,052,000**
17	BEACH REPLENISHMENT	$13,788,000
30	PLANNING, ENGINEERING, AND DESIGN	$1,790,000
31	CONSTRUCTION MANAGEMENT	$782,000
Continuing Construction or Replenishment First Costs		$16,360,000
TSP AVERAGE ANNUAL EQUIVALENT COSTS		
	AAEQ Costs [2]	$2,605,000
	AAEQ Benefits [3]	$2,755,000
	AAEQ Net Benefits [3]	$150,000
	Benefit-Cost Ratio [3]	1.06

FY 2025 price level and discount rate of 3%.
[1] Represents the incremental cost of improvements to the existing authorized project.
[2] Includes operation and maintenance
[3] Based on USACE Intermediate relative sea level rise

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Glossary of Acronyms and Terms

ACRONYM	DEFINITION
AEP	Annual Exceedance Probability
AOC	Area of Concern
ASP	Agency Specific Procedure
BO	Biological Opinion
BOEM	Bureau of Ocean Energy Management
CEA	Classified Exemption Area
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSRM	Coastal Storm Risk Management
CWWBS	Civil Works Work Breakdown Structure
CY	Cubic Yards
dB	Decibel
DRSAA	Disaster Relief Supplemental Appropriations Act
EDR	Engineering Documentation Report
EA	Environmental Assessment
EQ	Environmental Quality
ER	Engineer Regulation
ERDC	Engineering Research and Development Center
FY	Fiscal Year
GRR	General Reevaluation Report
GSLC	Global Sea Level Change
HDP	Harbor Deepening Program

HTRW	Hazardous, Toxic, and Radioactive Waste
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Consultation
IWR	Institute for Water Resources
LEDPA	Least Environmentally Damaging Alternative
LERRDS	Lands, Easements, Rights-of-way, Relocations, and Disposals
MLW	Mean Low Water
MSL	Mean Sea Level
NACCS	North Atlantic Coast Comprehensive Study
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NDBC	National Data Buoy Center
NED	National Economic Development
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Datum of 1929
NJ	New Jersey
NJBB	New Jersey Back Bays
NJBMP	New Jersey Biological Monitoring Plan
NJDEP	New Jersey Department of Environmental Protection
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrous Oxides
NRHP	National Register of Historic Places
OSE	Other Social Effects
P&G	1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies
PPA	Project Partnership Agreement
P&R	Principles and Regulations
PR&G	2013 Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies
PI	Preferred Id
RAT	Regional Air Team
RED	Regional Economic Development
RSLC	Relative Sea Level Change
SBOBA	Sea Bright Offshore Borrow Area
SLC	Sea Level Change
SNEO	Surplus NOx Emission Offsets
SOC	Statement of Conformity
TSP	Tentatively Selected Plan
USACE	U.S. Army Corps of Engineers
EPA	U.S. Environmental Protection Agency
CFR	Code of Federal Regulations

USC	United States Code
UST	Underground Storage Tank
WRDA	Water Resources Development Act
WSE	Water Surface Elevation

Chapter 1: Introduction

1.1 Integrated General Reevaluation Report and Environmental Assessment

The U.S. Army Corps of Engineers (USACE), New York District (District) and the non-Federal sponsor (NFS), the New Jersey Department of Environmental Protection (NJDEP), prepared this Draft Integrated General Reevaluation Report (GRR) and Environmental Assessment (EA) for the Sandy Hook to Barnegat Inlet, Sea Bright to Manasquan, New Jersey (NJ) Coastal Storm Risk Management (CSRM) Feasibility Study. The purpose of this report is to document the analyses conducted to investigate and determine if there is a technically feasible, environmentally acceptable, and economically justifiable recommendation for federal participation to improve the existing Sandy Hook to Barnegat Inlet Beach Erosion Control Project. These improvements would aim to address coastal storm risk to vulnerable populations, property, and infrastructure along the coast from Sandy Hook to Barnegat Inlet, Sea Bright to Manasquan, NJ. This reevaluation involved the formulation and consideration of a variety of nonstructural, structural, and nature-based flood risk management measures.

1.2 USACE Planning Process

As outlined in Engineer Regulation (ER) 1105-2-103, the USACE risk-informed planning process is a transparent, structured, and iterative approach to decision making for federal investments in water resources. The objective of a federal water resources project is to reflect national priorities, encourage economic development, and protect the environment per United States Code (42 USC 1962-3). Pursuant to Code of Federal Regulations (33 CFR 234), federal investments in water resource projects should aim to maximize net public benefits. Public benefits include positive economic, environmental, and social effects, including monetized, quantified, and qualitatively assessed effects. The 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies (Principles and Guidelines, or P&G) provide guiding principles for the USACE planning process. The 2013 Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies (PR&G) supersedes the 1983 P&G, though both are currently used to guide the planning process. On December 19, 2024, USACE issued the final rule for implementing the 2013 PR&G via its Agency Specific Procedures (ASPs), as there is no current implementation guidance for the ASPs, both are being utilized to guide the planning process. ER 1105-2-103 Policy for Conducting Civil Works Planning Studies and the Planning Manual Part II: Risk-Informed Planning lay out an iterative planning process used for all USACE Civil Works studies in developing and evaluating alternative plans (IWR 2017).

The six steps of the iterative USACE planning process consist of: (1) identifying water resource problems and opportunities (2) inventorying and forecasting existing and future conditions, (3) plan formulation, (4) evaluating alternative plans, (5) comparing alternative plans, and (6) recommendation of a plan. These steps are iterative and periodically revisited throughout the study as new information becomes available, study risks materialize, and as alternatives are further refined. All formulated alternatives are evaluated relative to a No Action alternative, in which no additional actions are undertaken. In the context of this study, the No Action alternative consists of continued renourishment of the existing project through the end of its currently authorized renourishment period of 2047 for Section I and 2049 for Section II. The planning process aims to ensure that plan formulation, evaluation, and recommendations reflect the guiding principles identified in the Principles and Regulations (P&R) as outlined by the Council on Environmental Quality (CEQ 2013): healthy and resilient ecosystems, sustainable economic development, floodplains, public safety, community resilience, and a watershed approach. The result of the planning process is investment advice. Within this draft integrated report, this advice is a Tentatively Selected Plan (TSP), subject to further public and internal USACE review.

1.3 Background and Existing Project

The existing Sandy Hook to Barnegat Inlet project is divided into three sections:

- Section I – 12 miles from Sea Bright to Loch Arbour (formally Ocean Township),
- Section II – 9 miles from Asbury Park to the Manasquan Inlet, and
- Section III – 14 miles from Manasquan Inlet to Barnegat Inlet, which is managed by Philadelphia District.

Sections I and II consist of 21 miles of shoreline from the Borough of Sea Bright to the Manasquan Inlet in Monmouth County, NJ. The existing project provides beach erosion control, protection of the shoreline of the highly populated communities and infrastructure located along the Atlantic coast of Monmouth County, NJ. The existing project consists of a beach template with no dune and a 100 ft wide berm, with an additional 40 ft of advanced fill. The existing berm specifies a top elevation of +7.3 ft North American Vertical Datum of 1988 (NAVD88), plus a 2 ft berm cap, leading to a +9.3 ft NAVD88 berm elevation.

The project includes periodic nourishment on a six-year cycle for a period of 50 years from the start of initial construction. Between the northern extent of Asbury Park and the southern extent of Avon by the Sea (Section II Reach 4), initial construction began in July 1999 and was completed in June 2000. Between the northern extent of Belmar, NJ and the southern extent of Manasquan, NJ (Section II Reach 5), initial construction began in June 1997 and was finished by October 1997. Placement locations for renourishment are determined based on topographic and bathymetric surveys. The existing project is authorized for periodic renourishment on a six-year cycle through 2049 in Section II. The NFS for the project is the NJDEP, who is responsible for acquiring all lands, easements, and rights-of-way and providing 35% of the total costs of the project.

The construction of the existing project was initiated in 1994. Construction of Section I was completed in 1998, except for a 3-mile stretch in Elberon, Deal, Allenhurst, and Loch Arbour, which was completed in 2016. Construction of Section II was completed in 2000. The most recent completed renourishment cycle, in Elberon, Monmouth Beach, and Sea Girt, was completed in March 2024 with the placement of approximately 2 million cubic yards (CY) of material. The next renourishment is expected to take place from September 2026 to March 2027, in areas that will be determined based on survey results obtained in December 2025.

Elberon and Monmouth Beach have been identified as hotspots experiencing high rates of erosion. Prior to the latest project and renourishment, sand loss from the southern Monmouth County fill section that moved to the north, benefited Loch Arbour and the Borough of Allenhurst as sand moved north around the northern Asbury Park groin into the short shoreline cell containing these two municipalities. An extensive groin complex built at the Allenhurst – Deal boundary prevented sand movement into the Borough of Deal.

Following WRDA 1988 authorization, the following USACE Studies were undertaken:

- Section I General Design Memorandum, 1989
- Section II General Design Memorandum, 1994
- Monmouth Beach, NJ: Beach-Fill "Hot Spot" Erosion Evaluation Report 1 Physical Processes Analysis, 1999
- Monmouth Beach, NJ: Beach-Fill "Hot Spot" Erosion Evaluation Report 2 Functional Design of Shore Protection for Beach-Fill Longevity, 1999
- Atlantic Coast of NJ, Sandy Hook to Barnegat Inlet, Beach Erosion Control Project, Section I – Sea Bright to Ocean Township. Elberon to Loch Arbour Reach. Integrated Hurricane Sandy Limited Reevaluation Report and EA, USACE July 2014
- Hurricane Sandy Coastal Projects Performance Evaluation Study, USACE 2013

1.4 Purpose and Need for Action

The existing project performs as designed and adequately manages the risk of erosion. However, in 2012, Hurricane Sandy showcased how much damage, and inundation can occur from an intense storm event. During Hurricane Sandy, the existing project performed well given the extreme storm conditions and was successful in reducing the magnitude of storm damages (Hurricane Sandy Coastal Projects Performance Evaluation Study, USACE, 2013). Nonetheless, the project was overtopped, revealing the opportunity to modify the project to better manage the risk of inundation in Section II.

As a result of Hurricane Sandy, impacts including berm lowering/flattening were documented over the entire project length (Sea Bright to Manasquan Inlet) with an estimated average drop in beach elevation of 5 - l0 feet. Locations across the existing project which had locally built dunes prior to the storm lost all or near all of the existing dunes, plus any established dune vegetation. On December 5, 2012, the Richard Stockton College of New Jersey Coastal Research Center (CRC) provided an analysis of 15 survey sites between Darlington Avenue in Deal, NJ and the Manasquan Inlet. Thirteen survey sites fall within the USACE constructed limits. Comparing a pre-storm survey completed October 4, 2012, with a post-storm survey completed November 12, 2012, the CRC determined a dry beach (subaerial) volume of sand loss of approximately 1,345,000 CY. Using profiles generated from these data sets, USACE extracted pre-storm and post-storm shoreline positions. From the difference in shoreline positions, the subaqueous volume of sand lost is approximately 855,000 CY for a total estimated volume loss of 2,200,000 CY in Section II.

Following Hurricane Sandy, the NJDEP sent USACE a letter in 2015 and again in 2021, requesting a reevaluation of the existing project study area due to the damages experienced from Hurricane Sandy and to reevaluate the project for responsiveness to future coastal storm conditions. Funding to conduct a reevaluation was provided through the Disaster Relief Supplemental Appropriations Act (DRSAA) 2022, Public Law 117-43. A Feasibility Cost Sharing Agreement was executed on

18 October 2022 with the NJDEP as the NFS, using DRSAA funding at 100% Federal expense.

The purpose of this study is to investigate and determine if there is a technically feasible, environmentally acceptable, and economically justifiable recommendation for federal participation to improve the existing project. The need for the study has been recognized by the U.S. Congress, the state of NJ, and other federal and local agencies.

1.5 Study Scope

The strategy for the study is to focus on the critical needs of the existing project over its remaining authorized renourishment period. During scoping for this study, two main problems/opportunities for improvement were identified:

- inundation risk in Section II, which leaves people and property at risk of damage; and
- increased rates of erosion in Elberon and Monmouth Beach within Section I, which demands more than anticipated renourishment to continue allowing the project to perform as designed and redirects renourishment funds and sand to these locations, as opposed to other sections of the project that could benefit from sand placement.

Initial evaluation of the erosion hotspots in Section I indicated that potential measures that could be used to manage the risk of erosion could include groin modifications. These potential measures could fit within the authority of the existing project in Section 101 of the River and Harbors Act of 1958. Given that additional authority would not be needed to construct a potential risk management measure in Section I, the investigation of Section I erosion hotspots will be pursued under an Engineering Documentation Report (EDR).

Therefore, the primary focus of this GRR is the management of risk to human life, safety, and property damage due to inundation, erosion, and waves during coastal storms within Section II of the Study Area through the period of analysis. The analyses would compare alternatives for improvement to the existing project in Section II across all four P&G accounts: National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED) and Other Social Effects (OSE). The tentative recommendation would add or modify features and seek to amend the existing authority, as needed, to include these features.

This draft report will be an interim response to the study authority, as the study is ongoing. This draft report presents the TSP for concurrent public and agency review. After reviews and consideration of comments, the TSP will be refined and optimized, resulting in the Recommended Plan detailed in a final report.

1.6 Federal Objective

The Federal Objective specifies the fundamental goal of Federal investments in water resources. It is specified in the PR&G, which is a common framework for analyzing a diverse range of water resources projects, programs, activities, and related actions involving Federal investment as identified by the agencies in the context of their missions and authorities – including by USACE. The Federal Objective specifies that:

> *Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by: 1) seeking to maximize sustainable economic*

development; 2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and 3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural system… In consideration of the many competing demands for limited Federal resources, it is intended that Federal investments in water resources should strive to maximize public benefits, with appropriate consideration of costs. Public benefits encompass environmental, economic, and social goals, include monetary and nonmonetary effects and allow for the consideration of both quantified and unquantified measure (PR&G 2013).

1.7 Study Authority

This general reevaluation study is being conducted under the authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-5511), which allows for the review of completed projects when advisable due to the significantly changed physical or economic conditions and to make recommendations on the advisability of modifying structures or their operation. The previously authorized project is the Sea Bright to Manasquan Coastal Storm Risk Management Project. The project report recommending the existing Sandy Hook to Barnegat Inlet Beach Erosion Control Project was submitted to Congress in 1956. The original project was authorized under the River and Harbor Act of July 3, 1958, in accordance with House Document No. 332, 85th Congress, second session, as modified by Section 854 of the Water Resources Development Act (WRDA) of 1986 (PL 99-662) and Section 4 of the WRDA of 1988 (PL 100-676), with further modification by Section 102(r) of the WRDA of 1992 (PL 102-580).

Section 216 of the River and Harbor and Flood Control Act of 1970 (PL 91- 611) authorizes a study of modifications to an existing project. Funding to conduct a reevaluation was provided through the DRSAA 2022, Public Law 117-43. A Feasibility Cost Sharing Agreement was executed on 18 October 2022 with the NJDEP as the NFS, using DRSAA funding at 100% Federal expense.

1.8 Study Area

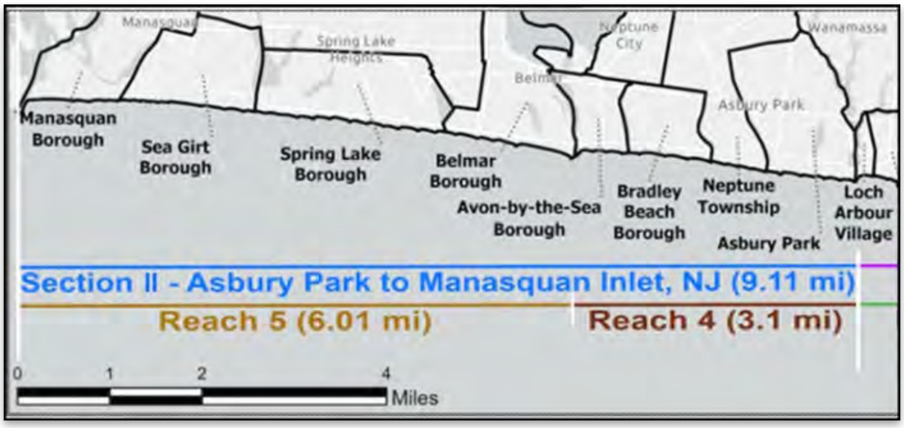

Figure 1: Study Area, Sea Bright to Manasquan, NJ

The GRR Study Area consists of the full length of Section II, the nine miles from the northern extent of Asbury Park to the Manasquan Inlet in Monmouth County, NJ. The Study Area includes several coastal lakes and tidally influenced back bays in the southern-most reaches. In alignment with the current authorized project, Section II is further divided into two reaches. Reach 4 spans approximately three miles from the northern extent of Asbury Park to the Shark River Inlet (southernmost extent of Avon-by-the Sea Borough); Reach 5 spans approximately six miles from the Shark River Inlet (northernmost extent of Belmar Borough) to the southern end of Manasquan Borough. The Study Area is the existing authorized project in Section II along with the immediately surrounding areas.

1.9 National Environmental Policy Act Coordination

The National Environmental Policy Act of 1969 (NEPA), CEQ's Guidance Regarding NEPA Regulations, USACE Procedures for Implementing NEPA (Department of Defense National Environmental Policy Act Implementing Procedures), and the Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (85 FR 43304) were applied to this study. An EA, which is a concise public document prepared by a federal agency to determine whether the proposed action has the potential to cause significant environmental effects (40 Code of Federal Regulations 1508.9(a), was prepared to:

- provide evidence and analysis sufficient to determine whether an Environmental Impact Statement (EIS) is required;
- aid the 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 EA discusses:

- the need for the proposed action;

- the proposed action and reasonable alternatives;
- the probable environmental impacts of the proposed action and reasonable alternatives; and,
- the agencies and persons consulted during preparation of the EA.

The EA is integrated within this GRR consistent with NEPA statutory requirements. The report reflects an integrated planning process, which avoids, minimizes, and mitigates adverse project effects associated with improvements to the existing CSRM project. Other federal agencies cooperated and participated in the preparation of this integrated report. The National Marine Fisheries Service (NMFS), the U.S. Environmental Protection Agency (EPA), the Bureau of Ocean Energy Management (BOEM) and the U.S. Fish and Wildlife Service (USFWS) were cooperating agencies, and the U.S. National Park Service (NPS) was invited as a participating agency, but USACE received no response.

NEPA interagency meetings were held on January 17, 2023. Virtual public information sessions were also held on August 22 and November 20, 2023 respectively.

Chapter 2: Existing and Future Conditions

2.1 Period of Analysis

While the existing project is performing as designed and adequately manages the risk of erosion, the resulting damages and inundation from Hurricane Sandy demonstrated the need for further evaluation of coastal storm risk within the Study Area. Uncertainty in future relative sea level change (RSLC) was considered when estimating the full range of coastal storm risk and projected economic benefits. The period of analysis is the length of time which alternative plans' benefits, costs, and impacts should be considered. To determine the period of analysis, the study team considered the time needed to further design the plan, obtain construction prerequisites, and the estimated construction duration itself. Alternative plans were evaluated within a 50-year period of analysis, which begins when project construction is anticipated to be complete and project benefits are realized; 2030-2080. Note that while the period of analysis is 50 years, any proposed action will be implemented and maintained for the remainder of the existing project authorization, through 2049. Further, although the potential benefits are anticipated to be realized upon final renourishment in 2049, the proposed action may produce benefits beyond the end of existing project authorization. Additional analyses will be performed during optimization to determine whether updates to the period of analysis are required.

2.2 Existing Conditions

2.2.1 Reach 4: Asbury Park to Avon by the Sea, NJ

Reach 4 is 3.09 miles long and consists of Asbury Park, Neptune Township, Bradley Beach Borough, and Avon by the Sea Borough. There are five outfalls and six groin notches located throughout Reach 4. Additionally, a series of boardwalks, promenades, and other walkways are located east of Ocean Avenue and adjacent to the landward extent of the beaches throughout Reach 4. Four coastal lakes are in this reach – Wesley Lake, Fletcher Lake, Sylvan Lake and Deal Lake. Two groin notches each are located in Avon-by-the-Sea Borough, Bradley Beach Borough, and Asbury Park.

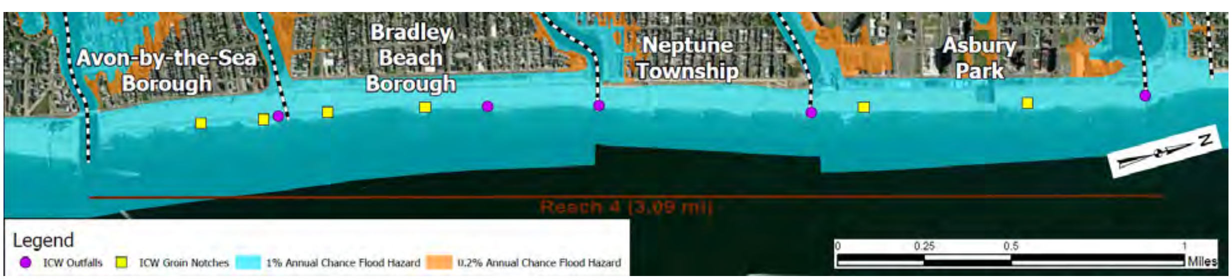

Figure 2: Study Area Map of Section II - Reach 4: Avon-by-the-Sea Borough, Bradley Beach Borough, Neptune Township, and Asbury Park

Asbury Park: A wide beach exists for the entire one mile of coast from the southern border with Ocean Grove and the northern border with Loch Arbour (Deal Lake outfall). Asbury Park is an urbanized mix of residential and commercial properties, both east and west of Ocean Ave. A boardwalk is located directly east of Ocean Ave., approximately 3-feet above grade. Two large pavilions are located east of the boardwalk within the city. Scarping is occurring in the Asbury Park area and the shoreline is hardened. Significant sediment transport is occurring in this area. Along the beach located east of Deal Lake is the Asbury Park Dog Beach. Within this particular section of beach there are sand fences and vegetation. This area is unique because herring spawning occurs between April and May.

In Asbury Park, the Deal Lake outfall extends to Elberon Avenue and is located under the groin. Deal Lake is a man-made, storm water drainage, coastal lake. It flooded the area in 2005 from a major 100-year rainstorm event. The lake levels are managed by the Deal Lake Commission, represented by the seven municipalities surrounding the lake. The outfall from Deal Lake includes a sluice gate and empties into the Atlantic Ocean.

Ocean Grove (Neptune Township): The approximate 0.5-mile coast of Ocean Grove has a wide beach for the entire length from its southern border with Bradley Beach and its northern border with Asbury Park. The southern and central sections of the coast along Ocean Avenue consists of residential properties and a boardwalk adjacent to the landward extend of the berm. Intermittent vegetated dunes are located east of the boardwalk along the landward extent of the berm throughout Ocean Grove. There are eight beach access points that result in separability of the dune system.

Bradley Beach Borough: A wide beach exists for the approximate 0.9-mile coast of Bradley Beach from the southern border with Avon-by-the-Sea borough and the northern border with Ocean Grove. The entire length of Ocean Avenue is uniform, with residential properties located along the western extent of the street. Both sides of Ocean Avenue contain vehicle parking. Along the eastern extent of Ocean Avenue is a boardwalk with various recreational use facilities, including a playground and miniature golf facility. The landward extent of the beach berm contains intermittent vegetated dunes near Sylvan Lake. Amidst the dune system are eleven public beach access points that result in separability of the dune system.

Avon-by-the Sea Borough: The 0.5-mile coast of Avon has a wide beach, aside from erosion impacts along the beach north of the Shark River Inlet north jetty. There are no dunes within Avon-by-the-Sea Borough. The entire length of Ocean Avenue is uniform, largely consisting of residential properties and limited commercial properties and municipal buildings along the western extent of Ocean Avenue. Located along the eastern extent of Ocean Avenue is a boardwalk, including various recreational use facilities, and a restaurant located at the northern extent of the boardwalk. Vehicle parking is located adjacent to the boardwalk along Ocean Avenue.

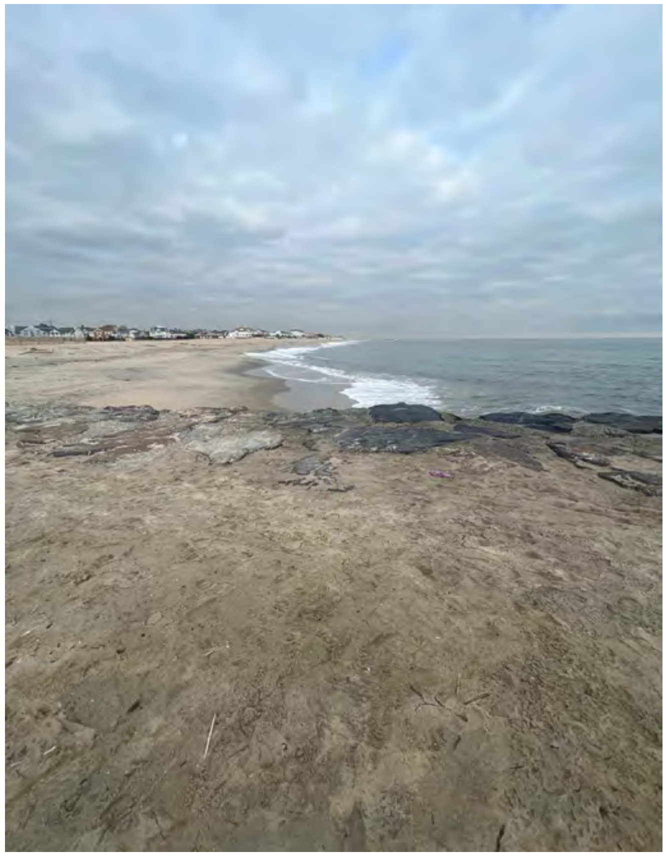

Figure 3: View from Asbury Park Dog Beach, Asbury Park, NJ

2.2.2 Reach 5: Belmar to Manasquan, NJ

Reach 5: Belmar to Manasquan, is 6.05 miles long and consists of Belmar Borough, Spring Lake Borough, Sea Girt Borough, and Manasquan Borough. The reach has eleven outfalls within the four townships and a total of 10 groin notches. Reach 5 contains a series of boardwalks, promenades, and walkways at varying elevations along the landward extents of the beaches. Four coastal lakes are in this reach – Silver Lake, Lake Como, Spring Lake, and Wreck Pond.

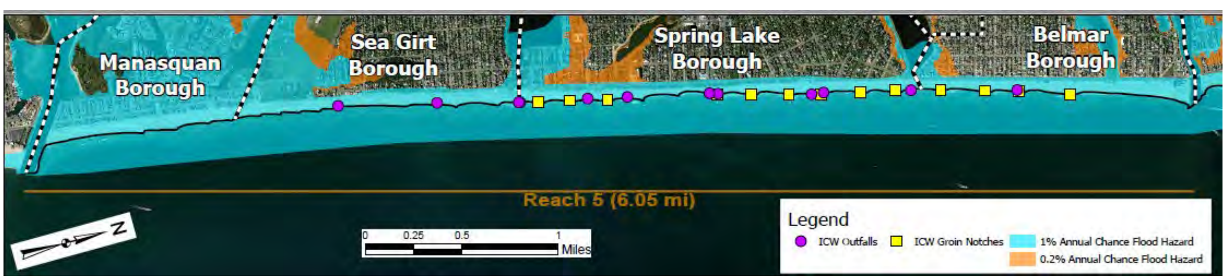

Figure 4: Study Area Map of Section II - Reach 5 Manasquan Borough, Sea Girt Borough, Spring Lake Borough, and Belmar Borough

Belmar Borough: A wide beach exists for the entire approximate 1.5 miles of coast from the southern border with Spring Lake (Lake Como outfall) and the northern border at the Shark River

Inlet south jetty. Belmar Borough contains a mix of residential and commercial properties, situated west of Ocean Ave. A boardwalk is located directly east of Ocean Avenue, approximately 3-feet above grade. A pavilion and several municipal structures (public bathrooms, beach offices, etc.) are located east of the boardwalk. The Belmar Fishing Club and pier is located one block south of Shark River Inlet. A portion of partially vegetated berm is located between the Belmar fishing pier at 1st Avenue and the Shark River Inlet south jetty.

Spring Lake Borough: A wide beach exists for the entire approximate 2 miles of coast from the southern border with Sea Girt (Wreck Pond outfall) and the northern border with the Belmar (Lake Como outfall). The entire length of Ocean Avenue is uniform, with residential properties situated along the western extent of Ocean Avenue. Along most of the beach in Spring Lake Borough are vegetated dunes and a boardwalk located east of Ocean Avenue nearby the landward extent of the berm. There are no dunes between the Spring Lake North End Pavilion near Tutle Ave. and the northern end of the Spring Lake boardwalk. A wall, approximately 550 ft. in length, is located on the northern end of Spring Lake Borough, situated east of Lake Como between North Boulevard and South Boulevard.

Sea Girt Borough: A wide beach exists for the entire approximate 1.4 miles of coast from the southern border with Manasquan Borough and the northern border with Spring Lake, at the Wreck Pond outfall. The southern extent of Sea Girt Borough consists of the National Guard Training Center (NGTC). The NGTC has intermittent dunes and walls situated along the western extent of the adjacent beach. The majority of Sea Girt Borough consists of residential properties. There are a series of locally built and locally maintained dunes located east of the Sea Girt boardwalk. Intermittent dunes are located from the southern extent of beach near Neptune Place extending to the northern extent near the Wreck Pond outfall. There are 10 beach access points that result in separability of the dune system.

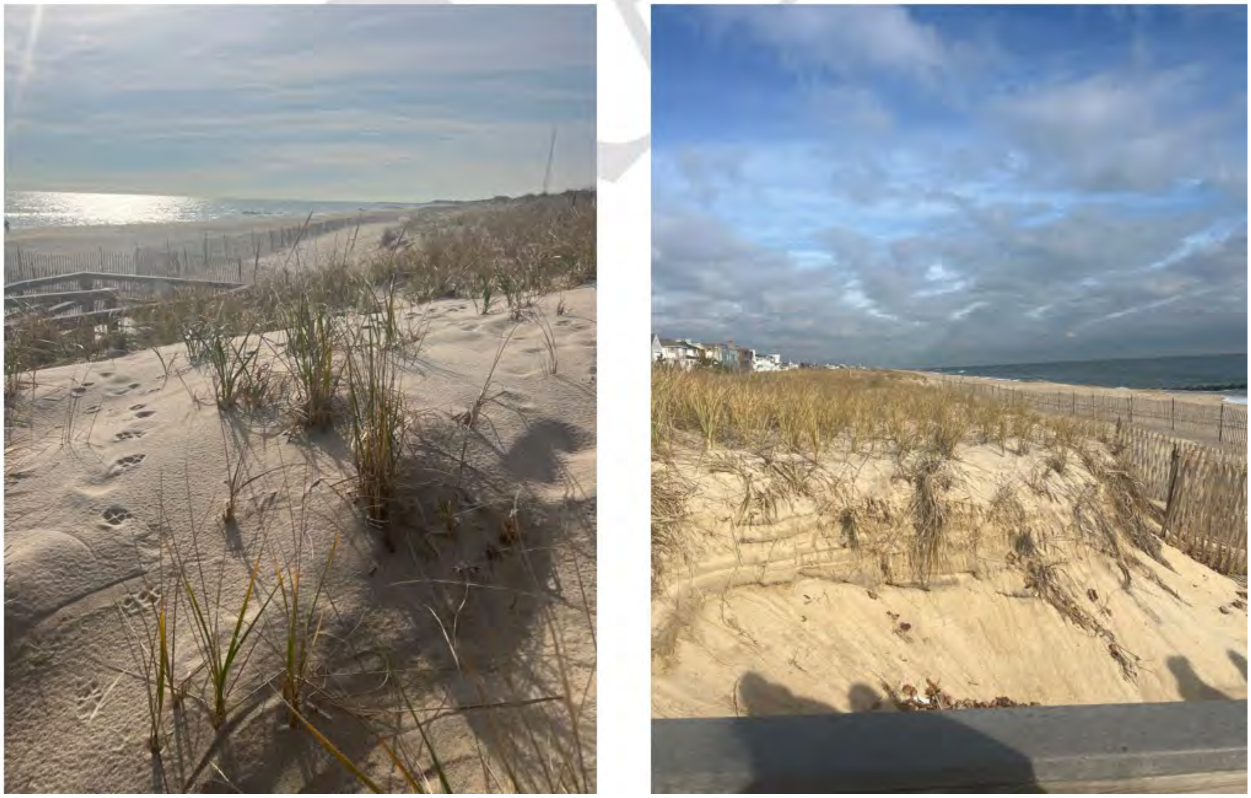

Figure 5: Photos taken at 1 Seaside Place near Sea Girt Beach in the Sea Girt Borough, NJ

Manasquan Borough: A wide beach exists for the entire 1-mile of coast from Manasquan Inlet to the northern border with Sea Girt near the National Guard Training Center. Residential properties are located along the entire one-mile reach, with a 15-ft wide walking path situated east of the residential properties and west of the beach. There are no dunes located within Manasquan Borough. Near the north end of Manasquan Borough are intermittent, vegetated berms, located directly adjacent to approximately 10-15 residential properties. Historically, Manasquan borough has been subjected to damages from back bay flooding.

Figure 6: Photos taken on 1st Avenue and Riverside in Manasquan Borough in November 2022

2.2.3 Existing Hydrology, Hydraulics, and Coastal Flood Risk

Existing conditions for Section II of Sea Bright to Manasquan were analyzed and documented prior to developing CSRM alternatives.

Astronomical Tides

Daily tidal fluctuations at the project site are semi-diurnal, with two highs and two lows per 24-hour day. The nearest long-term tidal gauge to the project site is at Sandy Hook, NJ. The tidal datum relationship at Sandy Hook, NJ is reported in Table 1. Conversion from NAVD88 to National Geodetic Datum of 1929 (NGVD29) at the National Oceanic and Atmosphere Administration (NOAA) tidal gauge (8531680) at Sandy Hook, NJ was computed using NOAA's VDATUM 4.7.1.

Table 1: Reported Datums at NOAA's Sandy Hook NJ Water Level Gauge

Datum	Value	Description
MHHW	2.41	Mean Higher High Water
MHW	2.08	Mean High Water
NAVD88	0.00	North American Vertical Datum 1988
NGVD29	1.08	National Geodetic Vertical Datum of 1929
MSL	0.24	Mean Sea Level

MLW	-2.62	Mean Low Water
MLLW	-2.82	Mean Lower Low Water

*All datums are reported for the 1983-2001 epoch

Storm Tides

Storm tide is the total observed water level during a storm due to the combination of storm surge and astronomical tide. Storm surge is defined as a rise above normal water level on the open coast due to the action of wind stress on the water surface and the decrease in atmospheric pressure during major storms. Water levels rise at the shoreline when the motion of wind driven waters is arrested by the coastal landmass. On the oceanfront, waves contribute to the total water surface elevation (WSE). Wave setup, the increase in WSE due to the presence of breaking waves, and wave runup, the increase of WSE due to the uprush of water upland after a wave breaks, add additional elevation to storm tide as shown in Figure 7.

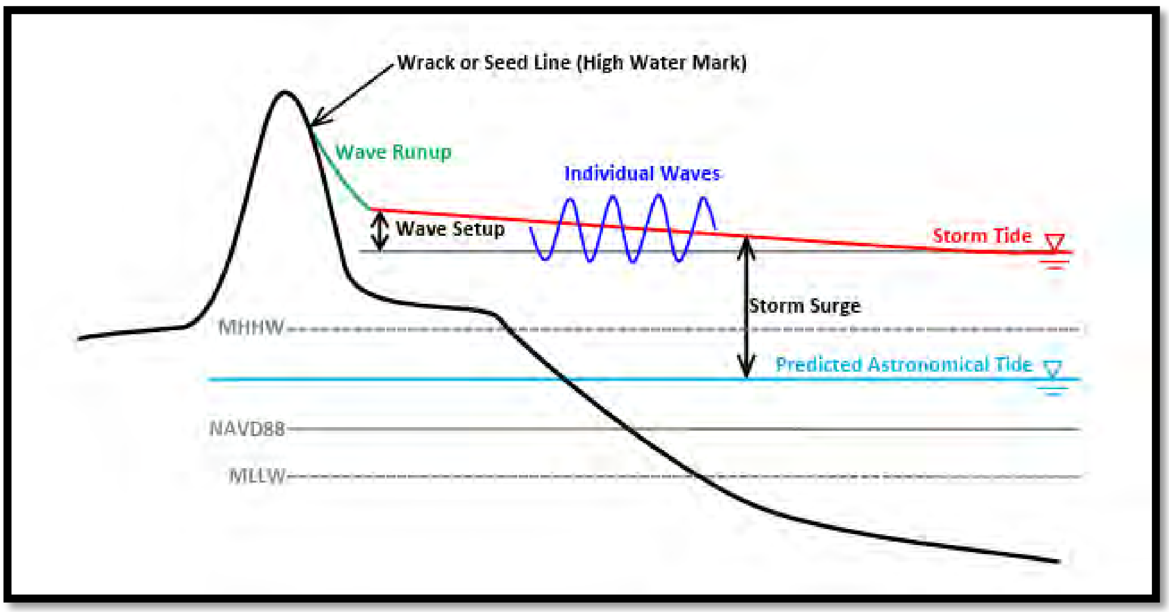

Figure 7: Total WSE including storm surge, wave setup, and wave runup

The NJ coastline is subject to two types of storms, extratropical and tropical storms, that develop significant storm tides. Extratropical storms can occur year-round; however, they typically form during the cooler months from October to March. These storms form when two air masses of differing temperature meet and create a “front”. Tropical storms typically occur during the warmer months from July to October and form when an area of low-pressure travels across warm tropical waters. The top ten water level events measured at NOAA’s Sandy Hook, NJ gauge (8531680) with event name and event category are listed in Table 2.

Table 2: Top ten water level events at Sandy Hook, NJ (8531680). WSE measured in feet above NAVD88

Rank	Date	Elevation (NAVD88)	Event Category	Event Name	Source
1	10/29/2012	10.42 ft	Tropical	Hurricane Sandy	Last Recorded Water Level
2	9/12/1960	7.27 ft	Tropical	Hurricane Donna	Inferred Water Level
3	12/11/1992	7.26 ft	Extra Tropical	Great Nor easter	Inferred Water Level
4	8/28/2011	6.93 ft	Tropical	Hurricane Irene	Observed Peak Water Level
5	11/7/1953	6.87 ft	Extra Tropical	Nor easter	Inferred Water Level
6	9/15/1944	6.49 ft	Tropical	1944 Great Atlantic Hurricane	Observed Peak Water Level
7	3/7/1962	6.47 ft	Extra Tropical	Ash Wednesday Storm	Observed Peak Water Level
8	3/13/2010	6.28 ft	Extra Tropical	Nor easter	Observed Peak Water Level
9	11/25/1950	6.17 ft	Extra Tropical	Storm of 1950	Inferred Water Level
10	10/27/2018	5.95 ft	Extra Tropical	October Nor'easter	Observed Peak Water Level

Storm tide frequency of occurrence is commonly defined by annual exceedance probability (AEP), the probability that a WSE of equal or greater magnitude will occur in a given year. Several sources of storm tide frequency of occurrence relationships (i.e. stage frequency curves) exist for the study area. The North Atlantic Coast Comprehensive Study (NACCS) developed a probabilistic storm suite and calculated the probability of occurrence of water levels at various save points in the North Atlantic. NOAA publishes water level exceedance probabilities based on the historic record at water level gauges.

Table 3 outlines the AEPs and associated WSE published for the study area. Data from the 1994 General Design Memorandum was interpolated from Figure A3 and converted from NGVD29 to NAVD88 using NOAA's VDatum tool. Data from the NACCS and NOAA Sandy Hook, NJ gauge were converted from mean sea level (MSL) to NAVD88 using the conversions provided by each respective data source.

Table 3: AEPs and Associated WSE (measured in feet above NAVD88)

AEP	NACCS (2015) Save Point 3748	NOAA Sandy Hook, NJ	1994 General Design Memorandum
99%	4.46 ft	4.06 ft	N/A
50%	5.25 ft	4.96 ft	4.62 ft
10%	7.00 ft	6.26 ft	5.72 ft
1%	9.76 ft	8.96 ft	8.92 ft

Sea Level Change

Sea level change (SLC) is defined as the change in the average water level of the ocean. Eustatic or global SLC (GSLC) is the change in the global average of sea level due to a change in total ocean water volume due to thermal expansion and melt water from glaciers and ice sheets. RSLC or local SLC is the change in sea level at a specific location due to the combination of GSLC and local factors including vertical land movement, subsidence, and ocean currents.

Global sea level has increased at an average rate of 2.3 mm/yr over the period 1971–2018 increasing to an average of 3.7 mm/yr over the period 2006–2018 (Fox-Kemper et al. 2021). Zervas et al. (2013) analyzed long-term NOAA water level gauges to estimate vertical land movement contributions. Based on data analyses of the NOAA Sandy Hook, NJ gauge (8531680), it was determined that relative sea level rose by 3.9 mm/yr from 1932 to 2006 with 2.27 mm/yr attributed to vertical land movement. The NOAA Sandy Hook, NJ gauge (8531680) was further analyzed for RSLC trend at the time of report documentation. On average, relative sea level has increased by 4.28 mm/yr from 1932 to 2024, equivalent to a 1.40 ft increase in sea level over a 100-year period. Figure 8 plots the monthly variation in MSL recorded by the NOAA Sandy Hook, NJ gauge (8531680).

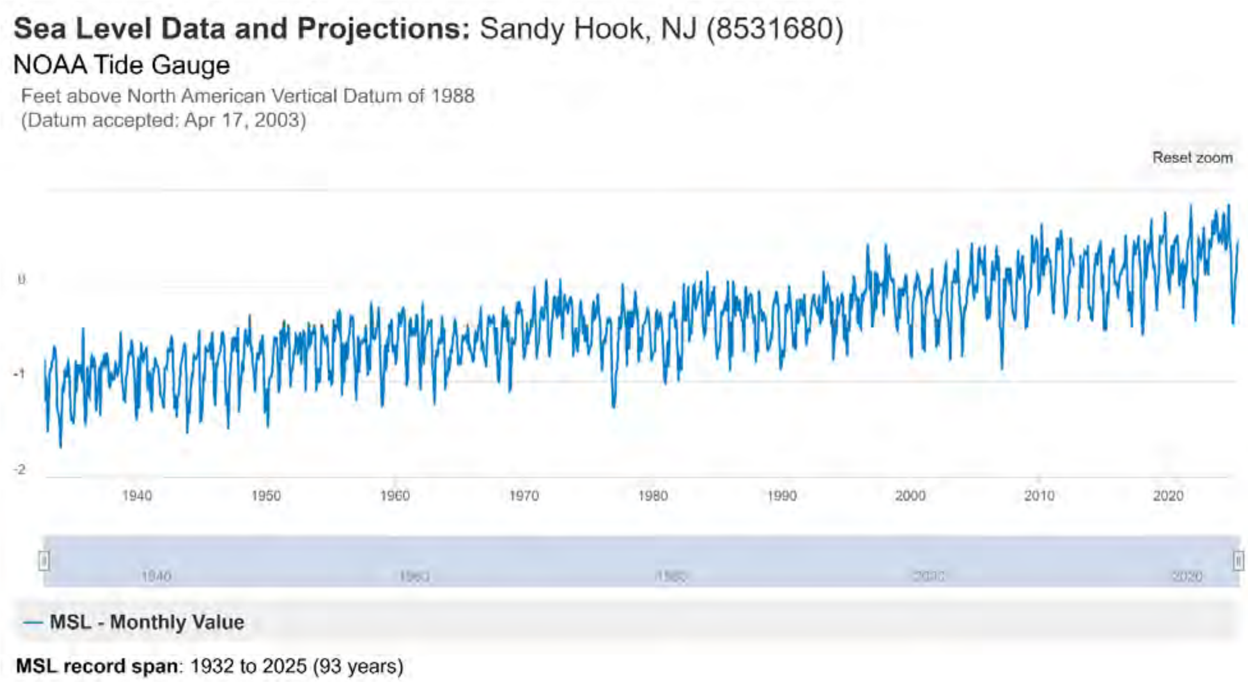

Figure 8: Monthly variation in MSL from 1932 to 2025

Current USACE guidance, ER 1100-2-8162, states that planning studies and engineering designs will consider alternatives that are formulated and evaluated for a range of possible SLC rates, including the low, intermediate, and high rates developed and published by USACE. The relative sea level rates consider a low rate based on an extrapolation of the historic rate, and intermediate and high rates which include future acceleration of the eustatic sea level rise rate. Figure 9 depicts and Table 4 reports the USACE 2019 low, intermediate, and high RSLC projections derived from data recorded at Sandy Hook, NJ. Values are shown in feet above the NAVD88 datum (1983 – 2001 epoch).

Assuming an initial construction date of 2031, it is expected that there will be 0.71 ft, 1.26 ft, and 3.04 ft of RSLC over the economic period of analysis, 2030 to 2080, for the low, intermediate, and high scenarios respectively. Over the planning horizon, 2030 to 2130, it is anticipated that there will be 1.41 ft, 2.97 ft, and 7.93 ft of RSLC for the low, intermediate, and high scenarios, respectively.

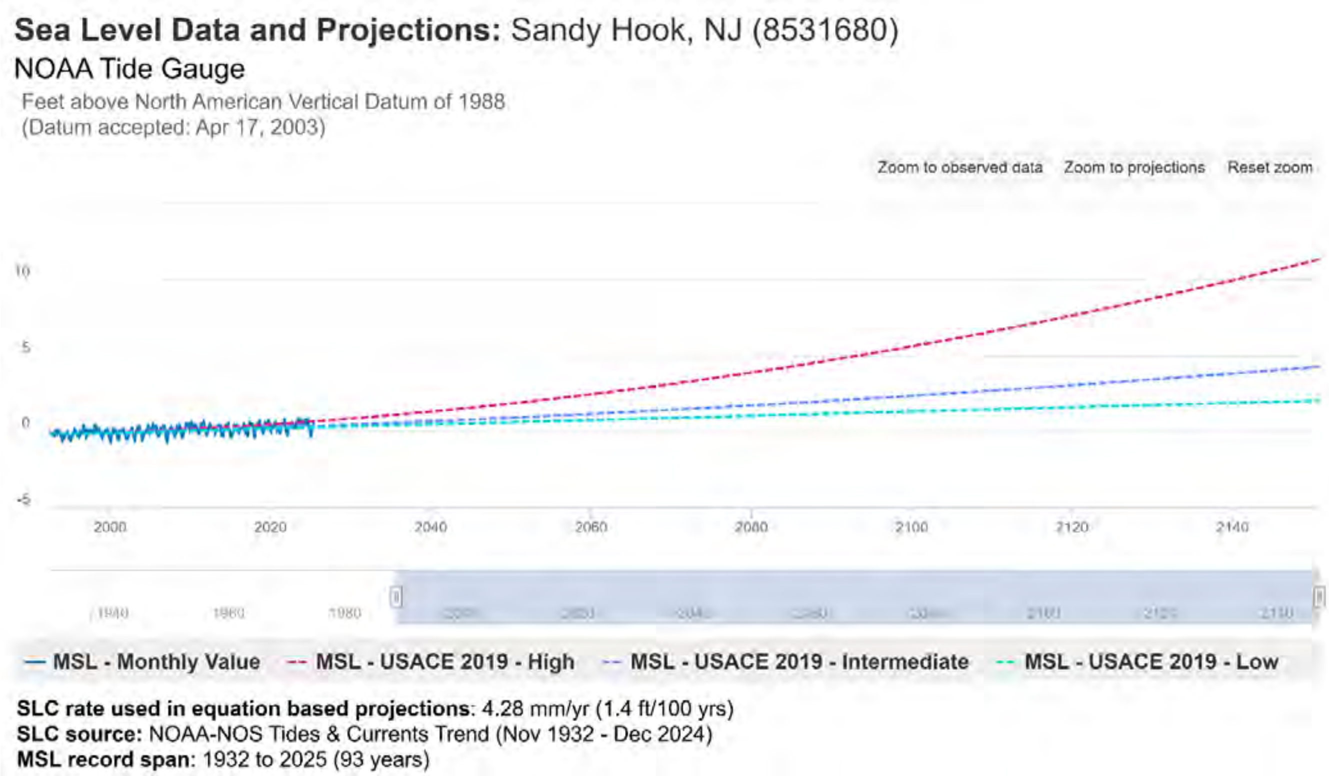

Figure 9: USACE 2019 SLC projections for the low, intermediate, and high scenarios. Values are measured in feet above NAVD88 (1983 - 2001 epoch)

Table 4: USACE 2019 RSLC projections for the low, intermediate, and high scenarios. Values are measured in feet above NAVD88 (1983 - 2001 epoch)

Year	Low	Intermediate	High
1992	-0.24 ft	-0.24 ft	-0.24 ft
2000	-0.13 ft	-0.12 ft	-0.1 ft
2010	0.01 ft	0.04 ft	0.13 ft
2020	0.15 ft	0.22 ft	0.44 ft
2030	0.29 ft	0.42 ft	0.83 ft
2040	0.43 ft	0.64 ft	1.29 ft
2050	0.57 ft	0.87 ft	1.82 ft
2060	0.71 ft	1.13 ft	2.43 ft
2070	0.86 ft	1.4 ft	3.11 ft

Year	Low	Intermediate	High
2080	1 ft	1.68 ft	3.87 ft
2090	1.14 ft	1.99 ft	4.7 ft
2100	1.28 ft	2.31 ft	5.6 ft
2110	1.42 ft	2.65 ft	6.58 ft
2120	1.56 ft	3.01 ft	7.63 ft
2130	1.7 ft	3.39 ft	8.76 ft
2140	1.84 ft	3.79 ft	9.96 ft
2150	1.98 ft	4.2 ft	11.23 ft

Waves

NOAA's National Data Buoy Center (NDBC) operates and maintains a collection of offshore buoys which measure wave heights. Station (44025) is positioned off the coast of the Study Area and contains a record of wave observations from 1991 to present day, 2025. Figure 10 highlights the offshore location of Station 44025.

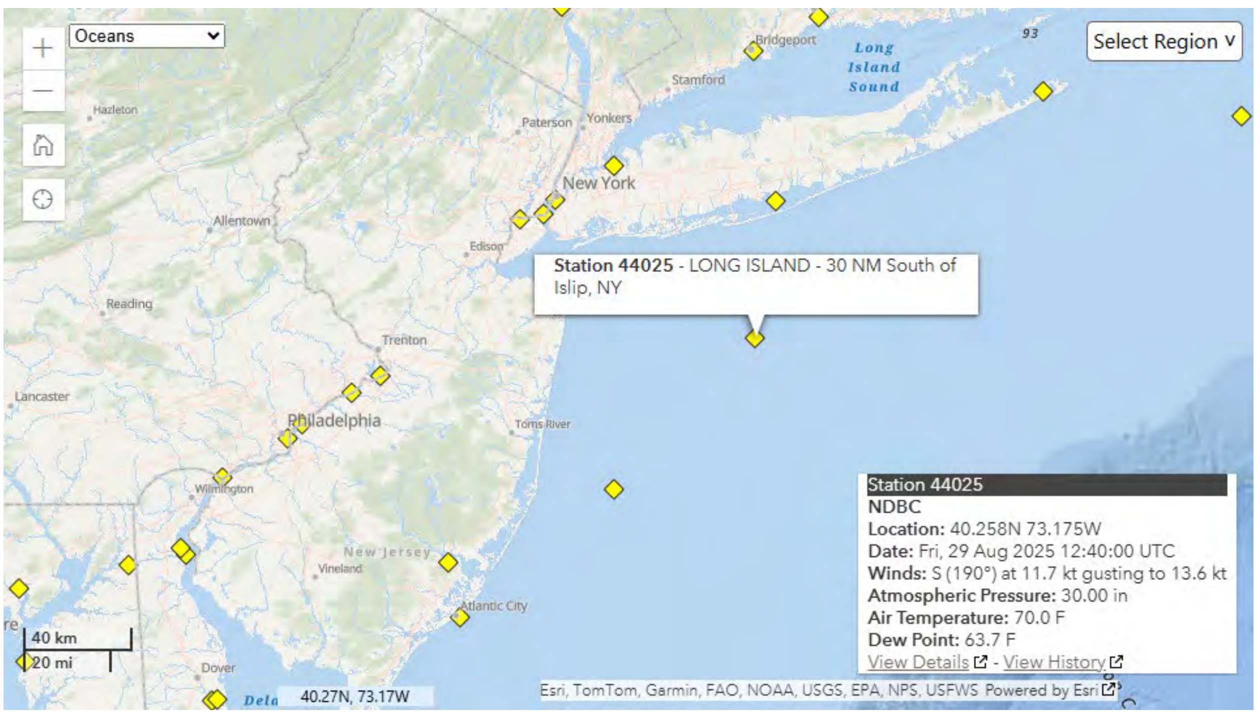

Figure 10: NDBC Station 44025

Figure 11 plots wave data observed at Station (44025) in a wave rose. The prevailing wave direction is from the southeast driving sediment transport to the north in the Study Area. Limited wave energy is generated from the north due to the sheltering effect of Long Island. The average wave height is approximately 4.1 ft, and the maximum wave height observed was 31.6 ft in October 2012 during Hurricane Sandy. Approximately 50% of wave observations were between 1.6 ft and 4.9 ft and approximately 1% of observations were greater than 11.5 ft.

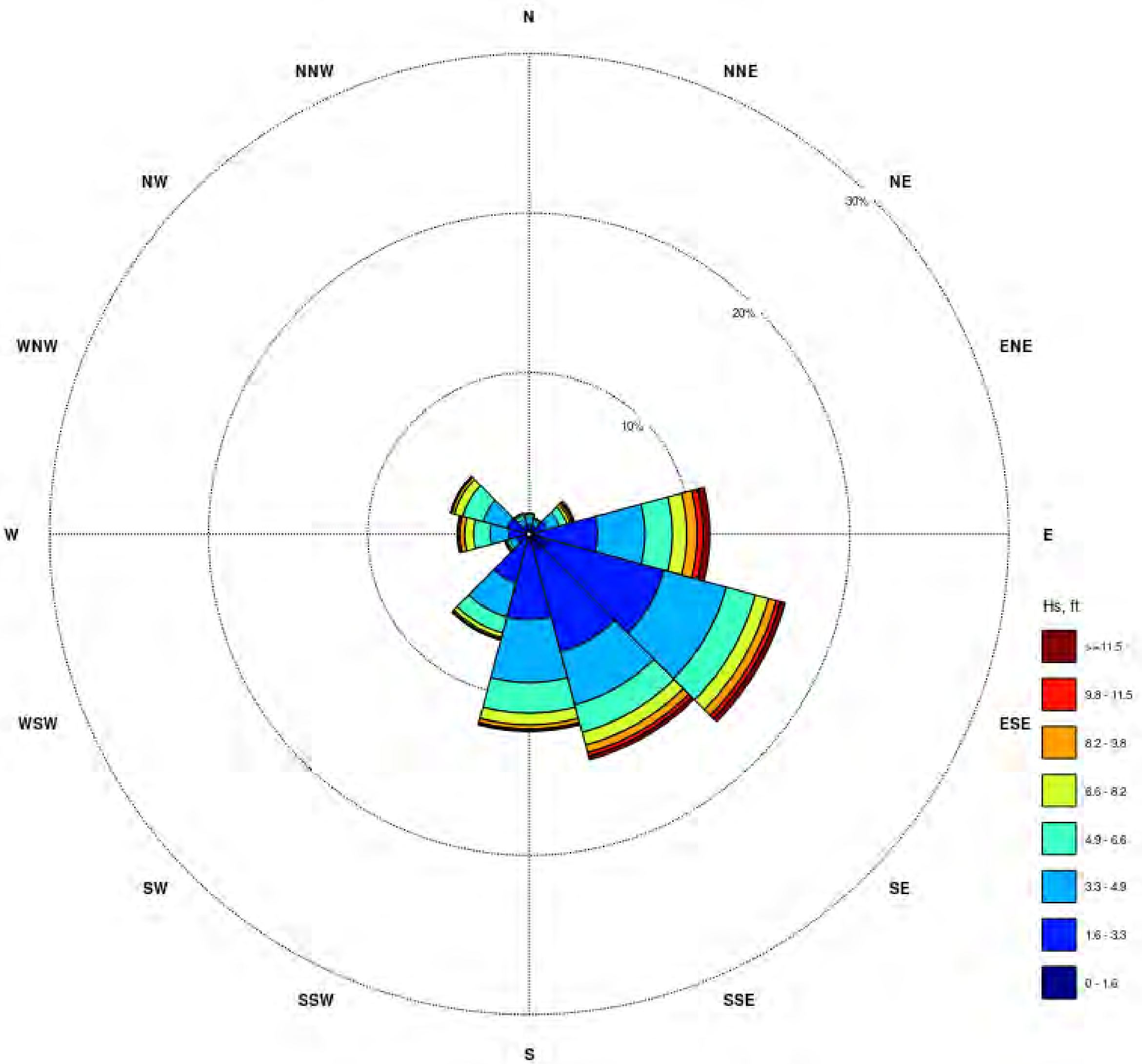

Figure 11: Distribution of waves measured at NDBC 44025 from 1991 to 2024

2.2.4 Authorized Project Renourishment History

The Sea Bright to Manasquan Study Area has a long history of beachfill operations associated with the authorized project. The authorized renourishment cycle is six-years; however, Section II historically has been nourished less frequently. From 1997 to 2025 a total of approximately 9.5 million CY of sand have been placed along Section II of the Sea Bright to Manasquan project area. A tabulation of the historical beach fill volumes by reach and years is shown in Table 5 . Historical beachfill operations in Table 5 account for CSRM placement of fill sourced from an offshore borrow area. A detailed account of inlet maintenance dredging is provided in Appendix B.

Table 5: Renourishment history for Section II

Contract	Dates	Quantity of Fill (CY)	Length of Fill (CY)	Average Fill Density (CY / FT)
Asbury Park to Manasquan South Reach Initial Fill Belmar to Manasquan	June 1997 – October 1997	4,100,000	31,320	131
Asbury Park to Manasquan North Reach Initial Fill Belmar to Asbury Park to Avon-by-the-Sea	July 1999 – June 2000	3,100,000	16,330	190
Hurricane Sandy FCCE Contract 3A Belmar to Manasquan	August 2013 – April 2014	1,290,909	23,985	54
Hurricane Sandy FCCE Contract 3B Asbury Park to Avon-by-the-Sea	October 2013 – April 2014	878,061	15,632	56
Renourishment Contract #7 – Elberon (base bid), North Elberon, Sea Girt and Monmouth Beach (Options)*	January 2024	440,670	5,500	12
*Fill information listed for Elberon only				

2.3 Future Without-Project Conditions

Developing an expectation of future conditions is a critical aspect of water resource planning. Further, the development of a future scenario in which no action is undertaken (i.e., the future without-project condition; FWOP) establishes a clear performance baseline, against which potential with-project conditions can be compared for each alternative under consideration.

The FWOP condition assumes that nourishment of the existing project continues as authorized with a six-year nourishment interval and the final renourishment occurring in 2049. During the period of analysis, nourishments are expected to occur in 2031, 2037, 2043, and 2049.

The study team selected a 50-year period of analysis for this study, from 2030 to 2080, over which we evaluate the FWOP baseline.

Section 2.3.1 details the hydrologic, hydraulic, and coastal aspects of the FWOP condition, specifically the flood risk (i.e., extent and depth of flooding associated with events of varying return periods) in the Study Area over the entirety of the planning horizon. This flood risk information directly informed the screening of measures and development of alternatives.

Informed by flood risk data (presented in Section 2.2), Section 2.3.2 details the economic aspects of the FWOP condition, describing the economic modeling used to evaluate the baseline expectations of annualized flood damage in the Study Area given expected future performance of the existing project.

Section 2.3.3 details environmental aspects of the FWOP condition, establishing a baseline against which environmental effects of action alternatives can be evaluated.

2.3.1 Hydrology, Hydraulics, and Coastal Modeling

Under the FWOP condition, the Study Area will continue to be subject to storm surge and coastal flood risk. Anticipated SLC will also increase costal flood risk in the Study Area over time, as storm surges will rise proportionally with sea level. In alignment with prevailing USACE guidance, Figure 12 provides a bounded range of potential SLC scenarios over the 50-year period of analysis (2030 – 2080) and the 100-year planning horizon (2030 – 2130) at the NOAA Sandy Hook, NJ tide gage (8531680), located less than 8 miles from Sea Bright, NJ as calculated using procedures specified in ER 1100-2-8162 (USACE, 2019). Table 6 demonstrates that within the 50 years between 2030 and 2080, the USACE intermediate scenario predicts a 1.2 ft increase, whereas the USACE low and high scenarios, which serve to bound expectations of SLC, predict a 0.6 ft and 3.0 ft increase respectively. Consequently, while the 1% AEP coastal flood event may be associated with a WSE of approximately + 10.1 ft NAVD88 in 2030, under the USACE intermediate scenario, a coastal flood with the same return interval (i.e., equivalent AEP) would yield a WSE of approximately +11.6 ft NAVD88 in 2080 as shown in Table 7 .

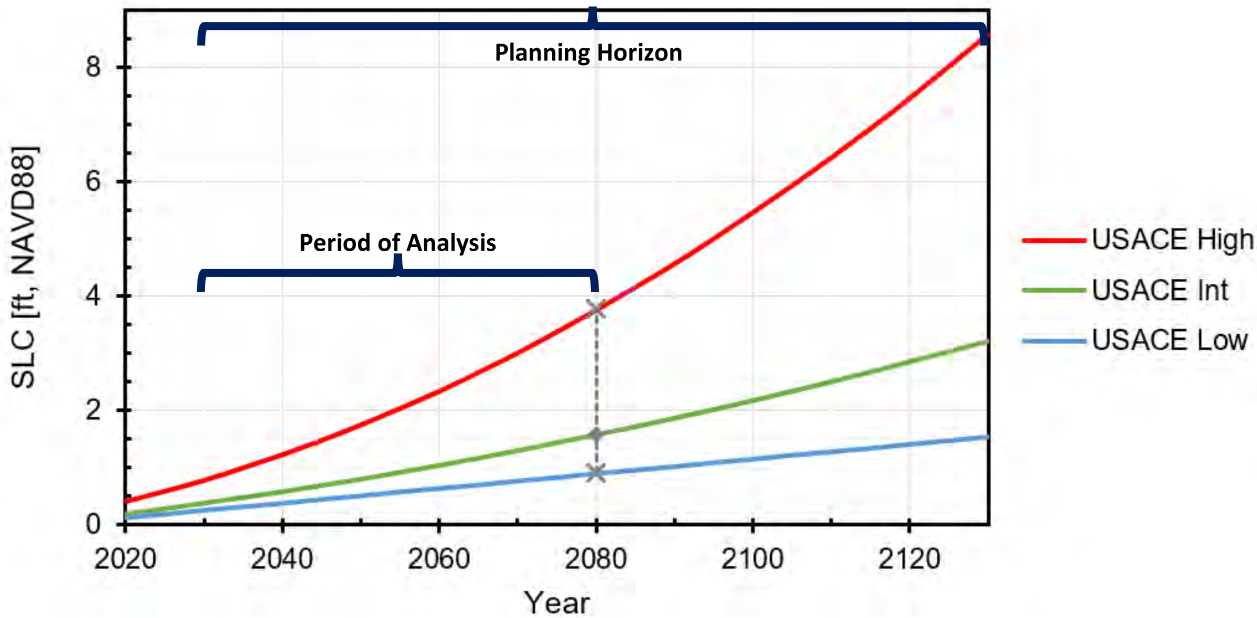

Figure 12: SLC over time at Sandy Point, NJ (NOAA Station ID 8531680) for the USACE Low, Intermediate, and High scenarios, expressed relative to NAVD88. Note MSL is -0.24 ft NAVD88 for the 1983-2001 National Tidal Datum Epoch.

Table 6: Summary of RSLC under the USACE Low, Intermediate, and High scenarios

Year	USACE Low	USACE Int	USACE High
2030	0.00	0.00	0.00
2040	0.12	0.20	0.45
2050	0.25	0.42	0.97
2060	0.38	0.66	1.56
2070	0.51	0.92	2.23
2080	**0.64**	**1.20**	**2.98**
2090	0.76	1.49	3.79
2100	0.89	1.80	4.69
2110	1.02	2.13	5.65
2120	1.15	2.48	4.69
2130	1.28	2.84	7.81

Table 7: NACCS Extreme Sea Levels (save point ID = 03558) for the study area, adjusted for projected sea levels in 2031 and 2080 under the USACE Intermediate SLC scenario

AEP	Annual Recurrence Interval	WSE [ft, NAVD88] 2030	2080
100%	1-year	5.0 ft	6.4
50%	2-year	5.7 ft	7.2
20%	5-year	6.7 ft	8.1
10%	10-year	7.4 ft	8.9
5%	20-year	8.1 ft	9.6
2%	50-year	9.1 ft	10.6
1%	**100-year**	**10.1 ft**	**11.5**
0.5%	200-year	11.4 ft	12.8
0.2%	500-year	13.1 ft	14.5

2.3.2 Economics

The economic analysis for this study was performed in accordance with ER 1105-2-100. Monetary values were calculated in October 2024, Fiscal Year (FY) 2025 price levels. Additionally, the FY 2025 federal discount rate of 3.0% was applied to the cost and benefits calculations while accounting for an economic period of analysis of 50 years. A structure inventory analysis was performed in accordance with EM 1110-2-1619.

Damages are sensitive to RSLC conditions, and it is expected that structures will be damaged with greater frequency and severity in the future given that extreme sea levels are expected to increase over time in the study area. Given the high RSLC condition, increased damages are anticipated relative to the low and intermediate RSLC scenarios.

Across the study area, the modeled damages are primarily to residential structures, followed by commercial structures. The majority of structures within the structure inventory dataset are residential (approx. 87%), verifying the majority of modeled damages to residential structures. Commercial structures are the second largest damage category but only constitute approximately 6% of structures within the structure inventory dataset. This can be contributed to commercial structures being larger on average than other structure categories and having a higher depreciated replacement cost.

Under the intermediate RSLC condition, the without-project equivalent annual damage due to flood inundation of structures and motor vehicles in the Study Area is approximately $12,159,000.

A detailed analysis is presented in Appendix C: Economics and displays the damages on a reach basis, damage category and by damage category per reach.

2.3.3 Environment

The Study Area is predominantly an urban environment, with limited natural resources interspersed amongst the development. These remnant natural areas, which include the beach berm, would also be subject to RSLC. As sea level rise results in inundation of these natural resource areas under the FWOP condition, the natural resource areas can be expected to be scarcer than at present. Detailed assessments of potential impacts to all environmental resources in the FWOP scenario, including the natural (e.g., aquatic species), physical (e.g., water quality), and human environment (e.g., recreation), are presented in Chapter 6 of this report under the No Action Alternative discussion for each environmental topic.

2.3.4 Authorized Project Planed Renourishment

In the future without project condition, it is anticipated the existing authorized project would continue to be renourished at its authorized interval every six-years. The renourishment quantities were estimated using GENCADE and expected erosion rates.

Table 8: Planned Renourishment of Existing Authorized Project During Period of Analysis

	Quantities [CY]
Initial Fill (2031)	1,041,000
Renourishment Fill (2037)	2,299,000
Renourishment Fill (2043)	2,299,000
Renourishment Fill (2049)	2,299,000
Total Project Fill	7,938,000

Chapter 3: Existing Environmental Conditions

This chapter has been prepared in accordance with NEPA and the CEQ Regulations for implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations 1500-1508). This section summarizes the existing (baseline) conditions, to provide a sound basis for plan formulation as described in Chapter 4: Plan Formulation, and the impact analysis that is provided in Chapter 6: NEPA Environmental Effects Analysis. The existing conditions are used as the baseline to forecast the changes that would be expected without USACE action to address improvements to the existing project. The topics in this section are structured to mirror the topics presented in Chapter 6, where the future without-project and future with-project alternatives are evaluated and compared.

3.1 Socioeconomics

Socioeconomics is defined as the study of the interaction of social and economic factors. The FWOP condition is not anticipated to significantly alter the racial composition, income, age distribution or division of employment of the Study Area population. However, in the FWOP condition, erosion of the shoreline may negatively impact adjacent infrastructure including roadways and utilities, as well as property and residences. A summary of the demographics and socioeconomics is outlined in Table 9 . A detailed analysis is presented within Appendix C.

Table 9: Demographics and Socioeconomics Summary for Section II

Demographics & Socioeconomics Summary for Section II				
	Population	Population	Percent of Total Population in Section II	
	2020 Census	2010 Census	2020 Census	2010 Census
Under 5 Years	2,358	4,784	3.63%	7.12%
5 Years thru 19 Years	9,791	12,227	15.07%	18.19%
65 Years and Over	12,481	10,664	19.21%	15.87%
Black or African American	16,149	20,014	24.86%	29.78%
American Indian and Alaska Native	131	192	0.20%	0.29%
Asian	1,258	1,138	1.94%	1.69%
Native Hawaiian and Other Pacific Islander	15	16	0.02%	0.02%
Hispanic or Latino (of any race)	8,121	8,099	12.50%	12.05%
Individuals Below Poverty Level	7,740	N/A	11.92%	N/A
Disabled	4,537	N/A	6.98%	N/A
Total Population	64,955	67,203	N/A	N/A
Total Households	28,727	28,978	N/A	N/A

3.2 Geology and Soils

Geologically, the study 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 Quaternary deposits and are exposed directly to wave attack.

3.3 Water Resources and Water Quality

NJDEP has established classification systems for the best intended uses of surface waters in the study area (Surface Water Quality Standards, New Jersey Administrative Code 7:9B). These classifications are based on the extent to which these surface waters will attain the Clean Water Act goals of aquatic life support and swimmability, and the designated uses outlined by the state. Designated uses are generally based on a set of numeric and narrative water quality criteria. The swimmability goal means having all possible surface waters of sufficient quality to allow for primary-contact recreation. The aquatic life support goal means having all possible waters of sufficient quality to support healthy and reproducing aquatic biota.

The Atlantic Ocean is categorized as SC, which is the general surface water classification applied to saline coastal waters, and SE1 which further classifies a waterbody’s ability to support recreation, shellfish harvesting and warm water fish species.

Throughout the Study Area, there are numerous stormwater outfalls that discharge directly into the Atlantic Ocean. In rare cases, beach closures are implemented due to high levels of fecal coliform bacteria that the NJDEP monitors.

3.4 Floodplains

Through Executive Order 11988, federal agencies are required to evaluate all proposed actions within the 1% AEP (100-year) floodplain. Actions include any federal activity involving: 1) acquiring, managing, and disposing of federal land and facilities, 2) providing federally undertaken, financed, or assisted construction and improvements, and 3) conducting federal activities and programs affecting land use, including, but not limited to, water and related land resources planning, and licensing activities. In addition, the 0.2 % AEP (500-year) floodplain should be evaluated for critical actions or facilities, such as storage of hazardous materials or construction of a hospital. The Executive Order provides an eight-step process to evaluate activities in the floodplain that generally includes 1) determine if the proposed action is in the floodplain, 2) provide public review, 3) identify and evaluate practicable alternatives to locating in the one percent AEP floodplain, 4) identify the impacts of the proposed action, 5) minimize threats to life and property and to natural and beneficial floodplain values and restore and preserve natural and beneficial floodplain values, 6) reevaluate alternatives, 7) issue findings and a public explanation, and 8) implement the action. Proposed actions may have limited impacts such that the eight-step process may vary or be reduced in application, which is the case for this project.

3.5 Essential Fish Habitat

Essential fish habitat (EFH) is defined under the Magnuson-Stevens Fishery Conservation and

Management Act (Public Law 94-265), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Sustainable Fisheries Act requires that essential fish habitat be identified for those species actively managed under federal fishery management plans. This includes species managed by the eight regional Fishery Management Councils, established under the Magnuson-Stevens Fishery Conservation and Management Act, as well as those managed by NMFS under fishery management plans developed by the Secretary of Commerce.

EFH designations emphasize the importance of habitat protection to healthy fisheries and serve to protect and conserve the habitat of marine, estuarine, and anadromous finfish; mollusks; and crustaceans. Essential fish habitat embodies both the water column (including its physical, chemical, and biological growth properties) and its underlying substrate (including sediment, hard bottom, and other submerged structures). Under the EFH definition, necessary habitat is that which is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. EFH is designated for a species' complete life cycle, including spawning, feeding, and growth to maturity, and may be specific to each life stage (e.g., eggs, larvae).

A complete essential fish habitat assessment can be found in Appendix A4.

3.6 Wildlife

3.6.1 Intertidal and Nearshore Species

In cooperation with the National Oceanic and Atmosphere Administration-Fisheries (NOAA-Fisheries), the United States Fish and Wildlife Service (USFWS), NJDEP and EPA, 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 nearshore encompassed an area from Allenhurst to Manasquan, NJ 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).

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 saxitillis)*, summer flounder (*Paralicthys 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 structures (i.e.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*).

3.6.2 Intertidal and Nearshore Benthos

The intertidal and near shore littoral zone of the study 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 study 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 the fall season whereas medium sands dominate in the spring season. This pattern reflects the annual cycle of erosion and deposition associated with high energy sandy beaches (USACE ERDC 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 ERDC 2001).

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 (Ilynassa 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 nepthyid polychaetes made up an additional 21% and 14% of the collections respectively.

Biomass was dominated by mollusks and annelids. The proportion of total biomass represented by mollusks 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.

3.6.3 Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act and Executive Order 13186 requires agencies to protect and conserve migratory birds and their habitats. Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the USFWS.

Migratory birds nest throughout North America, some as far north as the Arctic. In late summer and fall, they migrate south for the winter. Some winter in the southern United States, Mexico, the Caribbean or Central America while others go as far as South America. Each spring they return north to their breeding grounds. Many migratory songbirds, shorebirds, and raptors rest and refuel in the area during their spring and fall migrations. Others winter south and return to the watershed each spring to breed. Table 10 shows a list of species that may be found in the study area obtained from the USFWS Information for Planning and Consultation (IPaC) site.

Migratory birds are defined as those described by the USFWS in the 50 Code of Federal Regulations 10.13 and consist of species that that belong to a family or group of species in the United States as well as Canada, Japan, Mexico, or Russia. Most birds, native (naturally occurring in the U.S.) to the U.S., belong to a protected family and are protected by the Migratory Bird Treaty Act. A species qualifies for protection under the Migratory Bird Treaty Act if it meets one or more of the following four criteria:

(1) It

(a) belongs to a family or group of species named in the Canadian convention of 1916, as amended in 1996;
(b) specimens, photographs, videotape recordings, or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and
(c) the documentation of such records has been recognized by the American Ornithologists Union or other competent scientific authorities.

(2) It

(a) belongs to a family of group of species named in the Mexican convention of 1936, as amended in 1972;
(b) specimens, photographs, videotape recordings, or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and
(c) the documentation of such records has been recognized by the American Ornithologists' Union or other competent scientific authorities.

(3) It is a species listed in the annex to the Japanese convention of 1972.

(4) It is a species listed in the appendix to the Russian convention of 1976.

Table 10: USFWS IPaC - Migratory Bird Summary

Common Name	Scientific Name	Common Name	Scientific Name
Black Guillemot	*Cepphus grylle*	Razorbill	*Alca torda*
Black Scoter	*Melanitta nigra*	Red-breasted Merganser	*Mergus serrator*
Black-legged Kittiwake	*Rissa tridactyla*	Red-necked Phalarope	*Phalaropus lobatus*
Brown Pelican	*Pelecanus occidentalis*	Red-throated Loon	*Gavia stellata*
Common Eider	*Somateria mollissima*	Ring-billed Gull	*Larus delawarensis*
Common Loon	*gavia immer*	Roseate Tern	*Sterna dougallii*
Common Murre	*Uria aalge*	Royal Tern	*Thalasseus maximus*
Cory's Shearwater	*Calonectris diomedea*	Sooty Shearwater	*Ardenna grisea*
Double-crested Cormorant	*phalacrocorax auritus*	Surf Scoter	*Melanitta perspicillata*
Dovekie	*Alle alle*	Thick-billed Murre	*Uria lomvia*
Great Shearwater	*Puffinus gravis*	White-winged Scoter	*Melanitta fusca*
Long-tailed Duck	*Clangula hyemalis*	Wilson's Storm-petrel	*Oceanites oceanicus*

3.6.4 Bald Eagles Protected Under the American Bald and Golden Eagle Act of 1972

Previously listed as federally endangered, the bald eagle (Haliaeetus leucocephalus) has made a remarkable comeback and is no longer federally listed. The bald eagle is currently protected under the American Bald and Golden Eagle Act, and the Migratory Bird Treaty Act. Bald eagles breed throughout much of Canada and Alaska, in addition to scattered sites across the lower 48 states, from California to the southeastern U.S. coast and Florida. Wintering habitat covers most of the contiguous U.S., with some year-round distribution in the northwest. Northern birds return to breeding grounds as soon as weather and food availability permit, generally between January and March.

The USFWS National Bald Eagle Management Guidelines (2007) are used to assess potential effects to nesting bald eagles and provides management guidelines to avoid impacts to nesting bald eagles (USFWS, 2007). To avoid disturbing bald eagles, a nest buffer is recommended between the human activity and the nest where applicable. Human impacts are considered detrimental to nesting success within the primary buffer and within the secondary buffer, human impacts are thought to impact the quality of the primary nest buffer. The primary buffer is a distance of 330 feet from the nest and the secondary buffer is a distance of 660 feet from the nest. Human activities that are considered detrimental to breeding activities (e.g. development, logging, use of toxic chemicals, etc.) are to be limited within the primary buffer and those that could impact the integrity of the primary buffer are restricted within a secondary buffer (e.g. developments, roadways, etc.). Per the management guidelines, a nest buffer of 2,640 feet is recommended from the nest for loud, disturbing noises such as those caused by blasting and other loud, intermittent noises.

No bald eagle nests currently exist within the study area. The study area is not located in a Bald Eagle Concentration Area. The closest known nesting location for bald eagles are in Lincroft, NJ, near Swimming River Park, approximately 10 miles from the study area.

3.6.5 Marine Mammals

The Marine Mammal Protection Act of 1972, as amended, prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. In reference to the Marine Mammal Protection Act, a marine mammal is a species found in the U.S. that is classified into one of the following four distinct groups: cetaceans (whales, dolphins, and porpoises), pinnipeds (seals, sea lions, and walruses), sirenians (manatees and dugongs), and marine fissipeds (polar bears and sea otters). Only cetaceans, pinnipeds, and sirenians have the potential to occur in the study area. All marine mammals in the U.S. are protected under the Marine Mammal Protection Act.

The Marine Mammal Protection Act prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. The term "take" per the Marine Mammal Protection Act is defined as harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal. For most activities, "harassment" refers to the act of pursuit, torment, or annoyance which:

- Can injure a marine mammal or a marine mammal stock in the wild which is referred to as Level A Harassment; or
- Has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns that include but are not limited to the following: migration, breathing, nursing, breeding, feeding, or sheltering which is referred to as Level B Harassment.

Table 11 provides a comprehensive listing of marine mammals documented to occur throughout the coastal waters of NJ. The humpback whale, West Indies Distinct Population Segment, the only humpback whale population segment that occurs in NJ, is no longer federally listed, but is still protected under the Marine Mammal Protection Act and has been recently returning in numbers to NJ waters.

Table 11: Summary of Marine Mammals in NJ Coastal Waters

Taxonomic Category/Common Name	Scientific Name
Baleen Whales	
Blue Whale	*Balaenoptera musculus*
Fin Whale	*Balaenoptera physalus*
Humpback Whale	*Megaptera novaeangliae*
Minke Whale	*Balaenoptera acutorostrata*
Northern Right Whale	*Eubalena glacialis*
Sei Whale	

Delphinids	
Atlantic White-sided Dolphin	*Lagenorhynchus acutus*
Bottlenose Dolphin	*Tursiops truncatus*
Common Dolphin	*Delphinus delphis*
Long-finned Pilot Whale	*Globicephala melas*
Other Toothed Whales	
Cuvier's Beaked Whale	*Ziphius cavirostris*
Harbor Porpoise	*Phocoena phocoena*
Sperm Whale	*Physeter macrocephalus*
Pinnipeds	
Grey Seal	*Halichoerus grypus*
Harbor Seal	*Phoca vitulina*

3.6.6 Federally Threatened and Endangered Species

The study area includes the range of water quality impacts as they pertain to special status species. This section provides a summary of the special status species that are known or have the potential to occur in the study area. The following references were consulted for compilation of the special status species that have the potential to occur in the study area that is provided in Table 12 :

- Information, Planning and Consultation System (IPaC) search conducted within the Action Project Area (USFWS, 2020); and
- NOAA-NMFS (NMFS, 2020) Section 7 Mapper

Table 12: Summary of Special Status Species, (E) Endangered, (T) Threatened, (PT) Proposed Threatened

Taxonomic Category/Common Name	Scientific Name	Federal Status	NJ State Status	Critical Habitat in Study Area (Y/N)
Northern Long-eared Bat	*Myotis septrionalis*	E	E	N
Piping Plover	*Charadrius melodus*	T	E	N
Roseate Tern	*Sterna dougallii dougallii*	E	E	N
Rufa Red Knot	*Calidris canutus rufa*	T	E	N
Seabeach Amaranth	*Amaranthus pumilus*	T	E	N
Monarch Butterfly	*Danaus plexippus*	PT	E	N
Atlantic Sturgeon	*Acipenser oxyrinchus oxyrinchus*	E	E	N

North Atlantic Right Whale	*Eubalaena glacialis*	E	E	N
Fin Whale	*Balaenoptera physalus*	E	E	N
Green Sea Turtle	*Chelonia mydas*	T	T	N
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E	N
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E	N
Loggerhead Sea Turtle	*Caretta Caretta*	T	E	N

Animals and plants listed as endangered or threatened are protected under the Endangered Species Act of 1973. According to the Endangered Species Act of 1973, an "endangered species" is defined as any plant or animal species in danger of extinction throughout all or a substantial portion of its range. A "threatened species" is any species likely to become an endangered species in the foreseeable future throughout all or a substantial part of its range. "Proposed Species" are animal or plant species proposed in the Federal Register to be listed under Section 4 of the Endangered Species Act of 1973. "Candidate species" are species for which the USFWS and NMFS have sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act of 1973. Critical habitat is designated per 50 Code of Federal Regulations parts 17 or 226 and defines those habitats that are essential for the conservation of a species classified by the federal government as threatened or endangered and that may require special management and protection.

A Biological Opinion (BO) was issued on sea turtles and sturgeon by NMFS in 2014 relative to the Sea Bright to Manasquan- Elberon to Loch Arbour reach of the project.

A Biological Assessment for those species under the jurisdiction of NMFS is available in Appendix A1. Coordination is ongoing. There is no critical habitat within the study area.

3.7 Cultural Resources

As a federal agency, USACE has certain responsibilities for the identification, protection and preservation of cultural resources that may be located within the Area of Potential Effect (APE) associated with the proposed project. Present statutes and regulations governing the identification, protection and preservation of these resources include the National Historic Preservation Act of 1966, as amended; the National Environmental Policy Act of 1969 (NEPA); Executive Order 11593; and the regulations implementing Section 106 of the National Historic Preservation Act of 1966 (36 Code of Federal Regulations Part 800, Protection of Historic Properties, August 2004). A historic property is defined as any prehistoric or historic district, site, building, structure, shipwreck or object included in, or eligible for inclusion on, the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource. Cultural resources include historic properties as well as other cultural aspects of the human environment.

Cultural resource studies have been carried out for the project since 1985. In accordance with

Section 106 of the National Historic Preservation Act of 1966, as amended, two Memoranda of Agreement were executed for this project in 1991 and 1993, and subsequently a Programmatic Agreement (PA) was executed for Sections I and II in 2014. Most recently an amendment to the PA was prepared and signed in 2022 between the New York District, the State Historic Preservation Office of NJ (NJSHPO), BOEM, and federally recognized Tribes.

The PA stipulates that the New York District shall employ designated buffer zones around three shipwrecks identified within the study area, shall employ buffer areas around locations that have been identified as sensitive through previous maritime remote sensing surveys when dredging within the Sea Bright Borrow Area, and shall carry out additional maritime remote sensing surveys for any additional borrow areas as new sand sources are required for renourishment.

As part of this GRR, the New York District Archaeologist carried out a site visit and review of previous surveys, site data made available by NJSHPO, and historical records to identify cultural resources within the study area. Much of the survey relied on previously collected information from the original project, however, as many years have passed since the original surveys were carried out, the review of records was carried out in order to capture any records and site information that may have become available in the intervening years since the original surveys were conducted.

The entire length of the onshore, beach and nearshore in the study area has been extensively surveyed (Heritage Studies [1985], [Pickman 1988], Panamerican [2004], Panamerican [2014], Panamerican [2023], Commonwealth [2024]). Review of survey reports and current site records revealed that there are two shipwrecks, one listed NRHP Historic District, one listed property, and two NRHP eligible properties within the study area.

Underwater Resources

The shipwrecks identified within the current study area are the Amity and the Western World, both transatlantic ships built in the mid-1800s which struck bottom in the nearshore area of the project. The remains of a metal barge had also been identified in the study area. More surveys and additional research are needed to identify the identity of the metal barge. Under the PA, the New York District conducted a monitoring program for the project to ensure that these wrecks were not adversely affected by the project and through the renourishment cycles. The wrecks were monitored with multibeam, side scan sonar, diver inspection, and probes and the data were compared over time in subsequent surveys. The program began in 2000 with a baseline survey, continued in 2013 after Hurricane Sandy and before a beach renourishment effort, and concluded in 2021. The District continues to employ buffer areas when working within this segment of the project to avoid adverse effects from project activities.

NRHP Listed Resources

The Ocean Grove Camp Meeting Association Historic District was listed on the NRHP in 1976 as an important and intact example if a 19th century planned community with a unique aggregation of historic architecture, including residencies, businesses and religious structures in the late 19th and early 20th century seaside vernacular architecture styles (NJDEP Historic Site Inventory Form No. 1334-1). It contains the largest collection of Victorian and early 20th century structures in America. The historic district encompasses 16 blocks along Ocean Ave including the beach, boardwalk and pier..

The Asbury Park Convention Hall is located within the study area on the beach side of Ocean Avenue North. The Convention Hall was built in 1928 by architects Warren and Wetmore who designed many of Atlantic City's hotels (NJDEP Historic Site Inventory Form No. 1303-33). It has the characteristics of resort design which recalls temples, monuments and places of various times and places specifically Early Renaissance of Italy and Classical period of the French Renaissance . It utilized diamond- patterned brickwork and applied and freestanding terra cotta ornaments and statuettes (NJDEP Historic Site Inventory Form No. 1303-33). It includes a theater, exhibition hall and an arcade lined with shops and amusements.

NRHP Eligible Resources

In addition, there are two eligible NRHP properties within the study area. These are the Howard Johnson's Pavilion and the Asbury Park Casino and Carousel. Both of these properties are part of an identified potential Historic District the Waterfront Resort Historic District, in Asbury Park. In 1871, Asbury Park was purchased by James A. Bradley. His plan was to create a place for the affluent to escape the unhealthy stress of the city (NJDEP Historic Site Inventory Form No. 1303-70). His plan included a green space, wide tree lined streets and recreation areas. The Waterfront Resort Historic District includes a few buildings built by Warren and Wetmore and is a good example of Resort construction. A formal eligibility assessment has yet to be made for this collection of resources to be recognized as an eligible Historic District.

Archaeological Resources

There is one eligible archaeological site within one mile of the study area. The Sherman/Mount/Stockton Farmstead site is eligible for the National Register of Historic places. It is a mid-eighteenth though mid-nineteenth century archaeological site with a historic ceramic assemblage, faunal remains and the remains of two demolished structures.

For further discussion, please see the Cultural Resource Appendix A6.

3.8 Aesthetics

The study area is relatively flat with the exception of local dunes and in some areas a boardwalk. After storms and over time, the area is subject to erosion and erosional scarps. Periodic renourishment mitigates this erosion to maintain a wider berm.

3.9 Recreation

Beaches in Monmouth County are a top attraction for tourists. In 2024, the area brought in over $30 million in revenue according to the Monmouth County Board of Community Commissioners (Monmouth County 2024). Beaches provide recreational features such as swimming, fishing, surfing, boating, kayaking, etc.

3.10 Hazardous, Toxic, and Radioactive Waste (HTRW)

HTRW means hazardous, toxic, and radioactive wastes, which includes any material listed as "hazardous substance" under the Comprehensive, Environmental, Response, Compensation, and Liability Act (CERCLA) definition of hazardous substances which includes any substance, element, compound, mixture, solution, waste, and/or toxic or air pollutant listed in one of the following: Federal Water Pollution Control Act, Solid Waste Disposal Act, Clean Air Act, or the Toxic Substances Control Act. Releases of these hazardous substances and their records are tracked, organized, and made available by both the EPA and NJDEP. (USACE Engineering Regulation, 1165-2-132.) Moreover, under the model Project Partnership Agreements for coastal storm risk management, HTRW more broadly includes the foregoing definition and "any regulated material.".

To address HTRW and other environmental releases that could impact the study area, USACE uses a phased approach, first conducting desktop review of online EPA and NJDEP remedial databases during the feasibility phase. If soil excavations/removal are expected as part of project work, USACE often conducts soil characterization investigations, during the Pre-construction Engineering and Design phase, to determine if any contamination is present. This work is done in accordance with ER 1165-2-132 and often state codes (e.g., New Jersey Administrative Code 7:26E (Technical Requirements for Site Remediation) and NJAC 7:26D Remediation Standards). Should HTRW be identified during any phase of the project, it is USACE policy to avoid it as practicable. However, if HTRW avoidance is not possible, it will be the responsibility of the NFS to provide a clean site for the project, using 100% non-federal, non-project funds, in accordance with ER 1165-2-132.

3.11 Air Quality

The Clean Air Act, and its subsequent amendments, established the National Ambient Air Quality Standards (NAAQS) for seven common pollutants: particulate matter, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides (NO_x), and lead. These air pollutants are referred to as "criteria pollutants" by the EPA because they are regulated for permissible levels based on human health and environmentally based guidelines. The General Conformity Rule, under the Clean Air Act, applies to all Federal actions that are taken in designated nonattainment areas for to ensure projects or maintenance meet national standard for air quality.

Based on the NAAQS, Monmouth County is in the New York, Northern New Jersey, Long Island, Connecticut, Non-Attainment 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 and volatile organic compounds.

3.12 Noise

Noise and vibration are often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or diminishes the quality of the environment. Response to noise varies by the type and characteristics of the noise source; distance from the source; receptor sensitivity; and time of day. Noise can be intermittent or continuous, steady or impulsive, and it may be generated by either mobile or stationary sources, and changes in noise are typically measured and reported using a weighted sound intensity (or level), which represents sound heard by the human ear and is measured in units called decibels (dBA). The Project Area includes the borrow area to be dredged, and Section II of the Sea Bright to Manasquan Project, and the transit of dredging vessels. The geographic extent of noise impacts is dependent upon factors such as the type of dredging equipment, length of time spent dredging, equipment to grade the beach, and environmental conditions such as wind speed and direction. Noise can carry for considerable distance underwater and overland.

Ambient noise is the all-encompassing sound associated with a given environment at a specified time. Humans hear sound from 0-140 dB, and sound above this threshold is associated with pain. There are several sources of ambient noise within the study area which can be attributed to both natural (wind waves, fish, tidal currents, mammals) and anthropogenic (general city noise, commercial and recreational ships/vessels, dredging, pile driving, etc.) inputs. While some anthropogenic underwater noise is produced intentionally (e.g., naval sonar, echosounders), most noise sources are an incidental by-product of human activity (e.g., shipping, construction) (Farcas et al. 2016).

Chapter 4: Plan Formulation

This chapter details the planning process employed to identify and evaluate alternative plans, along with the criteria used to select the TSP. This includes a summary of the identified problems and opportunities, planning goals and objectives, along with key planning constraints, considerations, uncertainties, assumptions, and planning decisions. This chapter further describes the approach to developing an initial and final array of alternatives, along with their evaluation across the four P&G criteria and accounts.

4.1 Problem Identification and Opportunities

A key task in the plan formulation process is the identification and detailed description of the problems and opportunities of the study.

Problem: A problem statement is the detailed description of a problem that helps guide the planning process. It informs the identification of the study's goals and objectives, and ultimately plan formulation, comparison, and selection. Here, we define the problem statement of the project as follows:

- The Study Area is vulnerable to storm damages and risks to life safety caused by inundation and wave action. Ongoing erosion of the existing project and future SLC will increase this vulnerability in future, particularly in Section II of the Study Area.

Opportunities: Opportunities are instances in which the implementation of a plan has the potential to provide positive change within the Study Area and provides ways to address the specific problems within the Study Area. Here, the team identified the following opportunities:

- better management of the coastal system and consideration of regional interactions;
- updating the existing project to utilize the latest technology, engineering standards, and guidance;
- development of additional co-benefits for environmental protection, ecosystem restoration; and
- improvements to recreation.

Table 13 summarizes the problems and opportunities identified for this study.

Table 13: Problems and Opportunities

PROBLEMS	OPPORTUNITIES
• Risk to human life, health, and safety from coastal storms • Storm damages dues to erosion, inundation and waves	• Better manage coastal system, consider regional interactions • Update project for latest technology, engineering standards, and guidance • Environmental protection, ecosystem restoration • Improve recreation

4.2 Planning Goal and Objectives

The study team developed a planning goal based on the identified problems and opportunities to help create and evaluate alternative plans. It is the overarching intent of the project to manage coastal storm risk in the study area over the 50-year period of analysis, 2030-2080.

In support of these project goals and consistent with the Federal Objective outlined in Section 1.6 , the planning objectives for this study are as follows:

- Manage the direct and indirect risks to human life, health, and safety caused by coastal storms. This will be qualitatively assessed and will include discussion on risk to critical infrastructure and including evacuation routes.
- Manage structure damage and other national economic development impacts caused by coastal storms, including flooding and erosion. This will be quantitatively assessed through estimation of annualized flood damage and repair costs avoided over the period of analysis.

4.3 Planning Constraints and Considerations

Constraints: Planning constraints are defined as restrictions that limit the extent of the planning process. They can be divided into universal constraints and study-specific constraints. For brevity, only project-specific constraints are included here. The study's constraints include:

- **Erosion:** Implementation of measures cannot increase rates of shoreline erosion in the study area.

Given this constraint, Section II was evaluated as a system. Considering the long-shore sediment transport dynamics in the study area, alternatives were formulated and evaluated for all of Section II. Recommendation of an alternative along only a portion of the shoreline (e.g., only within Reach 4 or Reach 5) would require additional analyses to ensure that such action would not inadvertently induce erosion elsewhere within the Study Area.

Considerations: Planning considerations are issues or matters that should be accounted for during the planning process, but do not necessarily limit the extent of the process. The considerations of the study are as follows:

- **Sea Level Change:** The design elevation and maintenance schedules of proposed solutions should consider future SLC.
- **Public Beach Access:** Proposed measures should maintain and minimize negative impacts to existing public beach access in the Study Area.
- **Adjacent Structures:** The proposed alternatives should minimize negative impacts to structures, facilities, and utilities in the Study Area.
- **Environmental and Cultural Resources:** Impacts to environmental, cultural, and historic resources will be taken into consideration when formulating alternatives. Additional investigations will be necessary to determine the presence (or absence) of previously unidentified historic properties and archaeological sites within the Study Area.
- **Induced Flooding:** Additional analyses will be undertaken to determine the extent to which (if any) flooding is induced by the presence of proposed measures. Such instances

of induce flooding will be minimized to the greatest extent possible when considering and formulating alternatives.

4.4 Key Uncertainties, Assumptions, and Planning Decisions

During the plan formulation process, there are a number of uncertainties, assumptions, and planning decisions that must be considered and documented.

The key sources of uncertainty identified in the Study include:

- **RSLC Factors and Uncertainty:**

  SLC varies by region, due to the direction and magnitude of the local vertical land movement and how it relates to the GSLC rate. At any location, changes in local relative sea level reflect the integrated effects of global mean SLC plus local or regional changes of geologic, oceanographic, or atmospheric origin. These additional factors are primarily informed by historic observations. To reduce uncertainty in the regional RSLC factors, current USACE guidance (USACE, 2013) recommends that a NOAA tide gauge station should be used with a period of record of at least 40 years. The tide gage used for this study, NOAA tide gauge at Sandy Hook, NJ (8531680), has a 93-year period of record as of writing (1932 to present).

  While the analysis primarily relies on the USACE Intermediate RSLC scenario, the future rate and magnitude of future RSLC is quite uncertain. Following established guidance (USACE, 2019), the study team will consider RSLC uncertainty by conducting a sensitivity analysis, assessing performance of alternatives under lower and upper bound RSLC expectations (the USACE Low RSLC and High RSLC scenarios). The results of the completed sensitivity analysis and supporting documentation can be found in Appendix B.

The key assumptions underpinning the analysis presented in this Study Area as follows:

- The study team used a 50-year period of analysis between 2030 and 2080 to evaluate and compare all alternatives on a consistent basis.
- The existing project will continue to be replenished, as authorized, through the end of the renourishment period, 2049.
- Existing bathymetric, geotechnical, and ecological data will be used for screening purposes; the use of existing data may impact the accuracy of design and cost estimates used during screening.
- Assume existing physical and ecological data are sufficient for environmental analysis of alternatives and environmental compliance.
- It is assumed the borrow area study will provide a permitted borrow area closer in proximity to Section II; and that the borrow area will supply enough sand to meet the project's needs. If sand is not available, sand would need to be brought in from other sources and directly impact project cost. Delays in permitting a new borrow source may lead to delays in project implementation.

- It is assumed the New Jersey Back Bays (NJBB) CSRM Study will not result in solutions incorporated as part of the FWOP condition before this study is complete. This effort is still in the study phase; it has neither been authorized nor has funding been appropriated at this time. The NJBB study recommendation may require modifications to the study area. Given the focus of the ongoing NJBB Study, this study will characterize and assess, though not formulate for, back bay flood risk.
- Implementation and maintenance of beach related solutions (i.e. berm & dune combination) would occur before the end of the existing project authorization in 2049.
- Considering the long-shore sediment transport dynamics in the study area, alternatives were formulated and evaluated for Section II as a system and not by separable reaches.

4.5 Management Measures

Measures are types of actions that accomplish the study objectives when implemented. Measures can be implemented only or in combination with other measures to form alternatives. The study team identified and considered a variety of measures to manage erosion and storm surge-induced flooding. Structural measures are physical modifications designed to manage risk by reducing the frequency and severity of flooding during inundation events. Nonstructural measures are those that reduce exposure or vulnerability to a flood hazard without altering the nature or extent of flooding. Nature-based solutions (NBS) are landscape features that are engineered or modified to manage risk, while also producing additional economic, environmental, or social benefits. The study team screened measures based on their expected effectiveness within the Study Area. Table 14 details and summarizes the results of this screening process for Section II. The management measures screened out prior to alternative plan formulation include:

- floodwalls/seawalls; screened out based on implementation challenges and limited economic viability as compared to other measures,
- levees; screened out based on implementation challenges and deemed not suitable for the beach environment,
- reinforced dunes; screened out based on limited economic viability and implementation challenges,
- groin modifications; screened out of consideration for Section II based on limited economic viability. Groin modifications retained as a management measure for Section I alternative development to be addressed via EDR,
- sand back passing; screened out based on limited economic viability, and
- artificial reefs; screened out based on limited CSRM benefits.

Table 14: Summary of Measures Considered for Section II

	Environmentally Acceptable	Technically Feasible	Economically Justified	Other Social Effects	Meets objectives and avoids constraints	Retained?
Nature-Based Solutions						
Submerged Artificial Reefs	Possible	Possible	Possible, limited CSRM benefits	Contributes	Unlikely	× **No**
Structural						
Berm modifications	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**
Dunes	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**
Floodwalls/ seawalls	Likely	Likely	Possible. Less economically competitive than other measures.	Better manages risk to life safety	Likely	× **No**
Groin modifications	Likely	Likely	Possible. Less economically competitive than other measures.	Contributes	Likely	× **No**
Sand back passing	Possible	Likely	Possible. Less economically competitive than other measures.	Contributes	Likely	× **No**
Reinforced dunes	Likely	Likely	Possible. Less economically competitive than other measures.	Better manages risk to life safety	Likely	× **No**
Levees	Likely	Not suitable for beach environment	Possible	Contributes	Likely	× **No**
Nonstructural						
Acquisition	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**
Relocation	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**
Elevation	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**
Floodproofing	Likely	Likely	Possible	Contributes	Likely	✓ **Yes**

4.6 Alternative Plan Formulation and Screening

Plan formulation is the process of developing alternative plans through the combination of management measure(s) within the Study Area to satisfy planning objectives. Addressing these objectives while considering prevailing problems, opportunities, and constraints is a complex challenge that is unlikely to have a single clear solution or globally optimal alternative. As such, a diverse range of alternative plans are typically formulated and assessed against several different criteria. Given the set of management measures considered, the study team developed an initial array of alternatives for Section II.

Table 15 details the initial array of alternatives considered for implementation within Section II. Alternatives for Section I were initially considered early in study; these alternatives were initially developed as Alternatives 2 and 4. However, the scope of the study was refined to focus on Section II and these alternatives were not fully developed nor evaluated. ***Alternative 1*** consists of no additional action, and is equivalent to the FWOP condition, in which the existing project continues through the end of authorization without any modification. The existing project consists of a beach template with no dune and a 100 ft wide berm, with an additional 40 ft of advanced fill. The existing berm specifies a top elevation of +7.3 ft NAVD88, plus a 2 ft berm cap, leading to a +9.3 ft NAVD88 berm elevation. The existing project is authorized for periodic renourishment on a six-year cycle through 2049.

The costs and benefits of preliminary array of the alternatives are conceptual and preliminary; they do not include a full range of cost contingencies, real estate, or mitigation costs. The primary set of alternatives consist of modifications to the authorized berm and construction of dunes within Section II (Alternatives 3.a – 3.k). For ease of reference, the dunes considered in each of these alternatives are identified primarily by their target crest elevation, specified in feet, measured above NAVD88. Similarly, the proposed berm modifications are identified primarily by the proposed berm width, measured from the seaward toe of the proposed dune and specified in feet. As currently presented and evaluated, the specified berms do not include any additional advanced fill beyond the specified berm width. The dune and berm alternatives assume renourishment along the same six-year interval as the existing project.

For all dune and berm alternatives (Alternatives 3.a-k), berms are assumed to have the same top elevation of +9.3 ft NAVD88. ***Alternative 3a*** consists of a +14 ft NAVD88 crest elevation dune and 140 ft wide berm. This berm width (140 ft) is consistent with that of the design template and advanced fill of the existing project. ***Alternative 3b*** consists of a +16 ft NAVD88 crest elevation dune and 140 ft wide berm. ***Alternative 3c*** consists of a +18 ft NAVD88 crest elevation dune and 140 ft wide berm. ***Alternative 3d*** consists of a +20 ft NAVD88 crest elevation dune and 140 ft wide berm. ***Alternative 3e*** consists of a +16 ft NAVD88 crest elevation dune and 100 ft wide berm. This berm width is roughly consistent with the existing project design template, less the specified 40 ft of overfill. ***Alternative 3f*** consists of a +18 ft NAVD88 crest elevation dune and 100 ft wide berm. ***Alternative 3g*** consists of a +20 ft NAVD88 crest elevation dune and 100 ft wide berm. ***Alternative 3h*** consists of a +14 ft NAVD88 crest elevation dune and 60 ft wide berm. ***Alternative 3i*** consists of a +16 ft NAVD88 crest elevation dune and 60 ft wide berm. Alternative 3j consists of a +18 ft NAVD88 crest elevation dune and 60 ft wide berm. Alternative 3k consists of a +20 ft NAVD88 crest elevation dune and 60 ft wide berm. ***Alternative 3l*** consists of a +16 ft NAVD88 crest elevation dune and 40 ft wide berm. With the exception of Alternatives 3e, 3i, and 3j, the all other berm and dune combinations were not advanced to the final array due to higher costs associated with implementation (i.e. initial fill and renourishment) and resulting limited economic viability.

In addition, a nonstructural alternative was evaluated. ***Alternative 5a*** specified nonstructural treatment for a floodplain-delineated aggregation of structures. Through several rounds of iteration, structures were aggregated for nonstructural treatment based on their presence in the current FEMA 1% AEP floodplain and first floor elevation. Structures whose most likely first floor elevation was less than +10 ft NAVD88 were considered eligible for nonstructural treatment. This aggregation approach ultimately identified a significant number of structures primarily vulnerable to back bay flood risk, rather than coastal inundation. Further iterations of the nonstructural alternative demonstrated increased costs and further reduced net benefits. The nonstructural alternative was not advanced to the final array due to limited economic viability.

Table 15: Initial Array of Alternatives

Alternative		Preliminary First Costs	Preliminary AAEQ Benefits	Preliminary AAEQ Net Benefits	Preliminary BCR	Final Array?
1	No action (existing authorization)	–	–	–	–	✓ Yes
3a	+14 ft NAVD88 & 140 ft	$103,200,000	$900,000	-$2,920,000	0.2	No
3b	+16 ft NAVD88 & 140 ft	$137,290,000	$1,510,000	-$3,580,000	0.3	No
3c	+18 ft NAVD88 & 140 ft	$176,030,000	$2,130,000	-$4,390,000	0.3	No
3d	+20 ft NAVD88 & 140 ft	$206,690,000	$2,060,000	-$5,600,000	0.3	No
3e	+16 ft NAVD88 & 100 ft	$96,170,000	$1,160,000	-$2,400,000	0.3	✓ Yes
3f	+18 ft NAVD88 & 100 ft	$132,390,000	$1,850,000	-$3,050,000	0.4	No
3g	+20 ft NAVD88 & 100 ft	$170,150,000	$2,250,000	-$4,050,000	0.4	No
3h	+14 ft NAVD88 & 60 ft	$11,290,000	$30,000	-$390,000	0.1	No
3i	+16 ft NAVD88 & 60 ft	$31,750,000	$670,000	-$510,000	0.6	✓ Yes
3j	+18 ft NAVD88 & 60 ft	$68,580,000	$1,290,000	-$1,250,000	0.5	✓ Yes
3k	+20 ft NAVD88 & 60 ft	$110,760,000	$1,910,000	-$2,190,000	0.5	No
5a	Nonstructural in 1% FEMA AEP + First Floor Elevation < 10 ft NAVD88	$216,250,000	$5,660,000	-$2,740,000	0.7	No
FY24, 2.75% discount rate Note these costs and benefits are conceptual and preliminary; they do not include a full range of cost contingencies, real estate, or mitigation costs.						

4.6.1 Description of Final Array of Alternatives

Based on a preliminary assessment, of the initial array of alternatives, four alternatives were retained for further consideration as part of the final array, based on their contributing CSRM benefits, economic performance, and contributions to life safety and OSE. The alternatives in the final array consist solely of structural measures, with varying combinations of dune crest elevations and berm widths. The final array consists of the following alternatives:

- Alternative 1: No action (existing authorization)
- Alternative 3e: +16 ft NAVD88 crest elevation dune & 100 ft berm width
- Alternative 3i: +16 ft NAVD88 crest elevation dune & 60 ft berm width
- Alternative 3j: +18 ft NAVD88 crest elevation dune & 60 ft berm width

Figure 13 visually summarizes these alternatives via typical cross-sections, highlighting key characteristics and dimensions. Alternative 1: No Action (existing authorization); Alternative 3e: +16 ft NAVD88 crest elevation dune & 100 ft berm width; Alternative 3i: +16 ft NAVD88 crest elevation dune & 60 ft berm width; Alternative 3j: +18 ft NAVD88 crest elevation dune & 100 ft berm width

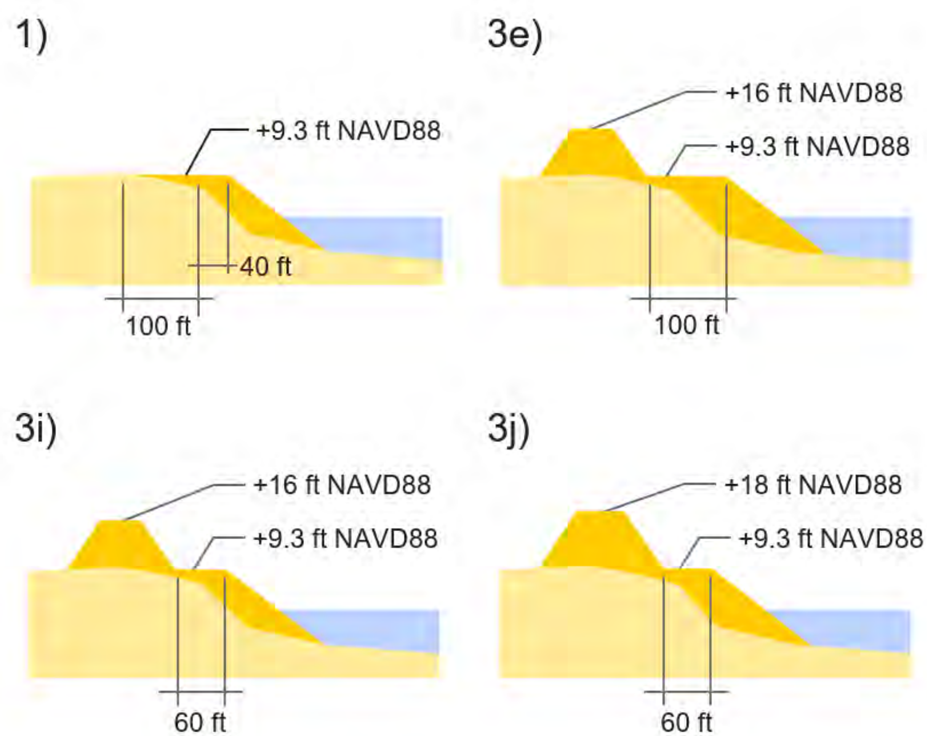

Figure 13: Visual summary of typical cross-sections (not to scale) for the final array of alternatives.

Alternative 1: No Action (Future Without-Project Condition)

Under Alternative 1, no additional federal action would be undertaken to reduce coastal flood risk in Section II of the Study Area. Equivalent to the future without project condition, this alternative would not satisfy the planning objectives or capitalize on the identified opportunities, though this alternative would not violate any constraints or considerations identified. Further, this alternative would neither incur any incremental costs, nor impose any additional adverse social or environmental effects. Under Alternative 1, the existing project would continue as authorized, renourishing the current project template on a six-year renourishment cycle, through the end of authorization in 2049. As mentioned previously, the current project template specifies a 100 ft wide berm with 40 ft of advanced fill, with a design elevation of +9.3 ft NAVD88 elevation, (inclusive of the 2 ft berm cap).

Alternative 3e:

In contrast to the existing project, Alternative 3e, includes a +16 ft NAVD88 crest elevation dune, with a 25 ft crest width and 1V:5H landward and seaward dune slopes. The extent of this dune would vary based on local conditions and topography, though the seaward toe of the dune would generally extend approximately 90 ft from the existing project baseline. To maintain a 100 ft berm width at the same design elevation as the existing project (+9.3 ft NAVD88), the berm would extend approximately 50 ft further seaward than the currently authorized project. The initial construction of the dune, extension of the berm, and future renourishments would require an additional 1,580,000 CY of sand over the remainder of the existing authorization. This alternative would remain on the existing six-year renourishment cycle, with initial construction during the renourishment scheduled for 2031.

Alternative 3i:

Similar to Alternative 3e, Alternative 3i includes a +16 ft NAVD88 crest elevation dune, with a 25 ft crest width and 1V:5H landward and seaward dune slopes. The extent of this dune would vary based on local conditions and topography, though the seaward toe of the dune would generally extend approximately 90 ft from the existing project baseline. To establish a 60 ft berm width at the same design elevation as the existing project (+9.3 ft NAVD88), the berm would only extend approximately 10 ft further seaward than the currently authorized project. The initial construction of the dune, extension of the berm, and future renourishments would require an additional 580,000 CY of sand over the remainder of the existing authorization. This alternative would remain on the existing six-year renourishment cycle, with initial construction during the renourishment scheduled for 2031.

Alternative 3j:

In contrast to the other alternatives, Alternative 3j includes a +18 ft NAVD88 crest elevation dune. Other characteristics, including the 25 ft crest width and 1V:5H landward and seaward dune slopes remain the same. The extent of this dune would vary based on local conditions and topography, though the seaward toe of the dune would generally extend approximately 110 ft from the existing project baseline. To establish a 60 ft berm width at the same design elevation as the existing project (+9.3 ft NAVD88), the berm would only extend approximately 30 ft further seaward than the currently authorized project. The initial construction of the dune, extension of the berm, and future renourishments would require an additional 1,229,000 CY of sand over the remainder of the existing authorization. This alternative would remain on the existing six-year renourishment cycle, with initial construction during the renourishment scheduled for 2031.

4.7 Evaluation of the Final Array of Alternatives

Alternatives in the final array were further evaluated. Costs, benefits, and assumptions were refined to better characterize the existing and future with/without project conditions. The alternatives in the final array were then further evaluated through a series of criteria to better characterize their performance against the study objectives and constraints, the four P&G planning criteria (completeness, effectiveness, efficiency, and acceptability), and the four P&G accounts: (National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE). Performance of alternatives was evaluated over the 50-year period of analysis, from 2030 to 2080. The study team iteratively refined the alternative costs and benefits to bring the performance of the final array of alternatives into sharper focus.

Current USACE policy, ER 1105-2-103, requires that, if feasible, the final array include the following alternatives: 1) a no action (i.e., future without project) alternative, 2) a nonstructural alternative, 3) a nature-based solution alternative, 4) an environmentally preferred alternative, 5) a maximum net public benefit alternative, and 6) a locally preferred alternative (if requested by the NFS). A single alternative within the final array can count as more than one required alternative. For instance, a nature-based solution alternative in the final array may also be the maximum net public benefit and locally preferred alternative. Pursuant to 33 CFR 234.8(f) if one or more of these alternatives is determined to be infeasible, it may be excluded from the final array, so long as the decision to exclude said alternative is documented.

4.7.1 Contributions to Planning Objectives and Constraints

Alternatives were evaluated based on their ability to make significant contributions to the planning objectives and sufficiently avoid the planning constraints. The evaluation of the alternatives is presented in Table 16. The contribution of the FWOP or No Action alternative is "N/A" for both objectives. A qualitative assessment was performed to determine the alternatives' contributions toward the management of the direct and indirect risks to human life, health, and safety. The qualitative assessment ranked each of the alternatives using a "low" ('-'/red), "medium" ('+'/yellow), "high" ('+ +'/green) system. Alternative 3i was assessed to provide some positive contributions to managing risks to human life, health, and safety due to the proposed implementation of a dune system. Alternative 3e and Alternative 3j contributed the highest amount to managing risks to human life, health, and safety. The maintained 100 ft berm width, relative to the existing project, under Alternative 3e and proposed higher crest elevation dune (+18 ft NAVD88) under Alternative 3j resulted in the equivalent "high" scores for both alternatives. Further, Alternative 3j demonstrates lower economic benefits as a result of the shorter berm width. This can be attributed to the proposed shorter berm width (60 ft berm) resulting in more frequent erosion of the dunes.

An incremental CSRM benefit assessment was performed to determine the relative ranking of the alternatives' ability to manage structure damage and other national economic development impacts. For the purposes of this study, costs and benefits were assessed incrementally relative to the respective costs and benefits of the FWOP (existing project). Positive incremental benefits are seen as additional benefits beyond the benefits provided by the continuation of the existing project. The quantitative assessment determined that Alternative 3e provides the most incremental AAEQ benefits at $2,755,000.

Table 16: Final Array of Alternatives' Contributions to Planning Objectives

Planning Objectives	Metric	No Action	Alternative 3e - Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i - Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j - Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Manage the direct and indirect risks to human life, health, and safety	Qualitative Assessment	N/A	+ +	+	+ +
Manage structure damage and other national economic development impacts	Incremental CSRM Benefit (AAEQ)	N/A	$2,755,000	$444,000	$2,590,000

The alternatives in the final array were evaluated for their ability to avoid planning constraints. None of the alternatives interfered with the study's constraint that the project cannot increase rates of shoreline erosion in the Study Area.

4.7.2 Contributions to Principles and Guidelines Accounts

Performance of the alternatives in the final array was evaluated across the four P&G accounts (NED, RED, OSE, EQ), in alignment with ER 1105-2-103:

- **NED (National Economic Development)**: changes in the economic value of the national output of goods and services
- **RED (Regional Economic Development)**: changes in the distribution of regional economic activity that result from each alternative plan
- **EQ (Environmental Quality)**: non-monetary effects on significant natural and cultural resources
- **OSE (Other Social Effects)**: non-monetary effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts

Performance of each plan in the final array of alternatives was assessed across the four P&G accounts for the 50-year period of analysis, from 2030-2080. Table 17 depicts the relative comparison of the final array of alternatives and their respective contributions to the four P&G accounts. Additionally, USACE is required to identify the plan with the highest net NED benefits, the plan that maximizes benefits across all four accounts, known as the Total Net Benefits plan, and the least environmentally damaging practicable alternative (LEDPA). Of the identified alternatives, they may or may not be the same plan.

Table 17: Summary of Final Array of Alternatives' Contributions to P&G Accounts

P&G Account	No Action	Alternative 3e Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
National Economic Development (NED)	-	+	- -	-
Regional Economic Development (RED)	-	+ +	+	+ +
Environmental Quality (EQ)	-	-*	-	-
Other Social Effects (OSE)	-	+ +	+	+ +

* Impacts are deemed to be minimal and temporary. See EQ Discussion for further explanation.

<u>National Economic Development (NED)</u>

NED effects are changes in the economic value of the National output of goods and services. This is calculated as the incremental NED benefits and demonstrated as incremental benefits relative to the existing project. The with and without-project conditions were evaluated for their contributions to the NED account. The analysis was performed using the USACE-certified Beach-fx model. Beach-fx is a comprehensive and innovative analytical framework that evaluates the physical performance and economic benefits and costs of shore protection projects. The analysis leveraged a structure inventory informed by the National Structure Inventory (NSI), an internal USACE tool developed by Hydrologic Engineering Center to provide data on structures and populations at risk to support life safety, economic, and social consequence modeling in risk assessments.

The qualitative assessment determined the alternatives' economic contributions to the NED account. Given the intermediate RSLC scenario, Alternative 3e provides AAEQ Benefits estimated at $2,755,000, AAEQ net benefits at an estimated $150,000 with a Benefit to Cost Ratio (BCR) of 1.06. Of the alternatives in the final array, Alternative 3e is the only alternative with a BCR greater than 1.0. Hence, Alternative 3e is the only alternative contributing positively to the NED account and was assigned a score of '+'. Alternative 3i provides AAEQ Benefits estimated at $2,590,000, AAEQ net benefits at an estimated -$990,000 with a Benefit to Cost Ratio (BCR) of 0.3. As a result, Alternative 3i was assigned a ranking of '--' due to a lack of positive contributions to the NED account. Alternative 3j provides AAEQ Benefits estimated at $2,590,000, AAEQ net benefits at an estimated -$122,000 with a Benefit to Cost Ratio (BCR) of 0.96. As a result, Alternative 3j was assigned a ranking of '-'. However, given the High RSLC condition, Alternatives 3e and 3j contribute CSRM to the NED account. When considering AAEQ Net Benefits, none of the alternatives contribute positively to the NED account under the low RSLC condition.

Table 18: Summary of average annual equivalent (AAEQ) costs and benefits for final array of alternatives under low, intermediate, and high RSLC scenarios

		Alternative 3e -	Alternative 3i -	Alternative 3j -
Incremental First Cost		$52,052,000	$32,064,000	$58,671,000
AAEQ Cost		$2,605,000	$1,434,000	$2,712,000
AAEQ Benefit	RSLC Low	$2,511,000	$269,000	$2,371,000
	RSLC Int.	$2,755,000	$444,000	$2,590,000
	RSLC High	$3,477,000	$840,000	$3,305,000
AAEQ Net Benefits	RSLC Low	($94,000)	($1,165,000)	($341,000)
	RSLC Int.	$150,000	($990,000)	($122,000)
	RSLC High	$872,000	($594,000)	$593,000
BCR	RSLC Low	0.96	0.2	0.9
	RSLC Int.	1.06	0.3	0.96
	RSLC High	1.3	0.6	1.2
FY25, 3% federal discount rate				

Table 19: Summary of average annual equivalent (AAEQ) coastal storm risk reduction (CSRM) benefits and residual risk under the final array of alternatives.

Alt.	**Description**	**CSRM Benefit (AAEQ)**			**Residual Risk (AAEQ)**
		Structures & Contents	**Vehicles**	**Total**	
1	No action	$0	$0	$0	$342,657,000
3e	+16 ft NAVD88 & 100 ft	$70,882,000	$4,430,000	$75,312,000	$267,346,000
3i	+16 ft NAVD88 & 60 ft	$11,421,000	$3,804,000	$15,225,000	$327,433,000
3j	+18 ft NAVD88 & 60 ft	$66,629,000	$4,881,000	$71,510,000	$271,148,000
FY25, 3% federal discount rate; Intermediate RSLC Scenario					

Table 20: Summary of NED Benefits

P&G Account	**No Action**	**Alternative 3e - Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)**	**Alternative 3i – Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)**	**Alternative 3j - Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)**
National Economic Development (NED)	-	+	- -	-

Regional Economic Development (RED)

Regional Economic Development (RED) effects are the impact of project spending, either directly or indirectly, on the local economy. This analysis leveraged the USACE Regional Economic System (RECONS) 2.0 input/output (I/O) model, developed by the Institute of Water Resources (IWR), to estimate the regional economic impacts of proposed construction work activities.

Regional economic impacts and contributions are measured as economic output, jobs, income, and value added for three levels of geographic impact area: local, state, and national. Estimates are based on the specific work activity associated with a project. The tool estimates the regional economic impacts and contributions of project expenditures and assesses impacts and contributions associated with project-related spending by systematically mapping expenditures to production and consumption sectors within a particular economy through a series of linkages among industries, households, and government. Changes to purchases of goods and services for final consumption (final demand change) drive I/O models. Each industry that produces goods and services generates demands for other goods and services. For example, when construction firms pay their workers and purchase supplies or services, such as electricians, plumbers, lumber, concrete, etc., economic activity is generated in the local or regional economy through salaries and business and household spending.

A qualitative assessment was used to determine each of the alternatives' contributions to the RED account. Alternatives 3e and 3j demonstrate comparable contributions to the RED account as a result of similar project first costs. Both Alternatives 3e and 3j were assigned '+ +' scores demonstrating positive contributions to the RED account. Considering the lower project first costs associated with Alternative 3i, a score of '+' was assigned to reflect some positive contributions to the RED account. The tables below depict the respective RED benefits for each of the alternatives in the final array

Table 21: RED Benefits for Alternative 3e

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$51,008,649	359.20	$39,091,099	$36,284,033
Secondary Impact		$42,554,226	208.20	$14,941,272	$25,013,440
Total Impact	$51,008,649	$93,562,875	567.40	$54,032,371	$61,297,473
State					
Direct Impact		$58,590,591	409.30	$44,485,272	$42,986,726
Secondary Impact		$58,511,975	261.00	$21,419,836	$35,476,526
Total Impact	$58,590,591	$117,102,567	670.20	$65,905,109	$78,463,252
US					
Direct Impact		$65,860,367	484.80	$48,150,049	$47,361,763
Secondary Impact		$118,141,329	493.20	$37,892,494	$64,767,759
Total Impact	$65,860,367	$184,001,696	978.00	$86,042,543	$112,129,522

Table 22: RED Benefits for Alternative 3i

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$26,438,555	186.20	$20,261,509	$18,806,564
Secondary Impact		$22,056,500	107.90	$7,744,288	$12,964,845
Total Impact	$26,438,555	$48,495,055	294.10	$28,005,797	$31,771,409
State					
Direct Impact		$30,368,391	212.10	$23,057,391	$22,280,671
Secondary Impact		$30,327,643	135.30	$11,102,226	$18,388,021
Total Impact	$30,368,391	$60,696,035	347.40	$34,159,616	$40,668,692
US					
Direct Impact		$34,136,426	251.30	$24,956,900	$24,548,319
Secondary Impact		$61,234,441	255.60	$19,640,254	$33,570,111
Total Impact	$34,136,426	$95,370,867	506.90	$44,597,154	$58,118,430

Table 23: RED Benefits for Alternative 3j

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		$51,407,206	362.00	$39,396,538	$36,567,539
Secondary Impact		$42,886,725	209.90	$15,058,017	$25,208,883
Total Impact	$51,407,206	$94,293,931	571.80	$54,454,555	$61,776,422
State					
Direct Impact		$59,048,391	412.50	$44,832,859	$43,322,604
Secondary Impact		$58,969,160	263.00	$21,587,201	$35,753,723
Total Impact	$59,048,391	$118,017,551	675.40	$66,420,060	$79,076,327
US					
Direct Impact		$66,374,969	488.50	$48,526,271	$47,731,826
Secondary Impact		$119,064,430	497.10	$38,188,568	$65,273,824
Total Impact	$66,374,969	$185,439,399	985.60	$86,714,839	$113,005,650

All of the alternatives in the final array contribute positively to the RED account. This is due to their respective positive economic impact as a direct result of anticipated project spending. Alternatives 3e and 3i have comparable RED contributions due to the similar estimated project costs. Both Alternatives 3e and 3j provide greater RED benefits than Alternative 3i.

Environmental Quality (EQ)

EQ is the non-monetary beneficial effects on significant natural and cultural resources. To review and assess potential adverse environmental impacts of each of the alternatives in the final array, a qualitative assessment was performed. The categories that make up EQ are in Table 25 and 26 using the definitions in Table 24.

Table 24: Defining Criteria for Scale of Impacts

IMPACT SCALE	CRITERIA
No Effect (0)	The resource area would not be affected and there would be no impact.
Negligible (-1)	Changes would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor (-2)	Changes to the resource would be measurable, but the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate (-3)	Changes to the resource would be measurable and could have either localized or regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures could be necessary, and the measures would reduce any potential adverse effects.
Major (-4)	Changes to the resource would be readily measurable and would have substantial consequences on regional levels. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Table 25: Impacts to EQ/Resources

Environmental Resource	No Action	Alternative 3e - Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i – Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j - Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Water Quality	Minor	Minor	Minor	Minor
Vegetation	No Effect	No Effect	No Effect	No Effect
Essential Fish Habitat	Minor	Minor	Minor	Minor
Wildlife	Minor	Minor	Moderate	Moderate
Cultural Resources	Negligible	Minor	Minor	Minor
Air Quality	Minor	Minor	Minor	Minor
Topography/ Bathymetry	Minor	Minor	Minor	Minor
Hazardous, Toxic, and Radioactive Waste	No Effect	No Effect	No Effect	No Effect

Water quality would be temporarily degraded while placing sand to achieve the desired template. As the material is sandy, it is expected the increase in turbidity is temporary and would settle out very quickly. Therefore, water quality impacts would be temporary and minor for any alternative considered.

It was determined that none of the alternatives would impact vegetation and therefore there would be no effect.

All alternatives would have minor impacts to Essential Fish Habitat. Placement within the intertidal and subtidal zone would bury immobile benthic resources. This would reduce the prey resources available; however, recovery of these resources is expected to take place between 2 and 6.5 months after beach fill takes place.

Alternatives 3i and 3j would have moderate impacts to piping plover and to seabeach amaranth. The addition of the dune is viewed as less favorable habitat to piping plovers and it could cover the existing seed bank of seabeach amaranth. It would also reduce the amount of available berm for piping plovers to forage, breed, and nest and available space for seabeach amaranth to sprout. The no action alternative and Alternative 3e would maintain the current width of the berm, which maximizes the amount of preferred habitat for species like piping plovers and seabeach amaranth.

The project alternatives are expected to have minor impacts to cultural resources or historic properties. The District has determined no effect to the properties within the viewshed. However, there is potential for direct effects to properties within the project alignment. A Programmatic Agreement is in place for the project and will be amended to ensure avoidance, minimization and mitigation will be carried out as needed.

The study area and final array of alternatives are within the New York-Northern New Jersey-Long Island nonattainment area for the National Ambient Air Quality Standards (NAAQS). All project alternatives, including the No Action Alternative would require mitigation to offset emissions and therefore impacts are considered minor.

All of the alternatives in the final array would have minor impacts to bathymetry and topography. The addition of a dune would alter the topography of the current beach and modification of the template would alter the elevation of the seafloor. As the beach is a dynamic environment and recovery of benthic organism is expected to take place within a few months, all impacts related to topography and bathymetry are minor.

Table 26: Impacts to Socioeconomic Resources

	No Action	Alternative 3e - Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i – Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j - Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Recreation	Negligible	Negligible	Moderate	Moderate
Aesthetics	Negligible	Minor	Moderate	Moderate
Noise and Vibration	Negligible	Negligible	Negligible	Negligible

Alternatives 3i and 3j would have moderate impacts to recreation by reducing the amount of available berm to the public. Beach berms are utilized by the public for relaxing, surfers, fishermen, kayakers, swimmers and more. Reduction of this area would limit the amount of people that could utilize this resource.

Alternatives 3e, 3i, and 3j would all result in impacts to aesthetics. The addition of the dune would alter the topography of the existing landscape and would alter viewsheds for beachfront homes and businesses. Alternatives 3i and 3j would have additional impacts due to the reduced berm width.

All alternatives would have negligible impacts from noise and vibration. All construction is temporary and would be consistently moving either to the north or south to continue constructing the template (based on specified design and construction plans). The project would also implement vibration monitoring to ensure the project does not damage surrounding structures.

Other Social Effects

Other Social Effects (OSE) include the effects that are not covered in the NED, RED, and EQ. This account includes items such as community impacts, health and safety, and displacement. An analysis was carried out to determine how alternative measures will affect resident and community well-being, both directly and indirectly, by affecting factors that contribute to well-being such as the life safety, community resilience, and recreation. Although these impacts cannot easily be monetized for inclusion in a benefit-cost analysis, they were qualitatively assessed so that they could be considered in tandem with other information in guiding plan selection.

OSE criteria were assessed possible scores ranging from -2 to +2, where a score of -2 indicates the most negative impacts, a score of 0 indicates no impacts or neutral impacts, and +2 indicates the most positive impacts. For example, the possible scores for community resilience range from -2 to +1 because a negative score would indicate that an alternative would increase the risk to limiting access to healthcare and emergency services immediately following a major storm event. Sum scores were assessed based on the combined total of a given alternative's OSE contributions. A sum score greater than +2 was assigned a ranking of "++". Sum scores of +1 were assigned a ranking of "+".

Table 27: OSE Contributions Scoring Legend

-2	-1	0	+1	+2
Most Negative	Some Negative	Neutral	Some Positive	Most Positive

Table 28: OSE Evaluation

OSE Metric	1 – No Action Existing Project (No dune, 100 ft berm width)	3e – Dune & Berm (16 ft NAVD88 dune, 100 ft berm width)	3i– Dune & Berm (16 ft NAVD88 dune, 60 ft berm width)	3j – Dune & Berm (18 ft NAVD88 dune, 60 ft berm width)
Life Safety	N/A	+2	+1	+2
Community Resilience	N/A	+2	+1	+2
Recreation	N/A	0	-1	-1
Sum Score		+4	+1	+3
OSE Ranking	N/A	+ +	+	+ +

Life safety was qualitatively measured through the final array of alternatives' contributions to reducing risk to roads and evacuation routes, critical infrastructure and health and public services such as hospitals, police stations, etc. Due to their comparatively higher CSRM benefits, Alternatives 3e and 3j are likely to provide greater life safety enhancements than Alternative 3i. All three alternatives provide an improvement to life safety relative to the no action alternative as a result of the proposed implementation of a dune.

Similarly, by managing coastal storm and flood risk within the study area, residents have better access to healthcare and emergency services, contributing to quicker recovery and community resilience. The ability to recover after a flood event contributes to bettering mental health and positively affecting the overall well-being of the community. Due to their comparatively higher CSRM benefits, Alternatives 3e and 3j are likely to provide greater improvement to community resilience. While Alternative 3i was determined to contribute positively to community resilience, the lower crest elevation dune and shorter berm width provides less positive contributions to community resilience and may result in longer recovery periods following a major storm event.

Use of the beach as a recreation and community space is a large part the communities' identity across the study area. This assessment considered the direct correlation between berm width and recreational use of the beach. For example, a 100 ft berm width was determined to contribute more positively to maintaining recreational use of the beach relative to a 60 ft berm width. Alternative 3e does not result in a reduction or expansion of the berm width relative to the existing project. For this reason, a score of 0 was assessed. Alternatives 3i and 3j result in a reduction in berm width relative to the existing project template and therefore determined to result in some negative benefits associated with recreational use. Alternatives 3i and 3j were evaluated independently and were assessed a score of -1.

4.7.3 Contributions to Principles and Guidelines Criteria

The study team evaluated the contribution of each alternative in the final array to the four P&G criteria (WRC, 1983), in alignment with ER 1105-2-103 and summarized in Table 29. The alternatives were assessed based on their completeness, effectiveness, efficiency, and acceptability in providing incremental improvements to the existing project (captured in Alternative 1, No Action); therefore, while the existing authorized project is performing as designed and is effective at managing coastal storm risk in the area, it does not contribute to managing incremental risk.

Completeness: the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating proposed alternatives to other ongoing public or private planning efforts, if those efforts are deemed crucial to the realization of the planning objective. All alternatives in the final array were evaluated with consideration of any such ongoing planning efforts, necessary investments, or other actions. The plans in the final array were assessed for environmental, cultural resource impacts, as well as the costs associated with mitigating those impacts and acquiring the required real estate for implementation. All alternatives within the final array are considered as complete.

Effectiveness: the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities. Aside from the no action alternative, all actionable alternatives in the final array alleviate the coastal storm risk and erosion problems and capitalize on one or more of the identified planning opportunities (Section 4.1). Alternative 3e is the most effective as it contributes the most AAEQ benefits across all three RSLC scenarios.

Efficiency: the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment. Efficiency was assessed via the benefit-cost ratio of each alternative. Of the four alternatives in the final array, only Alternative 3e was evaluated as efficient because it was the only alternative that was more economically efficient (i.e. had positive net benefits) than maintenance of the existing project under the intermediate RSLC scenario.

Acceptability: the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies. Acceptability has two dimensions – implementability and satisfaction. Implementability means the extent to which the alternative is feasible from a technical, financial, and legal perspective. Satisfaction is the extent to which the plan is welcome from a political or preferential perspective. The study team formulated all alternatives in accordance with applicable laws and regulations. Aside from the no action plan, all alternatives in the final array are considered acceptable as it relates to implementability. The satisfaction component of acceptability will be further verified during the draft integrated report comment period and documented within the final integrated report. The draft integrated report comment period will be used to capture input from the general public, local communities, NFS, and other state and federal stakeholders regarding the TSP.

Table 29: Summary Principles and Guidelines Criteria on the Final Array of Alternatives

Alternative	1 – No Action Existing Project (No dune, 100 ft berm width)*	3e – Dune & Berm (16 ft NAVD88 dune, 100 ft berm width)	3i – Dune & Berm (16 ft NAVD88 dune, 60 ft berm width)	3j – Dune & Berm (18 ft NAVD88 dune, 60 ft berm width)
Completeness	✓ Yes	✓ Yes	✓ Yes	✓ Yes
Effectiveness	× No	✓ Yes	✓ Yes	✓ Yes
Efficiency	× No	✓ Yes	× No	× No
Acceptability	× No	✓ Yes	✓ Yes	✓ Yes
The alternatives were assessed based on their completeness, effectiveness, efficiency, and acceptability in providing incremental improvements to the existing authorized project (Alternative 1).				

Chapter 5: Comparison of Final Array of Alternatives

USACE guidance in ER 1105-2-103 requires the identification of six alternative plans to evaluate trade-offs among the four P&G accounts: NED, RED, OSE, EQ. These six alternative plans include:

- The “no action” alternative.
- An NED Plan.
- A plan that reasonably maximizes total net benefits across all benefit categories including monetized and non-monetized benefits.
- A plan that reasonably maximizes net benefits including monetized and non-monetized benefits consistent with the study purpose only.
- The LEDPA, as required by the Clean Water Act under Section 404 (Title 40, Part 230 of the Code of Federal Regulations [40 CFR Part 230]).
- A locally preferred plan (LPP), if requested by the NFS and approved by the ASA(CW), if the LPP is not one of the plans identified above.

No Action: The “no action” alternative is Alternative 1. This assumes that the existing project continues as authorized with a six-year nourishment interval and the final renourishment occurring in 2049.

Alternative 3e has been identified as the NED Plan, the plan that reasonably maximizes benefits (consistent with the study purpose), and LEDPA.

NED Plan: The alternative demonstrating the largest contribution to NED net benefits has been identified as Alternative 3e. The NED plan has the same NED benefits as Alternative 3e, assessed incrementally relative to the benefits of the existing project, contributing $2,755,000 FY25 price levels in annual benefits and $150,000 in annual net benefits, respectively, based upon a federal discount rate of 3.0%.

Total Net Benefits Plan: Alternative 3e is also considered the Total Net Benefits Plan, since the plan reasonably maximizes total net benefits across all benefit categories.

Least Environmentally Damaging Alternative (LEDPA): Alternative 3e was identified as the LEDPA. While the EQ scoring of all alternatives in the final array were determined to be negative, the impacts are deemed minimal. Alternatives 3i & 3j consist of 60 ft berm widths, which would result in a reduction in favorable piping plover habitat relative to the existing project berm template. Alternative 3e maintains a 100 ft berm width, therefore does not reduce piping plover habitat.

Table 30: Comparison of Alternative Plans

Alternative Plans	1 – No Action Existing Project (No dune, 100 ft berm width)	3e – Dune & Berm (16 ft NAVD88 dune, 100 ft berm width)	3i– Dune & Berm (16 ft NAVD88 dune, 60 ft berm width)	3j – Dune & Berm (18 ft NAVD88 dune, 60 ft berm width)
No Action	✓			
NED Plan		✓		
Total Net Benefits Plan		✓		
Study Purpose Only Net Benefits Plan		✓		
LEDPA		✓		

The alternative plans were evaluated through several criteria, including their contributions to the planning objectives and constraints, the four planning criteria (completeness, effectiveness, efficiency, and acceptability), and the four P&G benefit accounts (NED, RED, EQ, and OSE). Alternative plans were evaluated for their contributions to these criteria within a 50-year period of analysis, which begins when project construction is anticipated to be complete and project benefits are realized (2030 through 2080).

As shown in Table 31, Alternative 3i requires the smallest increment of additional sand at 8.6 million CY and has the lowest estimated incremental first cost, estimated at $31,060,000. Alternatives 3e and 3j required a similar volume of sand, approximately 9.5 million CY, though Alternative 3e has a slightly lower estimated incremental first cost, estimated at $50,900,000, compared to $66,300,000 for Alternative 3j. Alternative 3e had the highest incremental CSRM benefit, estimated to be $2,755,000 in average annual equivalent benefit over the full period of analysis. Given its average annual equivalent cost, Alternative 3e is expected to yield $87,000 in average annual equivalent net benefits, corresponding to a benefit-cost ratio (BCR) of 1.06.

Table 31: NED Benefits, Intermediate RSLC Scenario

Alternative	No Action	Alternative 3e Dune & Berm [1,2,3] (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Total Project Fill Vol. [CY]*	7,930,000	9,510,000	8,606,000	9,446,000
Incremental First Costs	-	$52,052,000	$32,064,000	$58,671,000
Incremental Costs (AAEQ)	-	$2,605,000	$1,434,000	$2,712,000
Incremental Benefits (AAEQ)	-	$2,755,000	$444,000	$2,590,000
Net Benefits (AAEQ)	-	$150,000	-$990,000	-$122,000
Benefit-Cost Ratio (BCR)	-	1.06	0.3	0.96

FY25 price level, 3% federal discount rate, USACE Intermediate RSLC scenarios
[1]NED Plan; [2] Reasonably maximizes benefits consistent with the study purpose; [3]LEDPA
*Total Project Fill Volume values includes the volume required to maintain the existing project through 2049.

Table 32: RED Benefits

Alternative	No Action	Alternative 3e Dune & Berm (16ft NAVD88 dune & 100 ft berm width)	Alternative 3i Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Local Capture	-	$65,860,367	$34,136,426	$66,374,969
Output	-	$184,001,696	$95,370,867	$185,439,399
Jobs FTE*	-	978.00	506.90	985.60
Labor Income	-	$86,042,543	$44,597,154	$86,714,839
Value Added	-	$112,129,522	$58,118,430	$113,005,650

Based on benefits alone, Alternative 3e contributes the relative most of all plans to the NED and RED accounts. Alternative 3j ranks second and Alternative 3i ranking third.

Table 33: EQ Benefits

P&G Account	No Action	Alternative 3e Dune & Berm (16 ft NAVD88 dune & 100 ft berm width)	Alternative 3i Dune & Berm (16 ft NAVD88 dune & 60 ft berm width)	Alternative 3j Dune & Berm (18 ft NAVD88 dune & 60 ft berm width)
Environmental Quality (EQ)	-	-*	-	-
* Impacts are deemed to be minimal and temporary. See EQ Discussion for further explanation.				

The EQ account displays the non-monetary effects on ecological, cultural, and aesthetic resources including the beneficial and adverse effects of proposed project elements. The EQ rating is taken from Table 25 and represents the combined scores for the each of the alternatives

Alternative 3e provides the greatest contributions to the planning objectives than any of the other alternative plans. Additionally, Alternative 3e provides the greatest economic (NED and RED) benefits and so contributes the most, compared to other alternatives, to the planning objective related to managing structure damage and other national economic development impacts.

Alternatives 3e and 3j contribute a similar and significant amount of OSE benefits, which were assessed based on contributions to well-being such as the life safety, community resilience, and recreation. The alternative plans all enhance community resilience and manage risk to life safety, population, and businesses. Alternative 3i contributes the least to the OSE account due to the relative lower contribution to life safety, community resilience, and recreation.

Table 34: Comparison of Alternatives

FEDERAL OBJECTIVES	Maximize Economic Development				Avoid Unwise Use of Floodplains and Flood Prone Areas	Protect and Restore Natural Systems			
GUIDING PRINCIPLES	Sustainable Economic Development				Public Safety	Healthy and Resilient Ecosystems			
PLANNING OBJECTIVES	Obj 2	Obj 2	Obj 2	Obj 2	Obj 1	Obj 1			
P&G ACCOUNTS	NED	NED	NED	RED	OSE	EQ			
FORMULATION/ EVALUATION CRITERIA	Acceptability	Efficiency	Effectiveness		Effectiveness	Effectiveness	Completeness	Acceptability	
METRICS	Incremental First Cost	BCR (INT SLC)	Annual NED Net Benefits	Annual RED Benefits	Life Safety Risks Reduced	ER Benefits	Accounts for Necessary Investments	Implementability	Satisfaction
ALTERNATIVE 1: NO ACTION EXISTING PROJECT (NO DUNE, 100 FT BERM WIDTH)	$0	-	-	-	No	-	Yes	No	No
ALTERNATIVE 3E: DUNE & BERM (16 FT NAVD88 DUNE, 100 FT BERM WIDTH)	$52,052,000	1.06	$2.76M ($150k net)	++	Yes	No Change	Yes	Yes	Yes
ALTERNATIVE 3I: DUNE & BERM (16 FT NAVD88 DUNE, 60 FT BERM WIDTH)	$32,064,000	0.3	$0.44M (-$990k net)	+	Yes	Reduction in Berm	Yes	Yes	Yes
ALTERNATIVE 3J: DUNE & BERM (18 FT NAVD88 DUNE, 60 FT BERM WIDTH)	$58,671,000	0.96	$2.59M (-$122k net)	++	Yes	Reduction in Berm	Yes	Yes	Yes

Shown in Table 29 and further described in Section 4.7.2, all alternatives, including the No Action are considered complete. No Action would not provide any incremental enhancement of the existing project, and would therefore not be effective, efficient, or acceptable. Alternative 3e is the only alternative that meets all four P&G criteria deeming it the only alternative plan that is complete, effective, efficient, and acceptable. Given their negative net benefits, Alternatives 3i and 3j do not satisfy the efficiency criteria.

Alternative 3i has the lowest incremental first cost estimated at $32,064,000 and Alternative 3j demonstrated the highest incremental first cost at $58,671,000. Alternatives 3e and 3j demonstrate comparable incremental CSRM benefits at $2,755,000 and $2,590,000 respectively. However, only Alternative 3e yielded positive net benefits. Further, Alternative 3e meets both of the study's planning objectives and provides the greatest net economic benefit of the alternatives in the final array. Given their similar estimated incremental costs, Alternatives 3e and 3j are anticipated to provide more RED benefits than Alternative 3i. While Alternatives 3e, 3i, and 3j all result in encroachment upon the intertidal zone, the implementation of a 100 ft berm width would pose less adverse impacts to wildlife when compared to the reduced berm width proposed under Alternatives 3i and 3j. All three alternatives would provide an improvement to life safety and community resilience. However, Alternative 3e, due to the maintained berm width of 100 ft, and Alternative 3j, due to the higher relative crest elevation dune of 18 ft, would contribute greater benefits to life safety and community resilience. The reduced berm width of Alternatives 3i and 3j would result in negative impacts to recreation while Alternative 3e, as a result of the maintained 100 ft berm width, would result in no impact to recreation and is assumed to provide the same level of recreation benefit as the existing project.

Alternative 3e had the highest incremental CSRM benefit, estimated to be $2,755,000 in average annual equivalent benefit over the full period of analysis. Given its average annual equivalent cost, Alternative 3e is expected to yield $150,000 in average annual equivalent net benefits, corresponding to a benefit-cost ratio of 1.06.

All estimated costs, benefits, impacts, and trade-offs for each alternative plan were considered. The study team, including the NFS, selected Alternative 3e as the Tentatively Selected Plan.

Chapter 6: NEPA Environmental Effects Analysis

This chapter describes the existing and projected future conditions for each of the resources that reasonably could be expected to be impacted by the project and its Area of Potential Effect. Existing and projected future condition descriptions include physical, chemical, biological, and sociological conditions. These conditions are described without implementation of the alternative actions and with implementation of the alternative actions, including implementing best management practices. The comparison of without-project activity project (which assumes continued maintenance and renourishment under the existing authorization until 2049) and with-project conditions defines the impacts of the alternatives.

6.1 Socioeconomics

6.1.1 No Action/ Future Without Project

Under the No Action/Future Without-Project Alternative, socioeconomic conditions are expected to continue to follow local and national trends. No effect is expected to socioeconomic conditions.

6.1.2 Action Project Alternative

The impacts to socioeconomics will provide additional protection to include improved resiliency against catastrophic damages to life, property, infrastructure and structures, primarily residential structures, in the Study Area. Residents in the study should experience reduced damages to their property and should require fewer repairs and less expenditure to maintain their property. As less monetary expenditure is required on protecting the structures, the excess funds can be consumed elsewhere or provide opportunities for saving. Additionally, revenue collected from recreation activities will not be reduced by the alternative. The beaches that allow the collection of said recreation revenue will be maintained, resulting in a desirable beach for continued recreation activities. This is an important financial factor for towns located in the Study Area.

6.2 Geology and Soils

6.2.1 No Action/Future Without Project

Existing dredging and renourishment actions within the Project Area would continue until 2049. Adding compatible sand to areas that have naturally eroded are not expected to significantly alter the geology in the Project Area.

6.2.2 Action Project Alternative

Sand would continue to be placed in the Project Area. The revised template would result in up to 100.41 acres of sand placed in Section II of the project. The proposed project would add a dune and shift the template up to 92 feet into the Atlantic Ocean (if 40 feet of advanced fill is implemented). Shifting the template would not result in a change to the existing sediment grainsize or underlying geology.

6.3 Water Resources and Water Quality

6.3.1 No Action/Future Without Project

Temporary and negligible to minor adverse impacts to water quality that result from current maintenance operations that include increased Total Suspended Solids, turbidity, and nutrient levels would continue at dredging sites. Overall impacts to water quality with current operations are temporary, adverse and negligible to minor.

All dredging and placement activities would comply with the current Water Quality Certification (WQC) issued by the NJDEP. The dredging and nourishment operations would result in temporary, adverse impacts to water quality that are negligible to minor.

6.3.2 Action Project Alternative

Implementation of the Action Alternative may result in a temporary increase in Total Suspended Solids and turbidity in the dredging area and renourishment areas. These adverse water quality impacts would be temporary in nature and are anticipated to result in minor levels of impact, primarily in the sediment plume, which should quickly settle due to the predominant sand sediments to be dredged.

All dredging and placement activities would comply with the any WQC issued by the NJDEP. The dredging and nourishment operations would result in temporary, adverse impacts to water quality that are negligible to minor.

6.4 Floodplains

6.4.1 No Action/Without Project

The current authorized project places sand within a special flood hazard area subject to inundation by the 1% annual chance flood and is considered a coastal flood zone velocity hazard. This action was determined to minimize threats to life and property.

6.4.2 Action Project Alternative

The proposed action would place sand and create dunes within a special flood hazard area subject to inundation by the 1% annual chance flood and is considered a coastal flood zone velocity hazard. This action will improve protection to life and property in the event there is a large coastal storm.

6.5 Essential Fish Habitat (EFH)

6.5.1 No Action/Without Project

Intertidal and nearshore EFH will be sequentially altered by burial and localized increases in turbidity. EFH alteration impacts also include temporary loss of most benthic fauna as each worksite reach is covered. Benthic recovery begin almost immediately, and 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 may represent the period of highest risk to eggs and larvae along the nearshore during placement operations.

Over the lifetime of the project, numerous planned dredging events at the Sea Bright Offshore Borrow Area (SBOBA) will result in altered habitat, loss of prey species, and entrainment of early life history stages of EFH species as well as non-managed species. The District also agrees that some of these impacts will be temporary and others can be minimized with the use of best management practices as suggested in Service's EFH recommendations which the District implements:

> The pumps that extract the sand will not be turned on until the drag-head is at or near the sea bottom and will be turned off prior to its being lifted from the sea bottom. The implementation of this measure will eliminate the entrainment of resources that occupy areas in the lower, middle and upper levels of the water column. This practice is common because it facilitates optimal operating efficiency to reduce operating costs.
>
> The maximum depth that will be dredged for each dredging event will not exceed 20 feet below existing grade. This practice will avoid making deep holes, thus minimizing the potential to create anoxic environments.

6.5.2 Action Project Alternative

Approximately 100.14 acres of intertidal and nearshore EFH will be sequentially altered by burial and localized increases in turbidity. EFH alteration impacts also include temporary loss of most benthic fauna as each worksite reach is covered. Benthic recovery of each placement site 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 may represent the period of highest risk to eggs and larvae along the nearshore during placement operations.

6.6 Wildlife

6.6.1 No Action/Without Project

Intertidal and Nearshore Species

No significant 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 may represent the period of highest risk to eggs and larvae along the nearshore during placement operations because this period coincides 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. 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.

Intertidal and Nearshore Benthos

Areas of intertidal and nearshore (placement sites) would be covered with sand from either the SBOBA or a newly permitted borrow area off the coast of NJ. The intertidal and near shore zones of the Atlantic Coast of NJ 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. This same regenerative capacity, documented by the USACE ERDC (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.

As each renourishment contract is completed, intertidal and near shore recovery will occur. Thus, each area is expected to fully recover before the next renourishment as they are expected to be 6 years apart.

Marine Mammals

According to Todd et al. (2014), there are few studies on the effects of dredging and placement of material on marine mammals due to dredging activities in isolation. In terms of direct effects, vessel collisions are possible, but improbable because dredges operate either in a stationary position or at low speeds. The risk of injury to marine mammals from collisions with dredge-related vessels is considered discountable considering the species mobility and slow speed of the dredge vessels (10 knots or less) and associated barges and scow. Also, trained personnel that know how to recognize the presence of threatened and endangered whale and sea turtle species are always onboard to help ensure that vessel interactions are avoided. No marine mammal strikes with dredge-related vessels has ever been reported to occur in the Project Area.

Effects of turbidity are often localized with minimal direct impact on marine mammals (Todd et al., 2014). No Level A or B harassment to marine mammals occurs with existing dredging and dredged material placement operations. Todd et al. (2014) note that the indirect effects of dredging are more complex, and less understood. In general, literature has suggested that dredging can cause reductions in biomass and varying levels of prey availability, depending on the surrounding conditions. However, it is also noted that marine mammals can likely compensate for small-scale changes in prey by switching prey species or moving to other foraging areas (Todd et al., 2014).

Marine mammals that may occur in the Project Area are highly mobile, and it is expected that they would move away from disturbance such as noise or equipment operations. Therefore, the species are likely to move and forage elsewhere during the operation. Noise generated by dredge activities would not be expected to affect migration, nursing, breeding, feeding, or sheltering.

Overall, no Level A or Level B harassment to marine mammals from implementation of the Action Alternative is anticipated. Overall, no substantive disruption of behavioral patterns to migration, breathing, nursing, breeding, feeding or sheltering would be anticipated.

Threatened and Endangered Species

Through coordination via Section 7 of the Endangered Species act the District has consulted with the USFWS and obtained a 2002 Programmatic BO. For each renourishment contract, the District will continue to coordinate with the Service on the area where renourishment will take place through a Streamlined BO.

For species under NMFS jurisdiction, the existing project is covered by a BO dated March 7, 2014.

During the course of the project there has been no recorded take of any listed species covered under the BOs obtained.

6.6.2 Action Project Alternative

Intertidal and Nearshore Species

No significant 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 coincides 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.

Up to 100.41 acres of potential intertidal to nearshore foraging habitat will sequentially altered and may be temporarily unavailable to common surf zone 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.

Intertidal and Nearshore Benthos

Approximately 100.14 acres of intertidal and nearshore (placement sites) will be covered with sand from either the SBOBA or a newly permitted borrow area off the coast of NJ. The intertidal and near shore zones of the Atlantic Coast of NJ project sites are highly dynamic environments which have the capacity to quickly recover from extremely powerful and destructive regional natural 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.

As each renourishment contract is completed, intertidal and near shore recovery will occur. Thus, each area is expected to fully recover before the next renourishment as they are expected to be 6 years apart.

Marine Mammals

According to Todd et al. (2014), there are few studies on the effects of dredging on marine mammals due to dredging activities in isolation. In terms of direct effects, vessel collisions are possible, but improbable because dredges operate either in a stationary position or at low speeds. The risk of injury to marine mammals from collisions with dredge-related vessels is considered discountable considering the species mobility and slow speed of the dredge vessels (10 knots or less) and associated barges and scow. Also, trained personnel that know how to recognize the presence of threatened and endangered whale and sea turtle species are always onboard to help ensure that vessel interactions are avoided. No marine mammal strikes with dredge-related vessels has ever been reported to occur in the Project Area.

According to Todd et al. (2014), there are few studies on the effects of dredging and placement of material on marine mammals due to dredging activities in isolation. In terms of direct effects, vessel collisions are possible, but improbable because dredges operate either in a stationary position or at low speeds. The risk of injury to marine mammals from collisions with dredge-related vessels is considered discountable considering the species mobility and slow speed of the dredge vessels (10 knots or less) and associated barges and scow. Also, trained personnel that know how to recognize the presence of threatened and endangered whale and sea turtle species are always onboard to help ensure that vessel interactions are avoided. No marine mammal strikes with dredge-related vessels has ever been reported to occur in the Project Area.

Effects of turbidity are often localized with minimal direct impact on marine mammals (Todd et al., 2014). No Level A or B harassment to marine mammals occurs with existing dredging and dredged material placement operations. Todd et al. (2014) note that the indirect effects of dredging are more complex, and less understood. In general, literature has suggested that dredging can cause reductions in biomass and varying levels of prey availability, depending on the surrounding conditions. However, it is also noted that marine mammals can likely compensate for small-scale changes in prey by switching prey species or moving to other foraging areas (Todd et al., 2014).

Marine mammals that may occur in the Project Area are highly mobile, and it is expected that they would move away from disturbance such as noise or equipment operations. Therefore, the species are likely to move and forage elsewhere during the operation. Noise generated by dredge activities would not be expected to affect migration, nursing, breeding, feeding, or sheltering.

Overall, no Level A or Level B harassment to marine mammals from implementation of the Action Alternative is anticipated. Overall, no substantive disruption of behavioral patterns to migration, breathing, nursing, breeding, feeding or sheltering would be anticipated.

Threatened and Endangered Species

The Recommended Plan would shift the template to the east in order to add a dune. Though dunes are less favorable habitat for piping plover or seabeach amaranth, there is no reduction of available berm space. Any impacts to these species are discussed in detail in Appendix A1.

6.7 Cultural Resources

A more detailed analysis of the Cultural Resources for this project can be found in the Cultural Resource Appendix A6

6.7.1 No Action/Future Without Project

Under this alternative, no measures would be implemented to address future storm risk, which are anticipated to worsen due to relative sea level rise. As a result, this alternative would leave existing aesthetic, visual, historical, and cultural resources vulnerable to damage. Historic Properties within the study area face the risk of deterioration or destruction from coastal storms.

Under the current PA, signed in 2022 by the District, BOEM and NJ SHPO, future renourishment cycles would continue to be managed as laid out. This includes avoidance of identified shipwrecks and other submerged resources within borrow areas, survey of new borrow areas to identify buried cultural resources and periodic monitoring of sand pumped from the Sea Bright Borrow Area.

6.7.2 Action Project Alternative

Direct Effects

The Direct APE for the Proposed Activity comprises the entirety of Section II, the 9 mile stretch of beach from Asbury Park to Manasquan. The proposed activity includes the construction of a 16-foot dune and 100-foot-wide berm which could vary depending on location. As part of the District cultural resources survey it identified the historic properties within the direct APE and evaluated the potential effect the Proposed Activity would have on those historic properties.

There is one SR/NRHP-listed Historic District within the direct APE, the Ocean Grove Camp Meeting Association Historic District (NRIS ID: 76001170). The contributing homes, meeting house, ocean pathway and pilgrim pathway are all located outside of the direct APE. The only individual contributing properties to the Historic District that are within the direct APE are the Boardwalk and Pier. Both were destroyed and reconstructed following Hurricane Sandy.

Additional properties located within the direct APE include. The Asbury Park Convention Hall (SR/NRHP listed, 1979, NRIS ID: 79001512), the Howard Johnson Pavilion (Eligible, SHPO Opinion 1/9/2003), and the Asbury Park Casino and Carousel (Eligible, SHPO Opinion 1/11/1990). There is also one potential Historic District identified that may require additional review and an NRHP eligibility assessment, the Waterfront Resort Historic, which may extend the entire length of the Asbury Park beachfront. This area will be further assessed as more detailed project designs are developed.

The Proposed Activity will involve the construction of a dune adjacent to the properties within the direct APE, in the case of the Asbury Park Convention Hall and the Ocean Grove Boardwalk and Pier it may require modifications to the properties to complete the line of protection. To address adverse effects to the historic properties the District is proposing further analysis as more detailed designs are developed to ensure that any adverse effects are avoided, minimized or mitigated in consultation with the SHPO and additional consulting parties. As plans are advanced the District will consider design changes, treatments to minimize effects, and vibration monitoring if necessary to ensure structural damage is avoided.

Indirect Effects

The District also evaluated the potential for indirect effects to historic properties. The indirect APE has been defined as extending 250 feet landward from the direct APE and in the nearshore of the sand placement area. The indirect APE was formulated to capture any properties that may be affected by changes to setting, viewshed, or vibration during construction.

There are three listed or eligible Historic Properties within 250 feet of the Proposed Activity. All properties are located along the east side of Ocean Blvd, so they are not expected to be affected by construction. The properties are The Stone Pony (Eligible, SHPO Opinion 3/27/2024), Berkley-Carteret Hotel (Eligible, SHPO Opinion 10/21/1981), and Life Saving Station #9.

The Proposed Activity is not expected to alter the setting in a significant way for the historic properties within the indirect APE. The oceanside viewshed for each property and district has already been altered significantly over time due to storms and other modifications to the shoreline that have occurred over the years. In most reaches a dune is already present and would only be replaced with a taller dune. In other areas, such as Spring Lake where there is no dune, the addition of a dune seaward of the Boardwalk is not expected to be imposing as it would be compatible with the beach community setting. A dune will also provide beneficial effects to the many inland historic properties in the communities through the reduction of storm related impacts such as erosion and flood related damage to the historic fabric of the structures.

In addition to the properties listed above there are also two submerged resources within the indirect APE, the Amity and the Western World, which are located approximately 550 feet offshore in (Manasquan and Spring Lake). The Proposed Activity involves placement of sand in the vicinity of the shipwrecks and may require placement of dredging and pumping equipment in the vicinity temporarily. No adverse effects are anticipated from the placement of sand on and around the wrecks or from the pumping activities provided that the project continues to follow the stipulations in the PA to employ a 200-foot buffer for any near shore and offshore work.

The District also considered the potential for effects to submerged historic properties located within sand borrow areas. The Proposed Activity is expected to utilize the same sand sources that are utilized for the existing Sandy Hook to Barnegat Inlet Beach Erosion Control Project. Under the current Project PA any sand sources must be subject to remote sensing cultural resources surveys and treated in accordance with Stipulations I. The PA amendment being prepared for this GRR will ensure that any sand sources utilized for the construction of the Proposed Activity will follow the same Stipulations therefore there will be no effect to historic properties.

6.8 Aesthetics

6.8.1 No Action/Future Without Project

Under the No Action alternative, the beach would remain a largely flat berm with some local dunes in place. The continued renourishment would continue to benefit the scenic coastal resource.

6.8.2 Action Project Alternative

The Recommended Plan would continue to benefit the scenic coastal resource present by maintaining the width of the berm. The addition of dunes would add benefits to the scenic coastal resource as dunes are a naturally occurring feature in coastal areas. Residents of the coastal communities may be impacted by the dunes from a loss of viewshed. The construction of the dunes may prevent some residences from beach and ocean views.

6.9 Recreation

6.9.1 No Action/Future Without Project

The No Action alternative actions would continue to keep recreational benefits high due to the maintenance of an enlarged berm and beach area. This will include passive activities such as sunbathing and walking to more active past times including windsurfing and swimming. Depending on the location the quality of surfing and surf fishing may be reduced.

6.9.2 Action Project Alternative

In regard to recreation, the results of the project actions will generally stay the same as the available berm area would not be reduced. There would be no change from the without project conditions.

6.10 Hazardous, Toxic, and Radioactive Waste

6.10.1 No Action/Future Without Project

The No Action alternative would not include any site excavations, only maintenance of the beach area and therefore, would not be impacted by the presence of HTRW.

6.10.2 Action Project Alternative

Database Records Background

A review of EPA and NJDEP online databases was conducted, using both the EPA's Cleanups in my Community tool and the NJ Geoweb portal, to help determine if any active remedial or release sites were present in the project area that could impact berm placement/enlargement. These online tools pull remedial site information from several federal and state programs such as the EPA's CERCLA/Superfund and Resource Conservation and Recovery Act, and NJ's Industrial Site Recovery Act, Spill Discharge Act, and regulated tank program.

EPA or Federally Listed Sites

One EPA Superfund site was identified in the project area, but none were identified adjacent to it. The Superfund site is further described below:

> Swan Laundry and Cleaners, Sea Girt, EPA Id: NJSFN0204241 – this site is impacted with chlorinated solvents in groundwater. The portal entry contains a link to this site's EPA site information page, which includes remedial history and notes from a public information session in 2023. The site has recently undergone groundwater remediation using pump and treat methods, and a 2023 groundwater plume map shows low-level chlorinated solvents in groundwater along a roughly 1,000-foot-long section behind Crescent Park, along the beach in Sea Girt.

The presence of this Superfund site is not expected to impact project area work given, a) it is associated with groundwater impacts and not soil contamination and b) the nature of the planned beach renourishment work does not include dewatering/pumping groundwater from the impacted area. However, if any excavations or dewatering of groundwater are planned here in the future, consultation with NFS and EPA is necessary to determine roles/responsibilities and needed steps to safely work and discharge water.

NJDEP or State Listed Sites

There is one (1) active state listed site in the project area, which is further described below:

> The Sea Girt National Guard Training Center, 500 Sea Girt Avenue, Sea Girt, Preferred Id (PI) # 000682. In addition to the NJ Geoweb portal, several other sources of information were consulted to obtain remedial information for the training center, including a 2015 EA and 2019 Integrated Natural Resources Management Plan (INRMP). According to these sources, the training center is associated with several areas of concern (AOCs) related to past underground oil tank spills, polychlorinated biphenyls leaks from transformers, a release of grease, asbestos and lead paint in soil from building demolition, and lead in soil from firing ranges. However, most these AOCs have been remediated and given an No Further Action designation by NJDEP. Several remain; however, they are mostly in the developed area of the training center on the western or central portion of the property, away from the project area.
>
> The portion of the installation within the project area, is comprised of beach and is directly adjacent to a vegetated dune area approximately 300 feet in width, running the length of the training center property lot. According to the 2019 INRMP, two (2) AOCs exist on the western side of the vegetated dune and include both a small arms range and an area of buried asbestos containing material. Therefore, it is possible that the vegetated dune itself contains buried asbestos and lead from the range. Since this is a beach renourishment project with limited to no excavation, these AOCs are not likely a concern; however, if any excavation is later required here or in the beach area immediately adjacent to it, the NJ Department of Military and Veteran Affairs should be contacted to determine any necessary steps prior to excavation.

Three (3) active sites were identified adjacent to the project area and are further described below:

> Jersey Central Power & Light: 714 Morven Terrace, Sea Girt, PI # 1017633 – covered under the NJ spill discharge act, this release includes petroleum impacts due to a past spill but no associated/documented groundwater contamination area (CEA) extending off-site was noted.
>
> Casino Property: 700 Ocean Avenue, Asbury Park, PI # 030784 – covered under regulated underground storage tank (UST) program and includes a release from a regulated UST with groundwater impacts but no associated/documented CEA extending off-site was noted.
>
> Ocean Place Spa & Resort: 1 Ocean Blvd., Long Branch, NJ, PI # 032412 – covered under the spill discharge act and includes semi-volatile impacts to groundwater due to a past spill. A CEA is associated with the site but according to the NJ Geoweb map, it does not extend into the project area.

The presence of these three (3) adjacent state listed sites is not expected to impact project area work given, a) there are no documented impacts to the project area and b) the project is primarily focused on beach renourishment with minimal site excavation and/or dewatering of groundwater in these areas.

Borrow Area Material

Material for beach replenishment will be in the form of dredged material/sand obtained from up to twelve separate borrow areas off the coast of the project area. It should be noted that the definition of HTRW, per ER 1165-2-132, excludes “dredged material and sediments beneath navigable waters proposed for dredging”, unless they are included in the “boundaries of a site designated by the EPA or a state for a response action under CERCLA”. A review of federal and state databases did not identify any remedial sites near the existing (SBOBA) and proposed borrow areas. Therefore, the borrow material is not considered an HTRW risk for the project at this time.

Also of relevance, ocean dumping regulation 40 CFR 227.13(b), states that dredged material meets criteria for ocean placement without additional testing if one of the following is true: a) it is comprised predominantly of sand and is found in coastal areas with shifting bars or channels or b) it is for “beach nourishment and comprised predominantly of sand, gravel or shell with particle sizes compatible with material on receiving beaches”. It is likely that sand from the borrow areas meets these criteria and is therefore not subject to testing prior to placement.

6.11 Air Quality

6.11.1 No Action/Without Project

The No-Action Alternative would result in the continued renourishment cycles planned through 2049. Emission calculations based upon the equipment inventory developed for construction of each federal project within the Sea Bright to Manasquan area were determined via each project General Conformity analyses. There will be no impacts resulting from theses project since all emissions resulting from each USACE project within the NYNJLICT NAA will be fully offset.

6.11.2 Action Project Alternative

The Action Alternative would result in the continued renourishment cycles planned through 2049. Emission calculations based upon the equipment inventory developed for construction of each federal project within the Sea Bright to Manasquan area were determined via each project General Conformity analyses.

USACE has demonstrated conformity with the NJ State Implementation Plan, as required and regulated by the General Conformity Rule of the Clean Air Act, as Amended 1990 by utilizing the emission offset options listed below for the renourishment project that has been in construction since 2019. Compliance with the July 2019 Final Statement of Conformity (SOC) consists of any combination of options as listed by priority below and is not required to include all options or any single option to meet conformity. The options for meeting general conformity requirements include the following:

Emission reductions from project and/or non-project related sources in an appropriately close vicinity to the project location. In assessing the potential impact of this offset option on the construction schedule, USACE recognizes the possibility of lengthening the time period in which offsets can be generated as appropriate and allowable under the general conformity rule (40 CFR §93.163 and §93.165).

Use of Surplus NO_x Emission Offsets (SNEOs) generated under the Harbor Deepening Project (HDP) or subsequent offset generating programs. As part of the mitigation of the HDP, USACE and the Port Authority of New York & New Jersey developed emission reduction programs coordinated through the Regional Air Team (RAT). The RAT is comprised of the USACE, NJDEP, New York State Department of Environmental Conservation (NYSDEC), EPA, and other stakeholders. SNEOs will be applied in concurrence with the agreed upon SNEO Protocols to ensure the offsets are real, surplus, and not double counted.

Use of Clean Air Interstate Rule ozone season NO_x Allowances with a distance ratio applied to allowances, similar to the one used by stationary sources.

Due to the unpredictable nature of dredge-related construction preliminary estimates of sand volume required to restore the integrity of the coastline the project emissions will be calculated during the preparation of the Plans and Specifications for each construction contract and full mitigation will be achieved via one of the options listed above for each year of construction and continue to be regularly reported to the RAT.

In summary, USACE has been successfully achieving conformity for NOx using the options outlined above, as coordinated with the NJDEP and coordinated through the RAT since the signing of the Sea Bright to Manasquan SOC in July 2019.

6.12 Noise and Vibration

6.12.1 No Action/Without Project

There will be negligible increases in noise levels in the immediate vicinity of each of the currently authorized project placement site for each of the project locations during construction. 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. Increased noise levels will last only as long as each project’s construction duration. No long-term noise impacts anticipated.

6.12.2 Action Project Alternative

The TSP is within the same footprint as the currently authorized project. Therefore, there will be negligible increases in noise levels in the immediate vicinity of each project placement site for each of the project locations. 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. Increased noise levels will last only as long as each project’s construction duration. No long-term noise impacts anticipated.

6.13 Summary of Mitigation Measures

Per NEPA, mitigation includes (a) avoiding the impact by not taking a certain action or parts of an action; (b) minimizing the impact by limiting the degree of the action and its implementation; (c) rectifying the impact by repairing, rehabilitation or restoring the effected environmental; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (e) compensating for the impact by replacing or providing substitute resources or environments.

No compensatory mitigation is proposed for the project. However, the District will be implementing the following mitigation measures below that will avoid, minimize and reduce adverse impacts to environmental and cultural resources;

- EFH BMPs to include construction Best Management Practices
- ESA BMPs to include construction timing restrictions
- Purchase of CAA credits
- Continue to survey new borrow areas, avoid staging/placing a line on known resources, avoid construction activities on historic properties
- Dune Plantings

6.14 Irreversible and Irretrievable Commitment of Resources

There are several resources, both natural and built, that would be expended during the construction and operation of the proposed project. These resources include the land area used to construct the project. Materials used for construction; energy in the form of gas and electricity consumed during construction and routine maintenance activities; and the human effort (time and labor) required to develop construct and maintain various project components. These resources are considered irretrievably committed because their reuse for some purpose other than the project would be highly unlikely. This commitment of resources and material has been weighed against the public purpose and need for the proposed action and would provide various social, environmental and economic benefits.

Chapter 7: Tentatively Selected Plan

The National Economic Development (NED) Plan – Alternative 3e – has been selected as the TSP. The TSP specifies a uniform design profile across all of Section II, inclusive of the northern extent of Asbury Park through the southern extent of Manasquan Borough consisting of a +16 ft NAVD88 crest elevation dune and 100 ft wide berm. The TSP consists of:

- A dune at elevation +16 ft NAVD88 with a 25 ft dune crest width and 1V:5H side slopes;
- A 100 ft wide berm at elevation +9.3 ft NAVD88;
- A foreshore slope of 1V:10H from the seaward edge of berm to mean low water (MLW) (approximately -2.7 ft NAVD88) which transitions to a 1V:40H slope past MLW until the design profile meets the existing offshore profile;
- In addition to the anticipated renourishment quantities of the existing project, an additional beachfill quantity of 1,114,000 CY is anticipated for initial placement, and renourishment of 155,000 CY every six years in years 2037, 2043, and 2049, resulting in an estimated 1,579,000 CY total incremental project fill volume relative to the total project fill volume of the existing project, 7,938,000 CY. The total project fill volume for Alternative 3e, including the volume required to maintain the existing project, is 9,517,000 CY. Quantity estimates include feeder beach quantities, tolerance, and overfill, but not advanced fill;
- Cross-overs are designed as on-grade sand-paths. There are 89 pedestrian, 19 vehicular, and 12 Americans with Disabilities Act compliant cross-overs;
- Dune grass planted 18 inches apart and 48,000 linear feet of sand fence.
- The dimensions of the design template and necessary advanced fill for engineering performance will be further evaluated for the final integrated report.

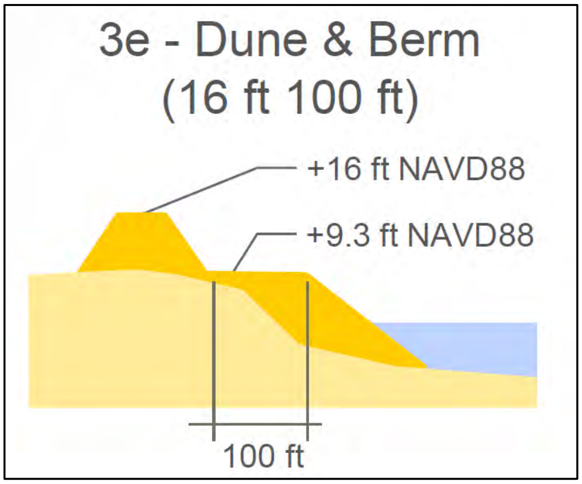

Figure 14: TSP - Alternative 3e

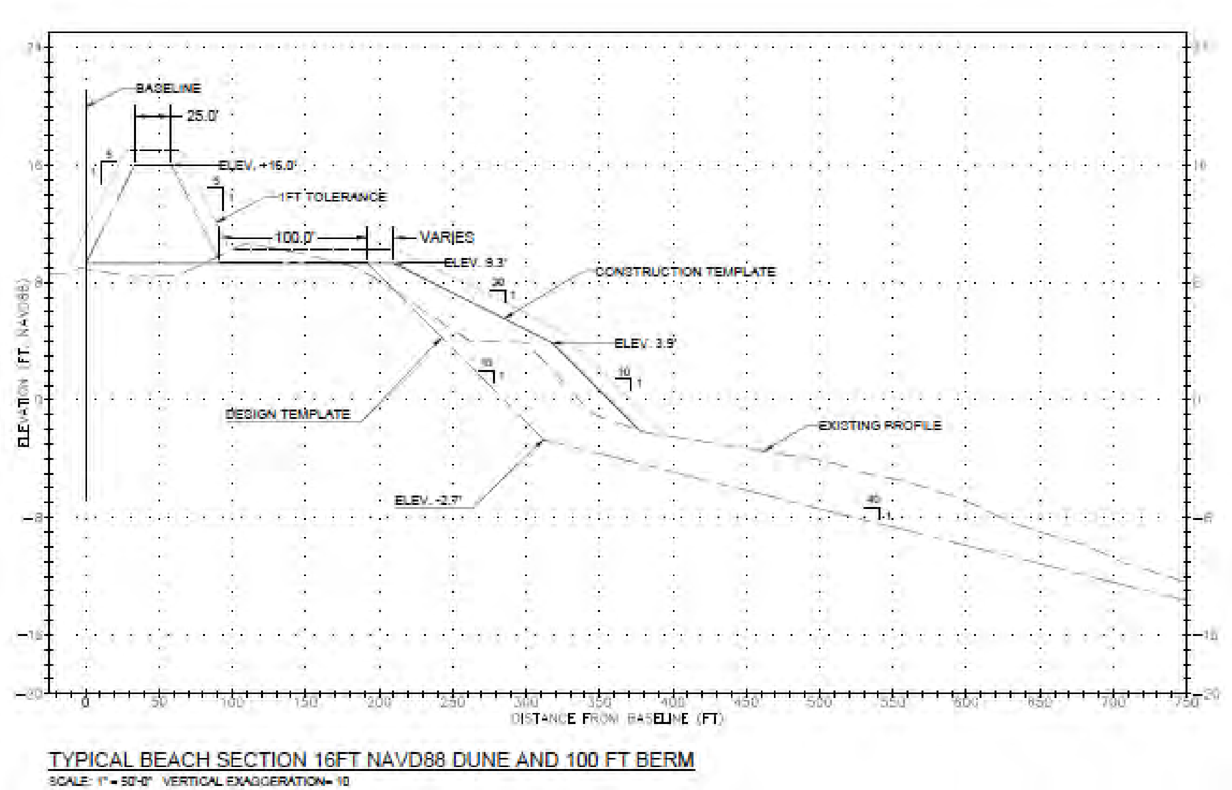

Figure 15: Typical Cross Section of a 16ft NAVD88 Dune and 100ft Wide Berm

Figure 16 depicts the approximate height of the proposed dune at a given location in Manasquan Borough. The purpose of the rendering is to demonstrate the relative height of the proposed dune in Manasquan Borough. This rendering does not reflect a final design. The perceived height of the dune will vary across Section II as it directly relates to the existing elevation of the berm near the footprint of the proposed dune. Additional renderings will be included as part of the final integrated report.

Figure 16: Preliminary rendering of TSP, Alternative 3e implemented in Manasquan, NJ.

7.1 Estimated Costs

The TSP has an estimated Project First Cost $52,052,000; this is the constant dollar cost at current price level of the incremental cost of the proposed improvements. The continuing construction cost of $16,360,000 includes periodic renourishment approximately every six years through 2049. Table 35 shows the nourishment quantities required for the existing project template, the TSP template, and the incremental quantity required. The breakdown of the incremental Project First Cost is presented in Table 36. A summary of the incremental AAEQ costs of the TSP is presented in Table 37 .

Table 35: Sand Quantities for Existing Authorized Project and Tentatively Selected Plan

Event	Existing Project, Total [cy]	Alternative 3e, Total [cy]	Incremental Volume Needed for TSP* [cy]
Initial Fill (2031)	1,041,000	2,155,000	1,114,000
Renourishment Fill (2037)	2,299,000	2,454,000	155,000
Renourishment Fill (2043)	2,299,000	2,454,000	155,000
Renourishment Fill (2049)	2,299,000	2,454,000	155,000
Total Project Fill	7,938,000	9,517,000	1,579,000
*Tentatively Selected Plan is the Incremental Improvements to the existing project and inform the incremental benefit to cost ratio and net benefits used in the evaluation.			

Table 36: First Cost of TSP

ACCOUNT		
01	Lands and Damages	$715,000
06	Fish and Wildlife Facilities	$629,000
17	Beach Replenishment	$42,305,000
18	Cultural Resource Preservation	$224,000
30	Planning, Engineering, and Design	$5,649,000
31	Construction Management	$2,530,000
Project First Costs		**$52,052,000**
17	Beach Replenishment	$13,788,000
30	Planning, Engineering, and Design	$1,790,000
31	Construction Management	$782,000
Continuing Construction or Replenishment First Costs		**$16,360,000**
FY25 Price Level; 3% Federal Discount Rate Incremental cost of improvements to existing project.		

Table 37: TSP Incremental AAEQ Costs

	COST
Project First Cost	$52,052,000
Interest During Construction	$2,365,000
Total Investment Cost	**$54,417,000**
AAEQ Investment Cost	$2,115,000
AAEQ Scheduled Renourishment	$450,000
AAEQ Major Rehabilitation	$
AAEQ Beach Maintenance Cost	$40,000
AAEQ Coastal Monitoring	$
AAEQ Environmental Monitoring Cost	$
Total AAEQ Cost	**$2,605,000**
FY25 Values; 3% federal discount rate; Annualized over 50 years	

7.2 Economic Benefits

The recommended plan includes a range of economic benefits quantified by the Beach-fx model (version 2.0). Beach-fx is a Monte Carlo simulation model developed by USACE that incorporates a new framework for performing engineering-economic analyses associated with storm damage reduction studies. Beach-fx utilizes a database that describes the coastal area under study, a suite of historically-based plausible storm events that can impact the area, an inventory of structures that can be damaged, and the estimated morphology response of the anticipated range of beach profile configurations to each storm in the plausible storm suite, together with the driving parameters for flooding and wave impact damages.

The project first cost is used as the basis for providing the cost of the project for which authorization is sought. The project first cost includes the PED costs; construction costs, including mitigation costs; lands, easements, rights-of-way and relocations; and contingencies. The economic cost is the monetary equivalent cost used in determining the benefit-cost ratio. The economic cost includes the project first cost and the opportunity costs of using the resource.

Future Without-Project Economic Damages.

Economic damages caused by coastal storms were estimated under a FWOP condition. Coastal storm risk was evaluated under the USACE intermediate RSLC scenarios (pursuant to ER 1110-2-8162). Within the economic analysis, the damage categories assessed include: commercial structures, municipal structures, apartment structures, residential structures, and vehicles. As shown in Table 38 , of the damage categories shown, residential structures demonstrated resulting damages of $197M. Approximately 86% of the structures accounted for within the structure inventory are considered residential.

Table 38: Section II FWOP Damages by Category

	Damages ($)				
	Commercial	**Municipal**	**Apartment**	**Residential**	**Vehicles**
Total	$68,952,000	$448,000	$15,965,000	$197,681,000	$29,805,000

Future With-Project Economic Benefits. Over the 50-year period of analysis (2030-2080) and given the intermediate RSLC scenario, the future with-project condition Incremental AAEQ Benefits are $2,755,000 (FY25 price level). Table 39 provides a summary of the incremental first costs and annualized costs, benefits, net benefits, and resulting BCRs across the low, intermediate, and high RSLC scenarios. As sea levels increase, the estimated benefits of the project are also anticipated to increase.

Future With-Project Residual Damages. The recommended plan will not fully manage risk within the study area. Over the 50-year period of analysis (2030-2080), under the FWOP scenario, the residual risk is $12,300,000 (FY25 price level) in estimated average annual damages.

Net Economic Benefits and Benefit-to-Cost Ratio. A comparison of the future with- and without-project economic benefits was completed to calculate the net economic benefits. Annual net economic benefits provided by the TSP (Alternative 3e) are estimated to be $150,000 with a corresponding benefit-to-cost ratio of 1.06 for the intermediate RSLC scenario (FY25 price level and 3% discount rate). If the high RSLC projection comes to fruition, the net benefits of the TSP are estimated to increase to $872,000 with a benefit-to-cost ratio of 1.3.

Table 39: TSP Benefits Across USACE RSLC Scenarios

Alternative 3e: 16 ft NAVD88 Dune & 100 ft Berm Width			
	Low RSLC	Intermediate RSLC	High RSLC
Incremental First Costs		$52,052,000	
Costs (AAEQ)		$2,605,000	
Benefits (AAEQ)	$2,511,000	$2,755,000	$3,477,000
Net Benefits (AAEQ)	-$94,000	$150,000	$872,000
BCR	0.96	1.06	1.3

7.3 Regional Economic Development, Environmental Quality, and Other Social Effects

The TSP would benefit the study area beyond ways captured in the NED account.

The TSP would reduce storm surges' risk to life safety and improve community resilience, the measure of the sustained ability of a community to utilize available resources to respond to, withstand, and recover from adverse situations, as damages in the study area may not occur as frequently or as severely. These effects can support social connectedness and community identity. The TSP would help manage the risk of erosion and storm surge, helping maintain the availability of transportation routes, including emergency operations and other vital services.

The improved resilience could also impact of project spending, either directly or indirectly, on the local economy (RED account). Implementation of the project could induce RED benefits in the area as residents and business owners may be able to allocate resources and spending on goods and services rather than on repairing and replacing structures or goods damaged by flooding, or from decreased recreation space. The TSP is estimated to provide approximately $112,000,000 to the state of NJ and approximately $65,000,000 to the local area in benefits as compared to the future without project condition.

7.4 Environmental Operating Procedures

The Environmental Operating Principles are an essential component of USACE's risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure. The Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization
- Proactively consider environmental consequences of all USACE activities and act accordingly
- Create mutually supporting economic and environmentally sustainable solutions
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments
- Consider the environment in employing a risk management and systems approach

throughout the life cycles of projects and programs

- Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE's actions in a collaborative manner
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities

Plan selection considered these principles to ensure the sustainability and resiliency of the TSP while considering the environmental consequences of implementation. In addition to following construction best management practices to maintain water quality standards, other opportunities to implement sustainable measures that are cost effective and comply with USACE construction standards will be further evaluated during the PED phase. If out-of-kind mitigation (e.g. vegetated wetlands) is warranted, planting plans will utilize native vegetation that support pollinator species, have a lower susceptibility to disease or pests, and are more adaptable to changing future conditions. The study team considered avoiding and minimizing adverse impacts to existing environmental resources and cultural resources within the project area to the extent practicable during the plan formulation process. Where impacts to these resources are unavoidable, compensatory mitigation will be performed.

Continuous coordination with the NJDEP, federal and non-federal resource agencies, and the public occurred throughout the study to ensure an open and transparent process that respects views of individuals and groups. The project will be constructed in compliance with all applicable environmental laws and regulations.

7.5 Risk and Uncertainty Analysis

There remains risk and uncertainty in project planning, engineering design, and environmental compliance at this phase of the study. Risk and uncertainty will be managed as more information is known and analyses are refined throughout the study, and into PED phase and construction. This Section presents major areas of risk and uncertainty known at this time.

Implementation Risk: The NJBB CSRM study is not considered as part of the FWOP condition. Per the Supplemental Draft Integrated Feasibility Report and Environmental Impact Statement (December 2024), the updated plan includes the elevation of approximately 6,400 residential structures; floodproofing 279 critical infrastructure facilities (police, fire, ambulance, hospitals); and the implementation of NBS (using dredged material) to enhance 217 acres of salt marsh habitat vulnerable to RSLC at 7 locations in the back bay area.

As a result, coordination with the NJBB CSRM team is ongoing. Additional analyses and modifications to the recommended plan may be required should a project become authorized and advanced to the PED and Construction phases.

Residual Risk: Flood risk is the function of flood hazard at a location, and exposure and vulnerability to the flood hazard. Residual risk is the flood risk that remains after a project is in place. It is the exposure to loss remaining after other known risks have been countered, factored in, or managed or addressed. This GRR did not formulate alternatives for back-bay flood risk, though residual back-bay flood risk is assessed as part of this study effort.

Risk to Life Safety: Life safety is the analysis of alternatives to protect against the loss of life, the well-being of individuals and managing risk to human lives. Life safety is a function of three items:

- Hazard: the likelihood of a hazard occurring. In this Study Area there are frequent storms, and the area has seen damage in past storms. As a result, residents in these communities generally understand the severe implications of staying in harm's way when a coastal storm is forecasted to affect the area.
- Performance: defined as how well the proposed features will perform in response to storm events. The dune height is not assumed to be at risk of failure, and the berm width will be periodically renourished to maintain project performance.
- Consequence: who and what is in danger. In this study the residents of the Asbury Park City, Avon-by-the-Sea Borough, Belmar Borough, Bradley Beach Borough, Loch Arbour Village, Manasquan Borough, Neptune Township, Sea Girt Borough, Spring Lake Borough, and the structures in the area are in danger.

Once implemented, the proposed dune and berm features will have no adverse impacts on the roadways or affect the communities' ability to evacuate ahead of an impending storm.

Performance Risk and Uncertainty

The alternatives are being evaluated using the USACE Intermediate RSLC scenario. A sensitivity analysis using the low and high SLC scenarios was performed to further assess the final array of alternatives and selection of the TSP. The project, should it be implemented, could result in more or less benefits than anticipated. Accounting for the low, intermediate, and high RSLC scenarios, a range of net benefits were captured between -$94,000 and $872,000 for the low and high RSLC scenarios respectively. The dune and berm combinations were formulated as to be adaptable. The project could be modified after construction to maintain resilience if deemed necessary.

Cost Estimation Risk and Uncertainty

An abbreviated risk analysis was performed to account for potential project risks and develop appropriate cost contingencies. The team assumes the ongoing Sandy Hook to Barnegat Inlet, NJ Borrow Area EDR will provide beach compatible sand with sufficient quantities to meet the recommended project's volume needs per the project's authorization. At time of draft report release, it is deemed likely for a potential new permitted borrow area to be in closer proximity to Section II. As a result, the associated costs with sand placement activities assuming the potential new borrow area are lower than those estimated costs of leveraging the existing Sea Bright Offshore Borrow Area (SBOBA).

Delays in permitting a new borrow source may lead to delays in project implementation or increased project costs. This could potentially affect economic justification and may result in exceeding the Section 902 limit (WRDA of 1986, as amended). To account for this risk, appropriate contingencies were added.

Induced flooding: Induced flooding, which can occur during a coastal, fluvial, or pluvial event, is defined as the increase in flood levels or expansion of flooded areas due to a USACE project or action. USACE guidance requires attention be paid to induced flooding caused by proposed projects. When a project plan would result in induced flooding, guidance requires that mitigation measures be investigated and implemented when economically justified, when there are overriding reasons of safety or economic or social concerns, or when it is determined that the induced flooding is significant enough to be considered a real estate “takings”. Induced flooding is not anticipated as a result of project implementation across Section II.

7.6 Operation, Maintenance, Repair, Replacement, & Rehabilitation

Operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) includes actions to sustain the constructed project and to maintain the stated level of benefits at the completion of construction and into the future. OMRR&R costs include major rehabilitation, beach maintenance, coastal monitoring and environmental monitoring. Major rehabilitation includes emergency beach fill and beach maintenance includes costs for maintenance related to dune grass, sand fences and crossovers. The NFS are responsible for OMRR&R costs and actions. Generally, the NFS are required to repair, rehabilitate or provide replacement of components to maintain the original project benefits. Updates to the OMRR&R manual will be developed during the PED phase to outline the expected additional OMRR&R requirements for each project component. Since the existing project is already being maintained, the incremental OMRR&R costs required for the TSP are anticipated to be minimal, with an estimated AAEQ cost of $40,000.

Chapter 8: Coordination and Compliance with Environmental Requirements

Applicability of and compliance with relevant environmental laws and executive orders (EO) is described for the Proposed Action (TSP) in Table 40. Note that this does not encompass every law or regulation potentially applicable to the Proposed Action.

8.1 Summary of Agency and Public Involvement

The draft integrated GRR and EA is being circulated for a 30-day public comment period beginning on October 24, 2025. All comments submitted by the public, and federal, state, and local stakeholders during the 30-day review period will be considered and specifically addressed in the final integrated GRR and EA.

NEPA interagency meetings were held on January 17, 2023. Virtual public information sessions were also held on August 22 and November 20, 2023 respectively. There will be public meetings scheduled after the release of the draft integrated GRR and EA during the comment period. This draft report is being used as the coordination vehicle for Section 7 ESA, EFH, and FWCA compliance.

In 2022, an updated Programmatic Agreement (PA) was prepared and signed by the District, the Bureau of Ocean Energy Management, and NJ SHPO. This PA combines the two project sections and includes the SBBA as well as the Belmar Borrow Areas. The PA also includes a stipulation allowing for the inclusion of additional borrow areas should the need arise during any upcoming renourishment events. Coordination has been ongoing throughout the project and will continue to successfully fulfill all stipulation of the PA. The PA will be amended to include the action alternative.

8.2 Tribal Consultation

The District invited the Delaware Nation, the Stockbridge Munsee, Absentee Shawnee Trive of Oklahoma, the Shawnee Tribe and the Delawar Tribe of Indians to participate as consulting parties on the Programmatic Agreement. Tribal consultation is ongoing and should be complete by the final draft of this report.

8.3 Environmental Compliance, EOs, and Permitting Requirements

Compliance with the following environmental laws (and implementing regulations) and Executive Orders is required for the project alternatives under consideration (Table 40). Note this is not necessarily an exhaustive list of all applicable environmental requirements.

Table 40: Compliance Status of Federal Laws and Executive Orders

TITLE	U.S. CODE/DATE	COMPLIANCE
Clean Air Act	42 U.S.C. §§ 7401-7671g	Due to the unpredictable nature of dredge-related construction preliminary estimates of sand volume required to restore the integrity of the coastline the project emissions

TITLE	U.S. CODE/DATE	COMPLIANCE
		will be calculated during the preparation of the Plans and Specifications for each construction contract and full mitigation will be achieved for each year of construction and continue to be regularly reported to the RAT. .
Clean Water Act	33 U.S.C. §§ 1251 et seq.	A 404(b) Evaluation is located in Appendix A (Environmental Documentation). In addition, the District will submit a water quality certification application to NJDEP to fulfill the requirements of Section 404 of this act prior to initiating construction.
Endangered Species Act of 1973	16 U.S.C. §§ 1531 et seq.	Based on initial coordination with the U.S. Fish and Wildlife Service, the project contains habitat supportive of Piping Plover, Seabeach Amaranth, and Red Knot. Protection of these species typically involves implementing time of year restriction. The District will continue coordination with the USFWS throughout the life of the project. A biological assessment/formal consultation is required. Threatened and Endangered species under NOAA-Fisheries occur within the project area. There is currently at 2014 BO for the original project and the District seeking concurrence on informal NLAA. More information is located in Appendix A (Environmental Documentation).
Fish and Wildlife Coordination Act	16 U.S.C. § 661 et seq.	The Corps is in continued coordination with the U.S. Fish and Wildlife Service. The USFWS will be preparing a Draft Fish and Wildlife Coordination Act Report. Pertinent correspondence between the District and the USFWS located in Appendix A (Environmental Documentation).
Magnuson Stevens Fishery Conservation and Management Act	38 U.S.C. § 1801 et seq.	An Essential Fish Habitat Assessment has been prepared and is included in Appendix A (Environmental Documentation). The Draft FR/EA and the EFH Assessment will be used as the coordination vehicle with NOAA-Fisheries.
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321-4347	The circulation of the draft integrated Feasibility Report/EA fulfills requirements of this act.
National Historic Preservation Act of 1966	16 U.S.C. §§ 470 et seq.	The District has continued to coordinate with the State Historic Preservation Office to fulfill requirements of this act. The draft Programmatic Agreement for the project is located in Appendix A (Environmental Documentation).
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 11988 Floodplain Management	May 24, 1977	The Water Resources Council Floodplain Management Guidelines for implementation of EO 11988, as referenced in USACE ER 1165-2-26, require an eight-step process that agencies should carry out as part of their decision making on

TITLE	U.S. CODE/DATE	COMPLIANCE
		projects that have potential impacts on or within the floodplain. The eight step assessment is as follows: 1. Determine if the proposed action is in the base floodplain: The proposed actions are located within the base floodplain for the Atlantic Ocean. 2. If the action is in the floodplain, identify and evaluate practicable alternatives to locating in the base floodplain: As the primary objective of the project is acquiring property for the purpose of removing structures from the continued threat of property loss, hazards to health and safety, and injury and loss of life within the Rahway River Basin, no practicable alternatives are completely outside of the base floodplain for the sites that would achieve this objective. 3. Provide public review: The proposed action was coordinated with the public, government agencies, and interested stakeholders. 4. Identify the impacts of the proposed action and any expected losses of natural and beneficial floodplain values: Practicable measures and alternatives were formulated and potential impacts and benefits were evaluated in Chapter 4 of this document. The anticipated impacts associated with the TSP are summarized. 5. Minimize threats to life and property and to natural and beneficial floodplain values. Restore and preserve natural and beneficial floodplain values: Implementing the TSP would have no significant flooding impacts on human health, safety, and welfare and will restore the affected properties to act as natural floodplain areas. 6. Reevaluate alternatives: No practicable alternatives are completely outside of the base floodplain for the sites that would achieve this objective. 7. Issue findings and a public explanation: The public will be

TITLE	U.S. CODE/DATE	COMPLIANCE
		advised that no practicable alternative to locating the proposed action in the floodplain exists, as indicated in Item 2 above. 8. Implement the action. The proposed project does not contribute to increased development in the floodplain and does not increase flood risk, but rather it restores "natural and beneficial values." This assessment concludes that all practicable alternatives have been considered, and that the Corps has determined that the proposed action does not induce direct or indirect floodplain development within the base floodplain.
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.
Executive Order 13112 Invasive Species	February 3, 1999	BMPs to prevent spread, proper disposal of invasive plant species during construction, replanting with native vegetation monitoring and adaptive management such as invasive species management until mitigation is determined to be successful.

8.4 List of Preparers

The team for the study was extensive. The team members listed below provided substantial text to the Draft Integrated GRR and EA.

Table 41: List of Report Preparers

NAME	ROLE/TITLE	DISCIPLE
Jason Shea	Civil Engineer/Project Manager	Project Management
Andrew Seaman	Lead Plan Formulator	Plan Formulation
Michael Martello	Plan Formulator	Plan Formulation
Karen Baumert	Supervisory Plan Formulator Water Resources Certified Planner	Plan Formulation
Marko Nedzbala	Economist	Economics

Katherine Amirr	NEPA Lead	Environmental Analyses
Arianna Stimpfl	Archaeologist	Cultural Resources
Jenine Gallo	Biologist	Environmental Analyses
Sophie Killy	Biologist	Environmental Analyses
Catherine Alcoba	Supervisory Environmental Analyses	Environmental Analyses
Matthew Davis	Geographer	Geographic Information System (GIS)
Audrey Fanning	Lead Coastal Engineer	Coastal Engineering
Suzana Rice	Senior Coastal Engineer	Coastal Engineering
DanaRose Brown	Coastal Engineer	Coastal Engineering
Peyton Bethea	Realty Specialist	Real Estate

Chapter 9: Plan Implementation

9.1 Institutional Requirements

This general reevaluation study was completed with all applicable laws and regulations. Specifically: the specific requirements necessary to demonstrate that the project is technically feasible, economically justified and environmentally complaint; and the costs and cost-sharing to support an amendment to the Project Partnership Agreement (PPA).

The prior sections of this report demonstrate that the Recommended Plan is technically feasible. It also identifies the plan to be economically justified. The EA has been prepared to meet the requirements of NEPA and demonstrate that the plan is compliant with environmental laws, regulations, and policies and has effectively addressed any environmental concerns of resource and regulatory agencies.

9.2 Real Estate Requirements

USACE projects require that the NFS provide the lands, easements, rights-of-way, relocations, and disposals (LERRDS) necessary for a project[1]. LERRD costs represent the NFS's estimated upfront (non-Federal) direct and indirect costs for acquiring all the necessary real estate interests, relocations and disposal/borrow areas required for the construction, operation and maintenance of the Project. The TSP impacts a total of 277.53 acres over 31 parcels.

The NFS has acquired easements in support of the existing authorized project. Consequently, the NFS currently possesses an easement interest in nineteen (19) of the parcels impacted by the TSP. The Project intends to utilize these existing easements for implementation of the Tentatively Selected Plan. The TSP impacts 0.924 acres over twelve (12) parcels that the NFS possesses no existing easement interest in. The following details the minimum interest in real property required for the TSP's construction, operation, and maintenance requirements that will need to be acquired:

- Perpetual Beach Storm Damage Reduction Easement (USACE Standard Estate No. 26):
  Approximately 0.924 acres require acquisition of a Perpetual Beach Storm Damage Reduction Easement for the construction of the berm and dune.
- Temporary Work Area Easement (USACE Standard Estate No.15):
  A Temporary Work Area Easement (or comparable interest) is required for a borrow area. Given this, the Project will obtain a permit, rather than a Temporary Work Area Easement, to utilize the borrow area.

Table 42 details the minimum interest in real estate property required for the TSP's construction, operation, and maintenance requirements that will need to be acquired. The approximate market value for all required real estate that has not yet been acquired is approximately $154,000. Additional information regarding the Real Estate Plan and its requirements can be found in

[1] Any conclusion or categorization that an item is a utility or facility relocation to be performed by the NFS as part of its lands, easements, rights-of-way, and relocations responsibilities is preliminary only. USACE will make a final determination of the relocations necessary for the construction, operation or maintenance of the project after further analysis and completion and approval of a Final Attorney's Opinion of Compensability for each of the impacted utilities and facilities.

Appendix D.

Table 42: LERRDS to be Acquired for TSP

Estate Type	Acres
Perpetual Beach Storm Damage Reduction Easement (total acres)	0.924

Ownership Type	No. of Parcels
Private (total parcels)	12

9.3 Implementation Schedule

For PED and construction to be initiated, USACE must sign a Design Agreement with a non-federal sponsor. After PED is complete, USACE must sign a PPA with NJDEP for construction to begin. The schedule is draft and dependent on appropriations. The TSP is anticipated to initially constructed in 2031 with renourishment every six years in years 2037, 2043, and 2049.

Table 43: Draft TSP Implementation Schedule

TASK	DATE
Chief of Engineering Report Approval	July 2027
Design Agreement	October 2027
Pre-Construction Engineering & Design	October 2027 – November 2028
Project Partnership Agreement Execution	November 2028
Real Estate Acquisition	January 2029 – June 2030
Construction	2031

9.4 Cost Sharing and Non-Federal Partner Responsibilities

Table 44 presents the cost sharing of the TSP, the incremental improvements to the existing project, assuming the cost share presented in the existing PPA for the existing project. The NFS shall contribute 35% of construction costs for initial construction of the project, and 35% of construction costs for periodic nourishment consistent with the existing PPA. The NFS's costs for LERRDs are credited against the additional cash contribution. The non-federal sponsor's cost share of the initial construction of dunes and extension of the berm is estimated to be $18,0600,000, with the Federal share being $33,830,000. Renourishment of the project would have equal cost share, of $8,180,000 each for the non-Federal sponsor and the Federal government.

Table 44: Cost Apportionment for TSP Above Existing Project

	Federal	Non-Federal	Total
Project First Cost			
Cash Contributions	$33,834,000	$18,064,000	
LERRD	$0	$154,000	
Total First Cost	**$33,834,000**	**$18,218,000**	**$52,052,000**
Continuing Construction First Cost			
Scheduled Beach Renourishment (a)	$10,634,000	$5,726,000	$16,360,000
Total Cumulative Construction Cost (c)	**$44,468,000**	**$23,944,000**	**$68,412,000**

FY25 Price Level
(a) Beach Renourishment = roughly every 6-year cycle; cost share 65% Federal, 35% Non-Federal assuming the same cost share as the existing PPA; 2037, 2043, 2049
(b) Environmental Monitoring varies yearly and is broken down in the Environmental Monitoring Cost Table
(c) Cumulative Costs include Total First Cost and Cumulative Construction

9.5 Views of the Non-Federal Sponsor and Other Agencies

NJDEP has expressed support of the releasing this Draft Integrated GRR and EA detailing the conducted analyses and TSP. Coordination with the NEPA participating and cooperating agencies is ongoing.

Chapter 10: Draft Recommendation

In making the following recommendations, I have 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 NJ and other non-federal interests.

I recommend that the selected plan for CSRM in the Sandy Hook to Barnegat Inlet, Sea Bright to Manasquan, NJ, Section II, as fully detailed in this Integrated GRR and EA, be authorized for construction as a federal project, subject to such modifications as may be prescribed by the Chief of Engineers to meet the direction of Congress as directed in Section 1217 of WRDA 2024. The Tentatively Selected Plan is Alternative 3e, consisting of a uniform design profile across all of Section II, inclusive of the northern extent of Asbury Park through the southern extent of Manasquan Borough consisting of a +16 ft NAVD88 crest elevation dune and 100 ft wide berm. Although this is a Draft Integrated GRR and EA with an appropriate design maturity level for authorization, any required mitigation and adaptive management will be further refined in subsequent phases of the study and in coordination with the appropriate federal, state, and local agencies.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of highest review levels within the Executive Branch. Consequently, the recommendations may be modified (by the Chief of Engineers) before they are transmitted to the Congress as proposals for authorization and implementing funding. However, prior to transmittal to Congress, the partner, the State, interested federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Alexander L. Young
Colonel, U.S. Army
District Engineer

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