



**US Army Corps
of Engineers®**
New York District

NEW YORK AND NEW JERSEY HARBOR DEEPENING CHANNEL IMPROVEMENTS

NAVIGATION STUDY

FINAL INTEGRATED FEASIBILITY REPORT & ENVIRONMENTAL ASSESSMENT

APPENDIX A11: Compensatory Mitigation, Monitoring and Adaptive Management Plan

1.0 Introduction

The U.S. Army Corps of Engineers (Corps), New York District (District) in partnership with the Port Authority of New York and New Jersey (PANYNJ) has developed feasibility level plans to provide improvements to the navigation channels of the New York/New Jersey Harbor.

In accordance with the Council of Environmental Quality National Environmental Policy Act (NEPA) regulation, 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, rehabilitating or restoring the effected environment; (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.

This document outlines the feasibility level Compensatory Mitigation, Monitoring and Adaptive Management Plan for the New York-New Jersey Harbor Deepening Channel Improvements (HDCI) Navigation Study, and only addresses the compensatory mitigation method. The other forms of mitigation exercised prior to considering compensatory mitigation (e.g., avoidance, minimization, reduction of impact) are addressed within the integrated final Feasibility Report/Environmental Assessment.

This plan identifies and describes the mitigation, monitoring and adaptive management activities proposed and the estimated cost of the effort. The general purpose of this plan is to provide a systematic approach for improving resource management outcomes and a structured process for recommending decisions, with an emphasis on uncertainty to improve management.

More specifically, the plan:

- Establishes the method for determining mitigation requirements.
- Establishes the framework for effective monitoring, assessment of monitoring data and decision making for implementation of adaptive management activities in the project area.
- Provides the process for identifying adaptive management actions in the project.
- Establishes decision criteria for vegetation and wildlife evaluation and modification of adaptive management activities.

1.1. Tentatively Selected Plan Description

The proposed action is comprised of the following:

- Deepening the pathway to Elizabeth-Port Authority Marine Terminal by 5 feet (-55 feet MLLW), and associated widening to allow passage of the design vessel (Maersk Triple E Ultra Large Container Vessel Class).
- Deepening the pathway to Port Jersey-Port Authority Marine Terminal by 5 feet (-55 feet MLLW), and associated widening to allow passage of the design vessel (Maersk Triple E Ultra Large Container Vessel Class).

1.2. Recommended Plan Impacts and Compensatory Mitigation Requirements

The study area encompasses subtidal habitats of varying depths, ranging from shallow subtidal shoals to deeper channel habitats. The navigation channel provides deeper open-water and deep-water benthic habitats. Within New York State the regulated habitat includes the “Littoral Zone” (defined as extending seaward from shore to a depth of six feet at mean lower low water), which has no impacts. In New Jersey, the regulated habitat includes “Intertidal and Subtidal Shallows” (defined as extending seaward to a depth of four feet below mean lower low water). Permanent impacts from the Recommended Plan requiring compensatory mitigation include approximately 0.53 acres of this New Jersey-regulated habitat.

As coordinated within the HQUSACE, the use of ratios for impacts under one acre is acceptable due to potential model imprecision with small impact amounts. Therefore, to compensate for the approximately 0.53 acres of impact to regulated subtidal habitat, Approximately 1.59 acres (a 3-to-1 ratio) of the Sea Bright Offshore Borrow Area (SBOBA) will be restored to pre-dredge conditions. To facilitate beneficial use, additional suitable dredge material will also be placed at SBOBA to satisfy Essential Fish Habitat consultation recommendations.

Table 1: Curated List of Potential Beneficial Use Sites by Project, Location, and Material Type Placement Purpose and Volume Provided by the Restoration Working Group

Project	Location	Coordinates	Material Type Used	Material placement / purpose	Volume Needed
Alley Creek, Little Neck Bay	East River, LI Sound	40° 46.239'N 73° 45.358'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 5 acres = 25,000
Arlington Marsh	Arthur Kill	40° 38.597'N 74° 10.405'W	A/B	Elevation change/wetland restoration	2,000 CY / Acre - 10 acres = 20,000

Project	Location	Coordinates	Material Type Used	Material placement / purpose	Volume Needed
East Newark Waterfront Park	Passaic River	40° 43.984'N 74° 9.098'W	A	Fresh water wet meadow	One Acre - depth not determined. Clean sand-FY 2022
Ferry Point Park	East River, LI Sound	40° 48.655'N 73° 50.343'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 2 acres = 10,000
Four Sparrow Marsh	Jamaica Bay	40° 36.136'N 73° 54.355'W	A	Elevation change/wetland restoration	3,000 CY / Acre - 3 acres = 9,000
Fresh Creek – HRE	Jamaica Bay	40° 38.215'N 73° 52.596'W	A	Elevation change/wetland restoration/channel restoration	3ft clean material over 35 acres= 170,000 CYD
Goose Pond Wetland, Broad Channel	Jamaica Bay	40° 36.647'N 73° 49.345'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 2 acres = 10,000
HRE - Naval Station Earle Oyster Reef	Lower Bay	40° 26.867'N 74° 3.377'W	C/D	Subtidal reef base	(complement/replacement of shell in gabions)
HRE - Pumpkin Patch East Marsh Island	Jamaica Bay	40° 37.694'N 73° 50.495'W	A	Elevation change/wetland restoration	352,000 CYD
HRE - Pumpkin Patch West Marsh Island	Jamaica Bay	40° 37.353'N 73° 51.125'W	A	Elevation change/wetland restoration	328,000 CYD
HRE - Stony Creek Marsh Island	Jamaica Bay	40° 36.664'N 73° 51.066'W	A	Elevation change/wetland restoration	152,000 CYD
HRE- Bush Terminal Oyster Reef	Upper New York Bay	40° 39.282'N 74° 1.082'W	C/D	Subtidal reef base	(complement/replacement of shell in gabions)
HRE- Duck Point Marsh Island	Jamaica Bay	40° 37.637'N 73° 51.673'W	A	Elevation change/wetland restoration	214,000 CYD
HRE- Elders Point Marsh	Jamaica Bay	40° 38.116'N 73°	A	Elevation change/wetland	285,000 CYD

Project	Location	Coordinates	Material Type Used	Material placement / purpose	Volume Needed
Island		50.831'W		restoration	
HRE- Head of Jamaica Bay	Jamaica Bay	40° 37.541'N 73° 45.620'W	C/D	Subtidal reef base	(complement/replacement of shell in gabions)
Hudson River Reefs - Dobbs Ferry Reef	Lower Hudson River	41° 0.991'N 73° 53.100'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - Hastings On-Hudson Reef	Lower Hudson River	40° 59.227'N 73° 53.342'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - Irvington Reef	Lower Hudson River	41° 2.976'N 73° 52.493'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - North West Yonkers	Lower Hudson River	40° 57.721'N 73° 53.779'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - Riverdale	Lower Hudson River	40° 54.209'N 73° 55.014'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - Sleepy Hollow	Lower Hudson River	41° 6.465'N 73° 52.109'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hudson River Reefs - Yonkers	Lower Hudson River	40° 56.004'N 73° 54.367'W	D	Subtidal reef base	5,000 CY / Acre - 5 acres = 25,000
Hutchinson River, Pelham Bay Park	East River, LI Sound	40° 51.865'N 73° 48.634'W	A	Elevation change/wetland restoration	1,000 CY / Acre - 5 acres = 5,000
Idlewild Park, Hook Creek Park	Jamaica Bay	40° 38.945'N 73° 44.492'W	A	Elevation change/wetland restoration	1,000 CY / Acre - 10 acres = 10,000
Lemon Creek	Raritan Bay	40° 30.698'N 74° 11.931'W	A	Elevation change/wetland restoration	1,000 CY / Acre - 5 acres = 5,000

Project	Location	Coordinates	Material Type Used	Material placement / purpose	Volume Needed
Liberty Island Aquatic Reef	Upper New York Bay	40° 41.590'N 74° 2.787'W	C	Subtidal reef base	1,400 CY / Acre - 20 acres = 28,000
Liberty Island Aquatic Reef	Upper New York Bay	40° 41.590'N 74° 2.787'W	D	Subtidal reef base	5,000 CY / Acre - 20 acres = 100,000
Liberty State Park	Upper New York Bay	40° 41.590'N 74° 2.787'W	B/C	Rock revetment/channel stabilization	1–3-foot boulders: 22,800 CY gravel/cobble mix: 10,500 CY
Lincoln Park West	Hackensack River	40° 43.730'N 74° 5.536'W	A	Elevation change/wetland restoration	1600 CY / Acre - 10 acres = 16,000
Lower Bay Reef (rock)	Lower Bay	40° 32.308'N 74° 0.235'W	C/D (large rock)	Subtidal reef base	TBD
Mott Basin, Jamaica Bay Park	Jamaica Bay	40° 35.969'N 73° 46.798'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 2 acres = 10,000
Old Bridge Waterfront Park	Raritan Bay	40° 27.573'N 74° 14.872'W	A/D	Rock jetty, rock revetment/ beach nourishment	TBD
Rockaway Community Park	Jamaica Bay	40° 36.148'N 73° 46.979'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 2 acres = 15,000
Rockaway Reef (rock)	NY Bight	40° 33.955'N 73° 49.522'W	C/D (large rock)	Subtidal reef base	222 acres needed
Saw Mill Creek	Arthur Kill	40° 36.573'N 74° 11.402'W	A	Clean Cap for restoration	TBD
Sawmill Creek WMA	Hackensack River	40° 46.040'N 74° 6.973'W	A	Elevation change/wetland restoration	TBD

Project	Location	Coordinates	Material Type Used	Material placement / purpose	Volume Needed
Snakapin Lagoon	East River, LI Sound	40.80511537582 989, - 73.85625321360 934	A	Elevation change/wetland restoration	5,225 CY / Acre - 2 acres = 10,500
Spring Creek – HRE	Jamaica Bay	40° 39.046'N 73° 50.956'W	A	Elevation change/wetland restoration	1,000 CY / Acre - 2 acres = 2,000
Turtle Cove, Pelham Bay Park	East River, LI Sound	40° 51.529'N 73° 48.215'W	A	Elevation change/wetland restoration	5,000 CY / Acre - 4 acres = 20,000

Source: RWG 2021 (portion of)

NOTES:

TBD – To be determined

1.3. Compensatory Mitigation Guidelines

1.3.1. Federal Compensatory Mitigation Guidelines

The following laws and Corps implementation guidance provide distinct Corps policy and guidance pertinent to developing this mitigation, monitoring, and adaptive management plan:

- CECW-PC 31 August 2009 Memo: Implementation Guidance for Section 2036(a) of the Water Resources Development Act of 2007 (WRDA 07) – Mitigation for Fish and Wildlife and Wetlands Losses” – requires: 1) monitoring until successful, 2) criteria for determining ecological success, 3) a description of available lands for mitigation and the basis for the determination of availability, 4) the development of contingency plans/adaptive management plans, 5) identification of the entity responsible for monitoring; and 6) establish a consultation process with appropriate Federal and State agencies in determining the success of mitigation.
- ER 1105-2-100 dated 22 April 2000, Planning Guidance Notebook, Section C-3 e. Mitigation Planning and Recommendations
- Compensatory Mitigation for Losses of Aquatic Resources; Final Rule; Federal Register,

Volume 73, No. 70, April 10, 2008.

- Water Resource Reform and Development Act (WRRDA) 2014, Section 1040 Fish and Wildlife Mitigation.
- Water Infrastructure Improvements for the Nation Act (WIIN Act) 2016, Sections 1162 Fish and Wildlife Mitigation, and 1163 Wetlands Mitigation. Implementation Guidance has not been issued by USACE HQ.
- CECW-P 02 February 2018 Memo Implementation Guidance for Section 1162 of the Water Resources Development Act of 2016 (WRDA 2016) - Fish and Wildlife Mitigation. Section 1162 authorizes the use of Preconstruction, Engineering Design funds to satisfy mitigation requirements through 3rd party arrangements or acquire lands for mitigation requirements.
- 16 November 2017 Memorandum for the Commanding General of the U.S. Army Corps of Engineers - Implementation Guidance for Section 1163 of the Water Resources Development Act of 2016 (WRDA 2016), Wetlands Mitigation. Rescinds CECW-P 06 November 2008 Memorandum Implementation Guidance for WRDA 2007 – Section 2036 (c). Establishes the following criteria for the use of mitigation banks and in-lieu fee credits as a mitigation alternative: a) demonstration of an approved mitigation banking instrument; b) the mitigation bank and/or in-lieu fee program operates within the service area of the impact; c) completion of a functional analysis of the potential credits using the approved Corps of Engineers certified habitat assessment model specific to the region; d) demonstration that the statutory (and regulatory) mitigation requirements, including monitoring or demonstrating mitigation success have been met; and e) purchase of credits prior to award of a construction contract for the project.

Corps regulations stipulate that the recommended plan must contain sufficient mitigation measures to ensure that the plan selected will have no more than negligible net adverse impacts on fish and wildlife resources, including impacts of the mitigation measures themselves.

1.4. State Mitigation Guidelines

Although this project is within the states of New York and New Jersey, all impacts to regulated habitat are within the state of New Jersey. The state of New Jersey assumed responsibility for administering the 404 authority in 1993. The following documents provide New Jersey policy and guidance that are pertinent to developing this monitoring and adaptive management plan:

- New Jersey Freshwater Wetlands Protection Act, N.J.S.A. 13:9B; Freshwater Protection Act Rules N.J.A.C. 7:7A: Outlines requirements for compliance with Sections 401 and 404 of Clean Water Act.

- N.J.A.C. Coastal Zone Management Rules: Establishes compliance and mitigation requirements related to Sections 401 and 404 of the Clean Water Act for tidal wetland and open water resources.

1.4.1.1. State Compensatory Mitigation Hierarchy

Compensatory mitigation hierarchy for state open water greater than 1.5 acres as outlined in the Freshwater Wetlands Protection Act Rules is as follows:

1. On-site restoration, creation, or enhancement.
2. Purchase of in-kind credits from a mitigation bank with a service area that includes the area of disturbance.
3. Off-site restoration, creation, or enhancement in the same watershed as disturbance.
4. Monetary contribution to the New Jersey In-lieu fee program.
5. Upland preservation.
6. Land donation in accordance with Freshwater Wetland Act Rules.

The NJDEP Freshwater Wetlands Protection Act Rules require a mitigation ratio of 2:1 for wetland restoration or creation, and a minimum mitigation ratio of a 3:1 for wetland enhancement. The purchase of wetland mitigation credits is based on a 1:1 mitigation ratio.

1.5. Roles and Responsibilities

The District will be responsible for the proposed mitigation construction and monitoring until the initial success criteria as defined in Sections 3.1 – 3.2 are met. Initial construction and monitoring will be funded in accordance with all applicable cost-share agreements with the non-federal sponsor.

The District will monitor (on a cost-shared basis) the completed mitigation to determine whether additional measures are necessary to achieve initial success criteria. If, during the monitoring period the mitigation is failing to meet the success criteria, the District will consult with the NJDEP to determine the appropriate management or remedial actions required to achieve ecological success. The non-federal sponsor will perform any additional monitoring of the site as part of their O&M obligations once the District has determined that the mitigation goals are met.

The District will retain the final decision on whether the project's required mitigation benefits are being achieved and whether remedial actions are required. If additional site modifications are deemed necessary to achieve ecological success, the District will implement the appropriate measures in accordance with the adaptive management plan. The adaptive management measures

will be subject to cost-sharing requirements, availability of funding, and current budgetary and other guidance.

2.0 Habitat Mitigation Alternatives

2.1. In-Kind Wetland Mitigation

The District pursued in-kind in-place wetland mitigation as first priority. Due to a lack of in-kind mitigation site availability, the current plan for meeting the project's compensatory mitigation is to restore a portion of the SBOBA by placing suitable grain size sediment within areas that were previously excavated for beach nourishment projects. If other sites are deemed necessary, a list of potentially suitable sites within the region has been identified (see Table 1) and will be further evaluated during the PED Phase.

2.2. Out-of-Kind Wetland Mitigation

Due to a lack of in-kind mitigation site availability, out-of-kind mitigation is the current plan for meeting the project's compensatory mitigation in the form of restoration to a portion of the SBOBA. This would be done by placing suitable grain size sediment within areas that were previously excavated for beach nourishment projects. In the event that additional mitigation sites are deemed necessary, and there continue to be no in-kind sites available within the region, the District will pursue further out-of-kind and/or out-of-place wetland mitigation. If further out-of-kind and/or out-of-place wetland mitigation is necessary, a suitable site within the region will be selected from the list and evaluated during the PED Phase. During the Harbor Deepening Project (HDP), wetlands were created as a form of mitigation for impacts to shallow subtidal habitat, and this may present a viable option for HDCI if no in-kind in-place mitigation opportunities are available.

2.3. Wetland Mitigation Banks and In-lieu Fee Programs

In the event that no reasonable mitigation sites are available, The District will assess the availability of mitigation credits at banks on the State of New Jersey Approved Wetlands Mitigation Banks List during the Preconstruction Engineering Design (PED) Phase when permits are acquired.

There are no privately-operated In-lieu Fee Programs within the state. The state operates its own In-lieu Fee Program through its Wetland Mitigation Fund. However, as noted in Section 1.2.1.1, this option is lower in the mitigation hierarchy structure than on-site restoration or off-site mitigation, of which opportunities exist within the region. Therefore, as an authority responsible

for administering Section 404 of the Clean Water Act, it is unlikely that the state would approve a monetary contribution.

2.4. Vegetation

For any vegetated habitat compensatory mitigation, the District will use native vegetative species with an emphasis on those that can compete with invasive plant species, and support federally and/or state endangered and threatened species, and pollinator species.

2.5. Preliminary Cost Estimate

A preliminary cost estimate was prepared and included parametric costs for compensatory mitigation, based on the Old Place Creek mitigation site, and assumed to be out-of-kind, out-of-place mitigation at a 3:1 ratio. The Total Project Cost for the mitigation calculated through this method is estimated to range from \$3M to \$11M. The costs are presented in Account 06 “Fish and Wildlife Facilities” in Appendix D Cost Engineering. This cost estimate will be refined in during the PED phase.

3.0 Monitoring and Reporting

An effective monitoring program will be required to determine if the mitigation performed is consistent with original project goals and objectives. Information collected under this monitoring plan will provide insights into the effectiveness of mitigation and adaptive management strategies and indicate where goals have been met, if actions should continue, and/or whether more aggressive management is warranted. The information generated by the monitoring plan will be used by the District in consultation with the non-federal sponsor to guide decisions on operation changes that may be needed to ensure that the mitigation project meets the success criteria.

Federal wetland mitigation rules require monitoring until success criteria is met and do not establish a minimum required monitoring period. The New Jersey Freshwater Wetlands Protection Act Rules require a minimum monitoring period of five years for any wetland enhancement, restoration, or creation, and establish specific criteria for determining success. Therefore, for cost estimating purposes, the District is assuming a minimum monitoring period of **five years** for any compensatory mitigation. Monitoring is not to exceed 10 years. Should the compensatory mitigation measures be achieved in less than five years, monitoring will cease or be continued by the non-federal sponsor at their cost.

3.1. Open Water/Shallow Subtidal Monitoring Protocol

Surveys will be conducted to determine mitigation success. Surveys will be conducted prior to construction to form baseline conditions. Once construction is completed, surveys will occur annually. A report discussing the results of the surveys and whether adaptive management measures may be required will be prepared annually. The report will be submitted to the NJDEP LURP and will be made available by the District for the public to review.

3.2. Intertidal Wetlands Monitoring Protocol

The District will survey vegetation growth on a bi-annual (spring and fall) basis and will conduct a wetland delineation on an annual basis utilizing the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)(Regional Supplement). As part of the wetland delineation, a minimum of six soil pits will be dug and described to a depth of 20 inches within the mitigation area. The soil profiles will document the depth of topsoil placement as well as indicators of hydric soil. The depth to saturated soil and free water will also be recorded for each soil profile. The location of each soil pit will be documented using GPS and plotted onto a map for inclusion in the Monitoring Report.

The criteria for which mitigation success is determined includes: 1) 85 percent survival and 85 percent area coverage of the mitigation plantings or target hydrophytes which are species native to the area and similar to ones identified in the mitigation planting plan; 2) Any trees planted are at least five feet in height; 3) The site contains hydric soils or there is evidence of oxidative reduction (redox) occurring in the soil; 4) Evidence that the site is meeting the hydrologic regime as specified in the mitigation proposal; 5) The site is less than 10 percent occupied by invasive or noxious species; and 6) The site delineates as a wetland using the 1989 Federal Manual for Identifying and Delineated Jurisdictional Wetlands and Regional Supplement.

Stem densities of woody plants will be generated using stem counts within permanent 10-meter square sample plots randomly located within upland forest mitigation area. The location of each sample plot will be determined prior to conducting field work by randomly by establishing a 10-meter square grid over the area to be monitored as shown on the As-Built plans, assigning each grid block a number, and generating a series of random numbers. The random numbers corresponding to the first ten grid blocks will be used to establish the sample locations. The location of each quadrat will be shown on the plans contained in the monitoring report. Within each plot the number of trees and shrubs will be counted, by species, and recorded onto a data form. The height of each tree and shrub will also be recorded. In addition, the presence and extent of any invasive plant species will be documented.

3.3. Monitoring Costs

Cost estimates for the monitoring of each mitigation type are included in the estimate described above and in the Cost Engineering Appendix. Costs are estimated to be up to \$10,000 per year, or \$50,000 across the five-year monitoring period. Monitoring cost estimates will be refined after optimization of the recommended plan, habitat suitability modelling, and site selection.

3.4. Reporting

The District will prepare an annual Monitoring Report summarizing the results of monitoring efforts conducted for compensatory mitigation and describing any necessary adaptive management measures.

The format of the report will contain, but not be limited to: 1) Executive Summary; 2) Requirements and goals of approved mitigation proposal that have been achieved 3) Documentation including wetland delineations, stream survey locations and results, habitat assessment worksheets, topographical surveys, photos, and field notes; 4) suggested adaptive management measures and their estimated costs.

Figures contained within the report will include but not be limited to: 1) mitigation site location delineated on USGS quad map; 2) mitigation site delineated on an aerial; 3) mitigation site delineated on tax map; and 4) preconstruction and post construction habitat type map.

Appendices will include but not be limited to: 1) permits; 2) as-built plans; 3) vegetation species table and survey data sheets; 4) photograph log and location map; and 5) soil investigation report.

As required by NJDEP, the District will submit the Monitoring and Adaptive Management Report to the agency by 31 December each year the monitoring is conducted. The District will also post the report on the District webpage and will submit the report to the Corps Headquarters (Corps HQ) for inclusion to the annual mitigation report that is submitted to Congress and posted on the Corps HQ website.

4.0 Adaptive Management

A comprehensive adaptive management plan will be prepared, if needed, during post-construction monitoring.