US Army Corps
of Engineers®
New York District

Integrated Hurricane Sandy
General Reevaluation Report
and
Environmental Impact Statement

Atlantic Coast of New York

East Rockaway Inlet to
Rockaway Inlet and Jamaica Bay

Appendix D

Environmental Compliance

Attachment D3
Essential Fish Habitat Assessment for
Federally-Managed Fisheries Species

December 2018

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation Study

General Reevaluation Report and Environmental Impact Statement

Appendix I Environmental Impacts

1 INTRODUCTION

1.1 Purpose and Objective of the Essential Fish Habitat Assessment

The regional fisheries management councils, with assistance from National Marine Fisheries Service (NMFS), are required under the 1996 amendments to Magnuson-Stevens Fishery Management and Conservation Act to delineate Essential Fish Habitat (EFH) for all managed species, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH.

EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity” (NMFS 2016a). In addition, the presence of adequate prey species is one of the biological properties that can define EFH. The regulations further clarify EFH by defining “waters” to include aquatic areas that are used by fish (either currently or historically) and their associated physical, chemical, and biological properties; “substrate” to include sediment, hard bottom, and structures underlying the water; areas used for “spawning, breeding, feeding, and growth to maturity” to cover a species’ full life-cycle; and “prey species” as being a food source for one or more designated fish species (NMFS 2016b).

Pursuant to Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act, Federal agencies are required to consult with the NMFS regarding any action they authorize, fund, or undertake that may adversely affect EFH. For assessment purposes, an adverse effect has been defined in the Act as follows: “Any impact which reduces the quality and/or quantity of EFH. Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species fecundity), site specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.”

The objective of this EFH assessment is to describe the potential adverse effects to designated EFH for federally-managed fisheries species within the project site. It will also describe the conservation measures proposed to avoid, minimize or otherwise offset potential adverse effects to designated EFH resulting from the recommended plan.

Figure 1 Project Area Location

1.2 Project Background

Rockaway, New York, has an extensive history of property damage and economic loss as a result of coastal flooding and erosion associated with frequent storms. Significant beach erosion and sand loss has reduced the width of the protective beach front and has exposed properties to a high risk of damage from ocean flooding and wave attack, and existing groins and jetties along the island have deteriorated and are becoming less effective at reducing sand loss along the shoreline and providing wave protection. Non-shorefront flooding in Rockaway is attributed to storm surges in Jamaica Bay inundating the bay shorelines of Rockaway (Back Bay Flooding) and storm surges that overtop the high elevations located near the Rockaway beachfront flowing across the peninsula to meet the surge into Jamaica Bay (Cross Shore Flooding).

The Reformulation Study for East Rockaway Inlet to Rockaway Inlet and Jamaica Bay was authorized by the House of Representatives, dated 27 September 1997, as stated within the Congressional Record for the US House of Representatives. It states, in part:

> *"With the funds provided for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York project, the conferees direct the Corps of Engineers to initiate a reevaluation report to identify more cost-effective measures of providing storm damage protection for the project. In conducting the reevaluation, the Corps should include consideration of using dredged material from maintenance dredging of East Rockaway Inlet and should also investigate the potential for ecosystem restoration within the project area."*

Public Law 113-2 (29Jan13), The Disaster Relief Appropriations Act of 2013 (the Act), was enacted in part to "improve and streamline disaster assistance for Hurricane Sandy, and for other purposes". The Act directed the Corps of Engineers to:

> *"…reduce future flood risk in ways that will support the long-term sustainability of the coastal ecosystem and communities and reduce the economic costs and risks associated with large-scale flood and storm events in areas along the Atlantic Coast within the boundaries of the North Atlantic Division of the Corps that were affected by Hurricane Sandy" (PL 113-2).*

In partial fulfillment of the requirements detailed within the Act, the Corps produced a report assessing "authorized Corps projects for reducing flooding and storm risks in the affected area that have been constructed or are under construction". The East Rockaway Inlet to Rockaway Inlet, NY project met the definition in the Act as a constructed project. In accordance with the Act, the Corps is proceeding with an Integrated Hurricane Sandy General Reevaluation Report (HSGRR) and Environmental Impact Statement (EIS) to address resiliency, efficiency, risks, environmental compliance, and long-term sustainability within the study area.

1.3 Project Area Description

The communities located on the Rockaway peninsula from west to east include Breezy Point, Roxbury, Neponsit, Belle Harbor, Rockaway Park, Seaside, Hammel, Arverne, Edgemere and Far Rockaway. The former Fort Tilden Military Reservation and the Jacob Riis Park (part of the Gateway National Recreation Area) are located in the western half of the peninsula between Breezy Point and Neponsit. The characteristics of nearly all of the communities on the Rockaway peninsula are similar. Ground elevations rarely exceed 10 feet, except within the existing dune field. Elevations along the Jamaica Bay shoreline side of the peninsula generally range from 5 feet, increasing to 10 feet further south toward the Atlantic coast. An estimated 7,900 residential and commercial structures on the peninsula fall within the FEMA regulated 100-year floodplain.

During Hurricane Sandy, tidal waters and waves directly impacted the Atlantic Ocean shoreline. Tidal waters amassed in Jamaica Bay by entering through Rockaway Inlet and by overtopping and flowing across the Rockaway Peninsula. Effective coastal storm risk management for communities within the study area requires reductions in risk from two sources of coastal storm damages: inundation, wave attack with overtopping along the Atlantic Ocean shorefront of the Rockaway peninsula and flood waters amassing within Jamaica Bay via the Rockaway Inlet.

The study area (Figure 1), consisting of the Atlantic Coast of New York City between East Rockaway Inlet and Rockaway Inlet, and the water and lands within and surrounding Jamaica Bay, New York is vulnerably located within the Federal Emergency Management Agency (FEMA) regulated 100-year floodplain. The shorefront area, which is a peninsula approximately 10 miles in length, generally referred to as Rockaway, separates the Atlantic Ocean from Jamaica Bay immediately to the north. The greater portion of Jamaica Bay lies in the Boroughs of Brooklyn and Queens, New York City, and a section at the eastern end, known as Head-of-Bay, lies in Nassau County. More than 850,000 residents, 48,000 residential and commercial structures, and scores of critical infrastructure features such as hospitals, nursing homes, wastewater treatment facilities, subway, railroad, and schools are within the study area

The project area consists of mosaic of native as well as highly modified habitats as a result of human development. Upland areas in the vicinity of the Project have been committed to residential, commercial and recreational development. Near shore and upper beach areas in the project area are heavily utilized for beach recreation. Numerous stone groins currently exist in the project area. The shoreline has been stabilized since the 1880s with beach fill, groins, bulkheads, and a stone jetty at Rockaway Inlet.

2 PROPOSED FEDERAL ACTION

The Recommended Plan is a component of the USACE response to the unprecedented destruction and economic damage to communities within the study area caused by Hurricane Sandy. The recommendations herein include a systems-based approach for coastal storm risk management that provides a plan for the entire area, which has been formulated with two planning reaches to identify the most efficient solution for each reach. Project partners include the New York State Department of Environmental Conservation, the New York City (NYC) Mayor’s Office of Recovery and Resiliency, the NYC Department of Parks and Recreation, the NYC Department of Environmental Protection, and the National Park Service.

2.1 Study Objectives

Five principal planning objectives have been identified for the study, based upon a collaborative planning approach. These planning objectives are intended to be achieved throughout the study period, which is from 2020 – 2070:

1. Reduce vulnerability to storm surge impacts;
2. Reduce future flood risk in ways that will support the long-term sustainability of the

coastal ecosystem and communities;

3. Reduce the economic costs and risks associated with large-scale flood and storm events;
4. Improve community resiliency, including infrastructure and service recovery from storm effects
5. Enhance natural storm surge buffers and improve coastal resilience.

2.2 Recommended Plan Description

The Coastal Storm Risk Management (CSRM) Recommended Plan for the area from East Rockaway Inlet to Rockaway Inlet and the lands within and surrounding Jamaica Bay New York consists of the following components, which are generally described for 2 Planning Reaches: 1) A reinforced dune and Berm Construction, in conjunction with groins in select locations along the Atlantic Ocean Shoreline; 2) High Frequency Flood Risk Reduction Features (HRFRRF) features in locations surrounding Jamaica Bay. In general, these features are intended to provide a design height of +6 ft NAVD through various methods to reduce frequent flooding. As HRFRRF features are further developed, additional NEPA documentation and resource agency coordination would be provided, as necessary. This Recommended Plan description includes the maximum footprint for the plan; however, the footprint may be reduced in scope based on public and agency comments as well as new information.

2.3 Recommended Plan: Atlantic Shorefront

The general approach to developing CSRM along Rockaway Beach (between Beach 9th Street and Beach 169th Street, which the east and west tapers are included) was to evaluate erosion control alternatives in combination with a single beach restoration plan to select the most cost effective renourishment approach prior to the evaluation of alternatives for coastal storm risk management. The most cost-effective erosion control alternative is beach restoration with increased erosion control. This constitutes of a beach berm width of 60ft at an elevation of +8ft NAVD88 constructed by a beach fill quantity of 1.6 million CY for the initial placement and with a 4-year 1,021,000 CY renourishment cycle, as needed, for the life of the project (50 years). In addition, a screening analysis was performed to evaluate the level of risk reduction provided by a range of dune and berm dimensions and by reinforced dunes, which would be combined with the beach restoration with increased erosion control to optimize CSRM at Rockaway Beach. A composite seawall was selected as the best coastal storm risk management alternative. The composite seawall protects against erosion and wave attack and also limits storm surge inundation and cross-peninsula flooding. The Recommended Plan spans from Beach 20th Street to Beach 149th Street (Reach 3 through Reach 6b) and combines Beach Restoration and Erosion Control and two tapered beach sections at both the east and west end of the project (Beach 9-19, and Beach 150-Beach 169, respectively), which are described below. In summary, the Recommended Plan has the following features:

- A composite seawall with a structure crest elevation of +17 feet (NAVD88), the dune elevation is +18 feet (NAVD88), and the design berm width is 60 feet;
- A beach berm elevation of +8 ft NAVD and a depth of closure of -25 ft NAVD;

- A total beach fill quantity of 1.6 million cy for the initial placement, including tolerance, overfill and advanced nourishment with a 4-year renourishment cycle of 1,021,00 cy, resulting in a minimum berm width of 60 feet;
- Extension of 5 existing groins; and
- Construction of 13 new groins.

The east beachfill taper is approximately 3,000 ft in shorefront length from Beach 19th Street east to Beach 9th Street. The taper comprises of approximately 1,000 ft of dune and beach taper including reinforced dune feature and approximately 2,000 ft of dune and beach fill without reinforced dune feature. In addition to the tapering of berm width, the dune elevation also tapers from an elevation of +18 ft NAVD at 19th Street down to approximately +12 ft NAVD at Beach 9th Street which will be tied into the existing grade. The west beachfill taper is approximately 5,000 ft in shorefront length from Beach 149th Street west to Beach 169th street fronting Riis Park. The beachfill taper will be beach fill only with a berm width tapered from the design width at 149th Street to the existing width and height at 169th Street. In addition to the beachfill taper, a tapered groin system comprised of three (3) rock groins is included for this section.

Figures 2a through 2d show the Atlantic Ocean Shorefront component of the Recommended Plan.

Figure 2a: Atlantic Ocean Shorefront Component of Recommended Plan (1 of 4)

Figure 2b: Atlantic Ocean Shorefront Component of Recommended Plan (2 of 4)

Figure 2c: Atlantic Ocean Shorefront Component of Recommended Plan (3 of 4)

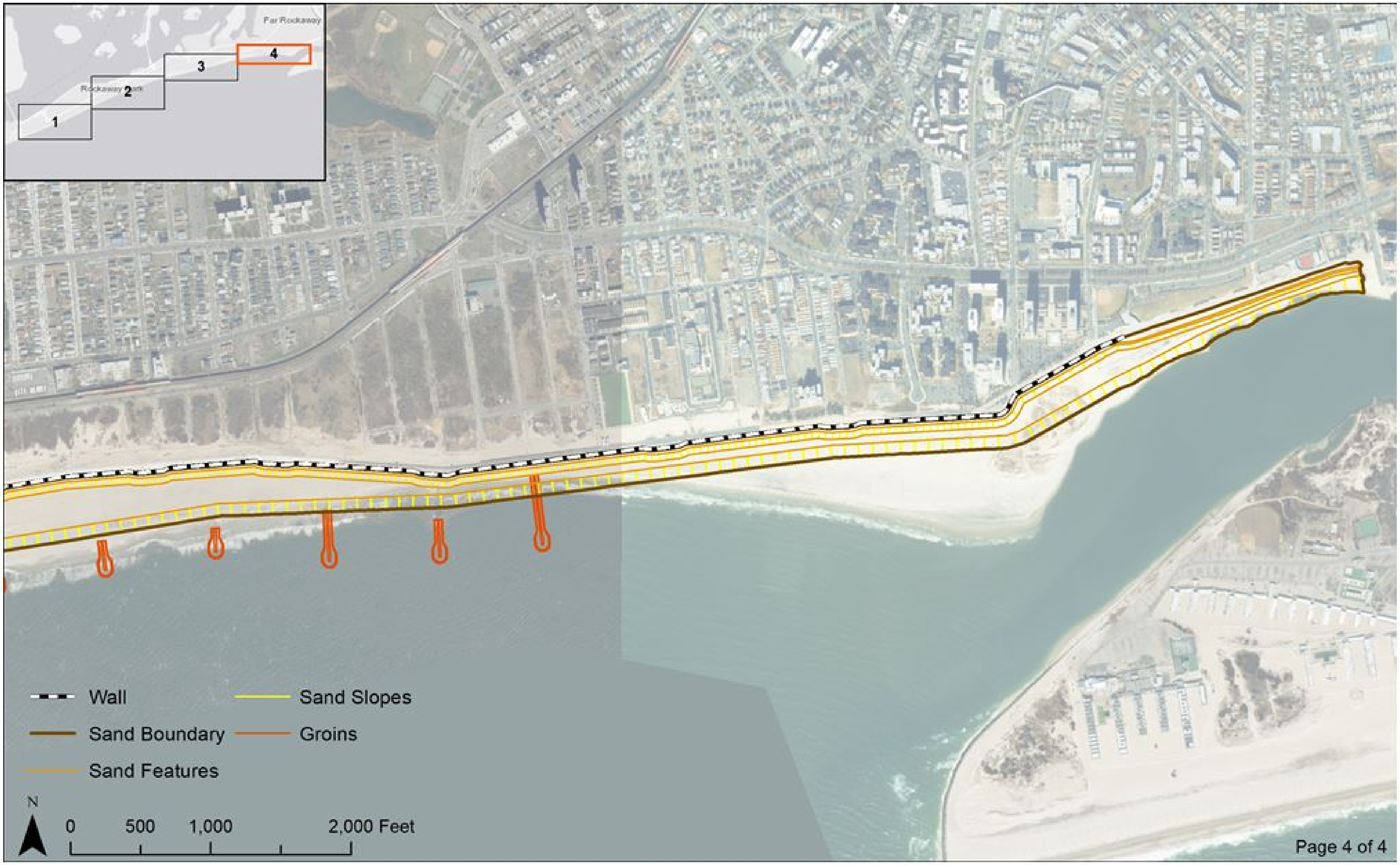

Figure 2d: Atlantic Ocean Shorefront Component of Recommended Plan (4 of 4)

2.4 Recommended Plan: Jamaica Bay

2.4.1 Cedarhurst-Lawrence

The Cedarhurst-Lawrence project (Figure 3) begins on the east side of the channel near the driveway to Lawrence High School. It consists of approximately 1000 feet of deep bulkhead that follows the existing bulkhead line around the southern end of the channel at Johnny Jack Park, and continues north along the west side before being connected to high-ground behind the Five Towns Mini Golf & Batting Facility with a 23 foot segment of medium floodwall. The project is located in Nassau County and crosses the border between the Village of Cedarhurst and the town of Hempstead. Project design elevations have preliminarily been established based on expected wave exposure are set at an elevation of +10.0ft NAVD88.

There are three existing outfalls in the area where the bulkhead will be raised. Each of the outlets will be modified to add a valve chamber that will include a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system. The outlet pipes will be replaced if the design phase indicates it is necessary. Drainage along the landward side of the bulkhead will be provided by a small ditch or drainage collection pipe, with inlets that will be connected to the existing or additional drainage outlets. When the drainage outlets are blocked by a storm tide the ditch or pipes will direct runoff towards a pump station. The preliminary pump station capacity is estimated to be approximately 40 cubic feet per second (cfs), which will be refined during the design phase.

Table 1: Cedarhurst-Lawrence Outlet Table

Drainage Area	Outfall Size	Outfall Location
Drainage Basin L1	TBD	Existing Outfall
Drainage Basin L1	TBD	Existing/New Culvert (500 feet from Peninsula Boulevard).
Drainage Basin L1	TBD	Existing/New Culvert (500 feet from Peninsula Boulevard).
Drainage Basin L1	5'x3'	Outfall L-1, Approximately 250 feet from Peninsula Boulevard

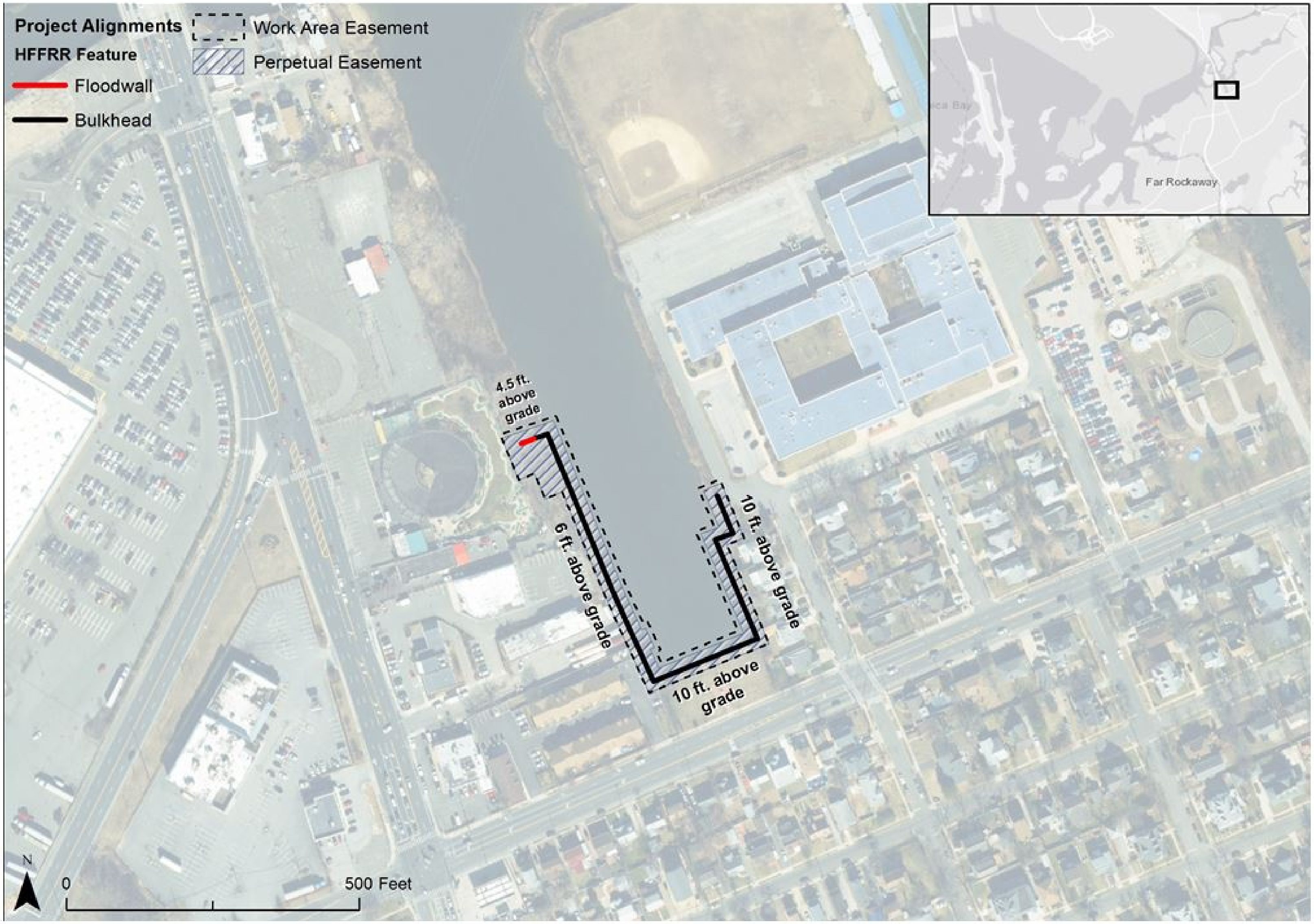

Figure 3: Cedarhurst-Lawrence HFFRRF Project Plan

2.4.2 Mid-Rockaway - Edgemere Area

The eastern end of the project area (Figure 4) begins at high ground near the intersection of Beach Channel Drive and Beach 35th Street. The project moves north and then west following parallel to Beach 35th Street before jogging to the north and crossing the abandoned portion of Beach 38th Street and continuing west. The project turns north and runs along the peninsula between Beach 43rd Street and the coastal edge. This approximately 3,200 foot section of hybrid berm has been maintained as far landward as possible and weaves in and out between the properties. The hybrid berm is strategically used at these locations to minimize and avoid impacts to existing healthy wetland habitats. This area has also been identified as a good candidate for the use of Natural and Nature Based Features (NNBFs). The NNBF design includes placement of a stone toe protection and rock sill structure just off the existing shoreline to attenuate wave action and allow tidal marsh to establish between the rock sill and the berm. In some locations the eroded/degraded shoreline (subtidal) will be regraded to allow for the development of low marsh (smooth cordgrass) to provide productive nursery habitats behind the sill structures. The shore slope behind the structure will be regraded to reduce risk of erosion further and create suitable elevation gradients and substrates for establishment of a high tidal marsh, designated as scrub shrub areas in the figure. In addition, the graded habitat behind the structure will be designed to allow the shoreward migration of various habitats with rising sea levels, thereby extending the life of these important ecological systems. On the north east of the Edgemere peninsula the project then transitions into 200 feet of shallow bulkhead, which continues north along existing water front properties and bulkheads. Approximately 200’ of medium floodwall then cuts west across, at the tip of the Edgemere peninsula. A road ramp on Beach 43rd Street has been included to maintain both pedestrian, and vehicle access to the coastal edge at north end of Beach 43rd street. The floodwall continues in southwest direction along the coastline after which it transitions into a 750 foot section of high berm. The berm continues west from Beach 43rd Street before turning south just to the east of the unpaved extension of Beach 44th Street. The project then transitions into a 660 foot section of high floodwall which continues southwest staying as far landwards as possible to avoid an existing restoration project. Near the intersection of Norton Avenue and Beach 46th Street, north of Norton Avenue, the floodwall transitions back into a low berm which runs parallel to Norton Avenue southwest and then turns northwest along Conch Place. The area waterward of this berm has also been identified as a good location for the use of NNBFs and to restore high marsh habitat. Project design elevations vary and have preliminarily been established based on expected wave exposure. Project elevations range between +8.0ft and +9.5t NAVD88.

The Edgemere interior drainage basin has two subbasins, E1 and E2 covering approximately 194 acres and 274 acres, respectively. The Edgemere drainage basin is almost fully developed and predominantly residential, except for a stretch of undeveloped, grassy area along the southern part of E1 and southwestern part of E2. Subbasin E1 was estimated to require 9 outlets, including 2 existing outlets. Subbasin E2 was estimated to require 6 outlets, including 1 existing outlet (See Edgemere Outlet Table). Each of the existing outlets will be modified to add a valve chamber that will include a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system. The existing outlet pipes will be replaced if the design phase indicates it is necessary due to the condition of the pipes or a need for additional capacity. The new outlets are generally assumed to be 5 ft. wide by 3 ft. high box culverts. Drainage along the landward side of the berm/floodwall structures will be provided by a small ditch or drainage collection pipe, with some inlets that will be connected to the existing or additional drainage outlets. When the drainage outlets are blocked by a storm tide the ditch or pipes will direct runoff towards a pump station. The preliminary pump station analysis indicates that three pump stations are desired in the Edgemere Area. Due to the length of the area and difficulties in draining all of the area to a single site, drainage subbasin E1 is proposed to have two pump stations one pump station would be located near Norton Avenue and Beach 49th Street and the other near Beach 43rd Street and Hough Place with a combined capacity of about 210 cfs. Subbasin E2 is proposed to have one pump station located near Beach 38th Street with an estimated capacity of 120 cfs. It should be noted that each pump station will include additional gravity capacity that will operate when the pump station is not in operations mode. The capacity of each pump station and drainage outlet will be refined during the project design phase.

Table 2: Edgemere Outlet Table

Drainage Basin	Outfall Size	Outfall Location
Drainage Basin E1	TBD	Existing Outfall ROC-648
Drainage Basin E1	5'x3'	Outfall E1-1 located on Norton Avenue between Beach 47th and 48th Streets.
Drainage Basin E1	5'x3'	Outfall E1-2 located on Norton Avenue between Beach 46th and 45th Streets.
Drainage Basin E1	5'x3'	Outfall E1-3 located on Beach 45th Street north of Hough Place.
Drainage Basin E1	5'x3'	Outfall E1-4 located on the north end of Beach 45th Street.
Drainage Basin E1	5'x3'	Outfall E1-5 located 550 feet north of Hough Place.
Drainage Basin E1	5'x3'	Outfall E1-6 located 500 feet north of Hough Place.
Drainage Basin E1	TBD	Existing Outfall ROC-637
Drainage Basin E1	5'x3'	Outfall E1-7 located north of Beach 40th Street.
Drainage Basin E2	TBD	Existing Outfall ROC-638
Drainage Basin E2	5'x3'	Outfall E2-1 located 50 feet east of Beach 37th Street.
Drainage Basin E2	5'x3'	Outfall E2-2 located 50 feet east of Beach 37th Street.
Drainage Basin E2	5'x3'	Outfall E2-3 located 50 feet east of Beach 36th Street.
Drainage Basin E2	5'x3'	Outfall E2-4 located 50 feet east of Beach 36th Street.
Drainage Basin E2	5'x3'	Outfall E2-5 located between Beach 36th Street and Beach 35th Street.

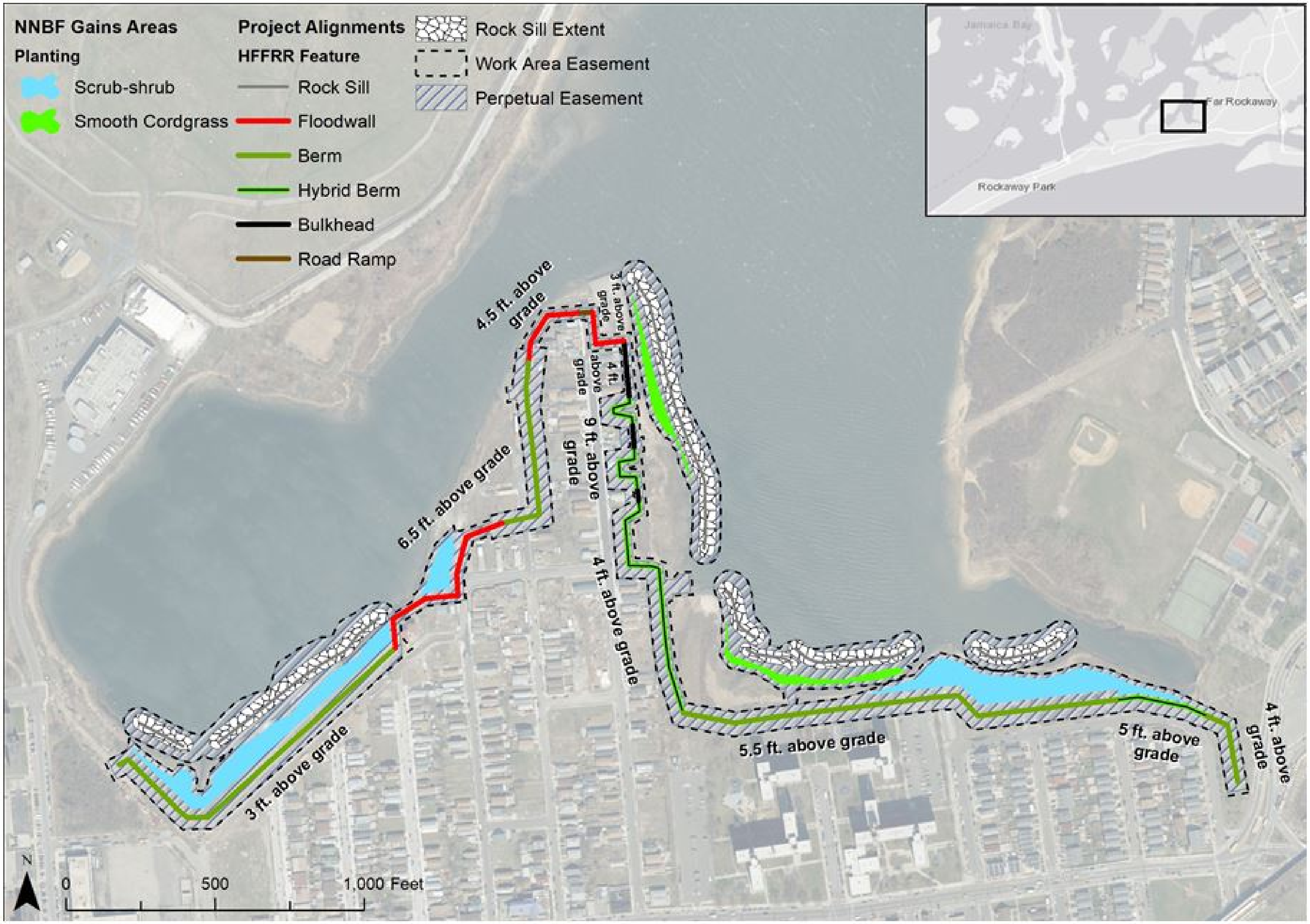

Figure 4: Mid Rockaway – Edgemere Area HFFRRF Project Plan

2.4.3 Mid-Rockaway - Arverne Area

This area of the project (Figure 5) begins at high ground to the north of Almeda Avenue and Beach 58th Street. An approximately 1,100 foot section of low berm runs south along Beach 58th Street. The berm has been maintained as far landward as possible to avoid healthy habitat. This segment has been identified as a candidate for the use of NNBFs. Much of the area is identified as existing quality wetlands, but a portion of fill area has been identified where intermediate marsh (Salt meadow Hay) will be restored. The project then transitions to an approximately 1,200 foot long medium floodwall which, for feasibility level analysis, is purposefully sited along property boundaries at the southern end of the channel to minimize impacts to the existing waterfront businesses. A road ramp has been included to maintain access to the marina. At the southwest corner of the channel the project transitions to run along the coastal edge north for approximately 1,700 feet. This segment transitions between revetments and bulkheads to match the existing coastline conditions and uses. The portion between Thursby Avenue and Elizabeth Road has been aligned such that it can be integrated into the planned NYC DPR Thursby Basin Park project. Just north of De Costa Avenue, the project transitions to low berm for approximately 1,600 feet and runs west along De Costa Avenue and around the edges of healthy habitat while also creating an area for stormwater storage and a pump station just north of Beach Street. At the corner of De Costa Avenue and Beach 65th Street the low berm transitions into a hybrid berm to minimize habitat impacts. The hybrid berm continues west and then north for 300 feet to the corner of Beach 65th Street and Bayfield Avenue. The project then transitions to a 2,400 foot long shallow bulkhead which travels west along the line of existing bulkheads where they exist and parallel with Bayfield Avenue in areas without existing bulkhead. The bulkhead section ends just west of the corner of Bayfield Avenue and Beach 72nd Street. The area west of Beach 69th Street and the eastern end of De Costa Ave has been identified as a good candidate for NNBF. Based on existing elevations and profiles, a combination of either fill or excavation is used to provide the appropriate elevations shoreward of the rock sills to maximize healthy subtidal habitats, with restoring a transition area for low to high intertidal marsh. Eroded shorelines were replaced with low intertidal (smooth cordgrass) habitats, and transition to either intermediate (salt meadow hay) and/or high marsh (scrub-shrub) habitats. From the end of the bulkhead section the project continues south with a 120 foot section of medium floodwall connecting the bulkhead to a 1,080 foot section of high berm. The berm runs south along Beach 72nd Street and turns west at Hillmeyer Avenue and continues west past the corner of Barbados Drive and Hillmeyer Avenue, where it turns north and transitions to a flood wall to minimize the features footprint. The berm section has been positioned close to the roads to minimize impacts on habitat. The berm section transitions into a high floodwall which goes west and then runs parallel to the coast southwest for 440 feet, ending at a bulkhead section just west of the end of Hillmeyer Avenue. The Brant Point area includes the creation of wetlands between the berm and the rock sills that are placed just off the coastal edge. The rock sill will protect the shoreline where eroded areas will be restored to low marsh habitats protecting the existing high quality habitats shoreward. The areas behind the existing wetlands areas will be graded to provide a transition area to high marsh and then uplands where practical. The existing uplands areas will be replanted as necessary to provide for a high quality maritime forest habitat, with appropriate tree species. South of Hillmeyer Avenue the alignment follows the bulkheaded coastal edge. The project proposes a high frequency flood risk reduction bulkhead feature that follows an existing bulkhead along the coastal edge for approximately 270 feet ending just south of Almeda Avenue. From this point a low floodwall runs parallel with the coastal edge southeast for 700 feet then transitions into a deep bulkhead. This section of bulkhead continues southeast along the line of existing bulkhead for approximately 540 feet to the end of Thursby Avenue. The project continues as a low floodwall for approximately 1,400 feet, traveling east along Thursby Avenue and then south, parallel with Beach 72nd Street turning west and running along Amstel Boulevard, ending just past Beach 74th street. Two road ramps and one vehicular gate are included to maintain access to the waterfront. The final segment is approximately 250 feet of medium floodwall which runs along the coastal edge and connect the low floodwall to high ground in the west. Project design elevations vary and have preliminarily been established based on the expected wave exposure. Project elevations range between +8.0ft and +11.5t.

The Arverne drainage basin has three subbasins A1, A2, and A3, covering 76 acres, 139 acres, and 209 acres, respectively. The Arverne drainage basin is almost fully developed and predominantly residential, with a few, scattered undeveloped areas. Subbasin A1 was estimated to require 8 outfalls, including 5 existing outfalls. Subbasin A2 was estimated to require 3 outlets. Subbasin A3 was estimated to require 5 outlets, including 3 existing outlets. Each of the existing outlets will be modified to add a valve chamber that will include a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system. The existing outlet pipes will be replaced if the design phase indicates it is necessary due to the condition of the pipes or a need for additional capacity. The new outlets are generally assumed to be 5 ft. wide by 3 ft. high box culverts (See Arverne Outlet Table). Drainage along the landward side of the berm/floodwall structures will be provided by a small ditch or drainage collection pipe, with some inlets that will be connected to the existing or additional drainage outlets. When the drainage outlets are blocked by a storm tide the ditch or pipes will direct runoff towards a pump station. The preliminary pump station analysis indicates that three pump stations are desired in the Arverne Area. Drainage Subbasin A1 is proposed to have a pump station located adjacent to DE Costa Avenue near Beach 72nd with a capacity of about 70cfs. Subbasin A2 is proposed to have one pump station located on DE Costa Avenue near Beach 63rd Street with an estimated capacity of 180 cfs. Subbasin A3 is proposed to have one pump station located south of Thursby Avenue with an estimated capacity of 300 cfs. It should be noted that each pump station will include additional gravity capacity that will operate when the pump station is not in operations mode. The capacity of each pump station and drainage outlet will be refined during the project design phase.

Table 3: Arverne Outlet Table

Drainage Basin	Outfall Size	Outfall Location
Drainage Basin A1	TBD	Existing Outfall ROC-633
Drainage Basin A1	TBD	Existing Outfall ROC-634
Drainage Basin A1	TBD	Existing Outfall ROC-40062
Drainage Basin A1	5’x3’	Outfall A1-1 located at the end of Hillmyer Avenue.
Drainage Basin A1	5’x3’	Outfall A1-2 located adjacent to Hillmyer Avenue and Barbadoes Avenue.
Drainage Basin A1	TBD	Existing Outfall ROC-658
Drainage Basin A1	5’x3’	Outfall A1-3
Drainage Basin A1	TBD	Existing Outfall ROC-659
Drainage Basin A2	5’x3’	Outfall A2-1 located on Bayfield Avenue 150 feet west of Beach 65th Street.
Drainage Basin A2	5’x3’	Outfall A2-2 located at the east end of DE Costa Avenue.
Drainage Basin A2	5’x3’	Outfall A2-3 located at the east end of Burchell Road.
Drainage Basin A3	TBD	Existing Outfall. Located at the east end of Thursby Avenue.
Drainage Basin A3	TBD’	Existing Outfall ROC-636
Drainage Basin A3	5’x3’	Outfall A3-1 located 250 north of Beach Channel Drive on 58 Street.
Drainage Basin A3	TBD	Existing Outfall ROC-635
Drainage Basin A3	5’x3’	Outfall A3-2 located 50 north of Beach Channel Drive on 58 Street.

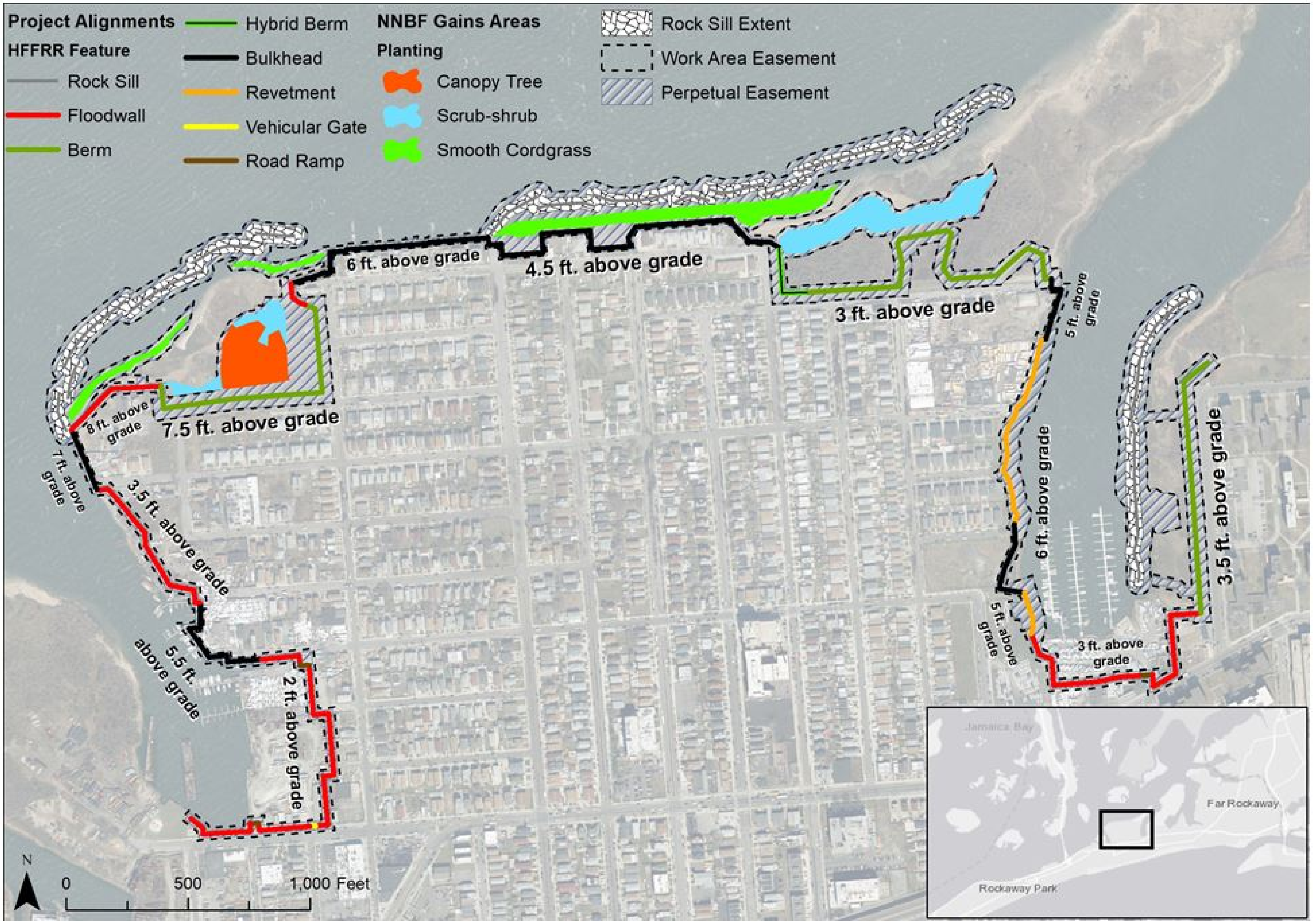

Figure 5: Mid Rockaway – Arverne Area HFFRRF Project Plan

2.4.4 Mid-Rockaway - Hammels Area

Two separate segments compose the Hammels area of the Mid-Rockaway project (Figure 6). The east segment begins approximately 320 feet west of the intersection of Beach 75th Street and Beach Channel Drive. It is composed of approximately 1,400 feet of low floodwall, running west along the north side of Beach Channel Drive, and parallel with the Rockaway Line elevated subway track. Three road ramps have been included to maintain access to the water front properties. The west segment consists of 1,400 feet of low floodwall beginning to the west of the MTA facility Hamels Wye adjacent to the Rockaway Line. The project heads west and south in a stair-step fashion avoiding impacts on existing structures, ending on the north side of Beach Channel Drive just west of Beach 87th Street. Three road ramps have been included to maintain access to the waterfront. Project design elevations have preliminarily been established based on the expected wave exposure, which is expected to be low, and are set at +8.0ft NAVD88.

The Hammels drainage basin includes two subbasins, H1 and H2, approximately 105 acres and 139 acres respectively. The Hammels drainage basin is almost fully developed, except for a few scattered grassy areas and is predominantly residential, with some commercial development. Subbasin H1 was estimated to require 3 outlets, including 2 existing outlets. Subbasin H2 was estimated to require 3 outlets, including 1 existing outlet. Each of the existing outlets will be modified to add a valve chamber that will include a sluice gate and flap valve to prevent high tides or storm surge from flooding through the drainage system (See Hammels Outlet Table). The existing outlet pipes will be replaced if the design phase indicates it is necessary due to the condition of the pipes or a need for additional capacity. The new outlets are generally assumed to be 5 ft. wide by 3 ft. high box culverts. Drainage along the landward side of the berm/floodwall structures will be provided by a small ditch or drainage collection pipe, with some inlets that will be connected to the existing or additional drainage outlets. When the drainage outlets are blocked by a storm tide the ditch or pipes will direct runoff towards a pump station. The preliminary pump station analysis indicates that two pump stations are desired in the Hammels Area. Drainage subbasin H1 is proposed to have a pump station located at the southern end of Hammels near Beach 87th Street with a capacity of about 100cfs. Subbasin H2 is also proposed to have one pump station which is located at the northern end of Hammels near Beach Channel Drive with an estimated capacity of 180 cfs. It should be noted that each pump station will include additional gravity capacity that will operate when the pump station is not in operations mode. The capacity of each pump station and drainage outlets will be refined during the project design phase.

Table 4: Hammels Outlet Table

Drainage Area	Outfall Size	Outfall Location
Drainage Basin H1	TBD	Existing Outfall ROC-656
Drainage Basin H1	5'x3'	Outfall H1-1, Approximately 70 feet east of Beach 85th Street
Drainage Basin H1	TBD	Existing Outfall ROC-657
Drainage Basin H2	5'x3'	Outfall H2-1, Approximately 350 feet west of Beach 80th Street
Drainage Basin H2	5'x3'	Outfall H2-2, Approximately 100 feet east of Beach 79th Street
Drainage Basin H2	TBD	Existing Outfall ROC-653

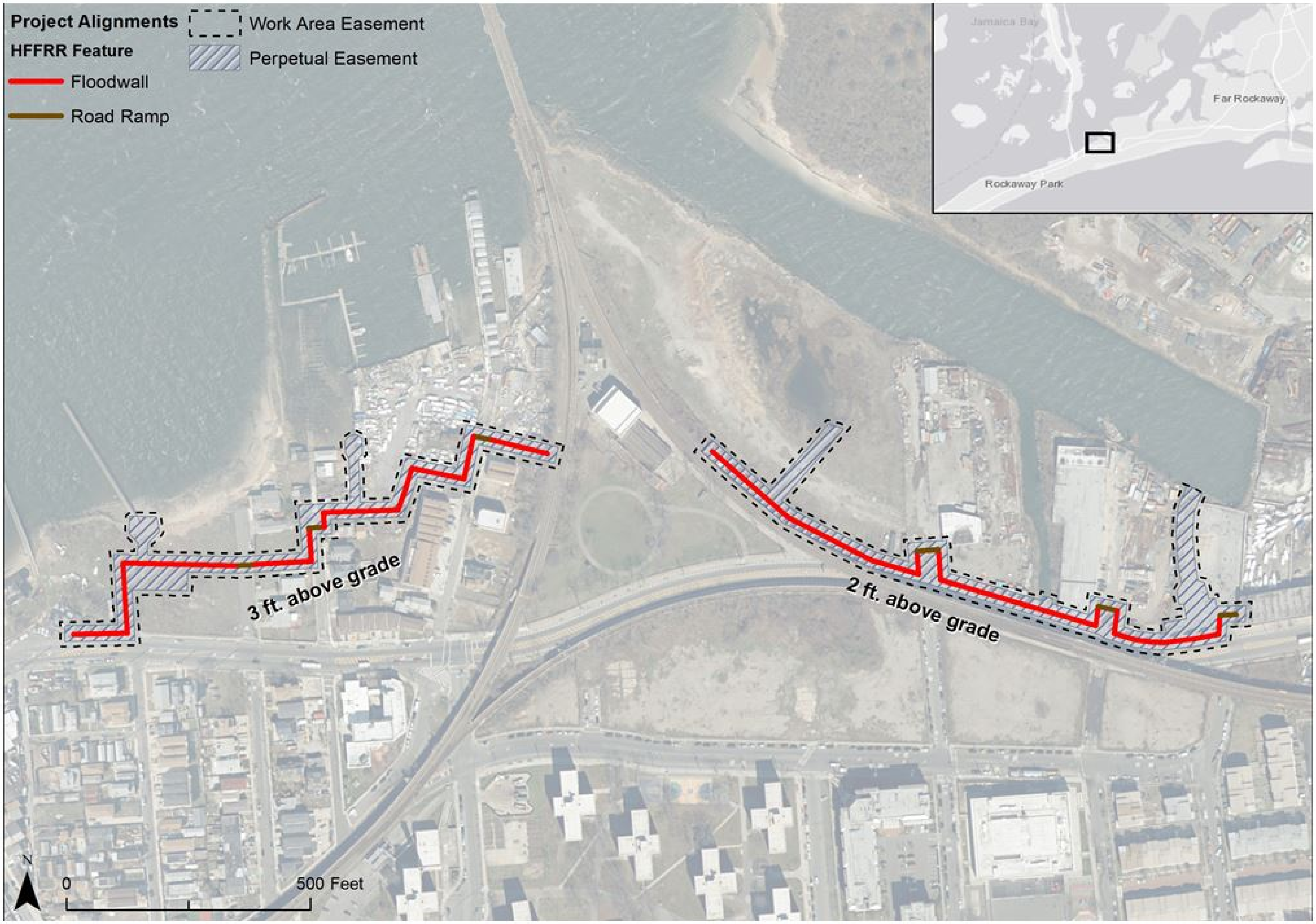

Figure 6: Mid Rockaway – Hammels Area HFFRRF Project Plan

2.5 Project Elements

Structural and non-structural management measures, including NNBFs, were developed to address one or more of the planning objectives for the project. Management measures were developed in consultation with the non-federal sponsor (NYSDEC), state and local agencies, and non-governmental entities. Measures were evaluated for compatibility with local conditions and relative effectiveness in meeting planning objectives. Effective measures were combined to create CSRM alternatives for two geographically discrete reaches: the Atlantic Ocean shorefront and Jamaica Bay. Integrating CSRM alternatives for the two reaches provides the most economically efficient system-wide solution for the vulnerable communities within the study area. It is important to note that any comprehensive approach to CSRM in the study area must include an Atlantic Ocean shorefront component because overtopping of the Rockaway peninsula is a source of flood waters into Jamaica Bay. Efficient CSRM solutions were formulated specifically to address conditions at the Atlantic Ocean shorefront. The best solution for the Atlantic Shorefront reach was included as a component of the alternative plans for the Jamaica Bay reach.

The Atlantic Ocean shorefront reach is subject to wave attack, wave run up, and over topping along the Rockaway peninsula. The general approach to developing CSRM along this reach was to evaluate erosion control alternatives in combination with a single beach restoration plan to select the most cost effective renourishment approach prior to the evaluation of alternatives for coastal storm risk management. The most cost-effective erosion control alternative is beach restoration with increased erosion control (See Figures 2a through 2d). This erosion control alternative had the lowest annualized costs over the 50-year project life and the lowest renourishment costs over the project life. A screening analysis was performed to evaluate the level of risk reduction provided by a range of dune and berm dimensions and by reinforced dunes, which would be combined with beach restoration with increased erosion control to optimize CSRM at the Atlantic Ocean shorefront.

Beach fill for the Atlantic Shoreline component of the proposed project is available from an offshore borrow area containing approximately 17 million cy of suitable beach fill material, which exceeds the required initial fill and all periodic renourishment fill operations. The borrow area is located approximately two miles offshore (south) of the Rockaway peninsula.

Other factors such as prior projects at Rockaway Beach, project constraints, stakeholder concerns, and engineering judgment were also applied in the evaluation and selection. A composite seawall was selected as the best coastal storm risk management alternative. The composite seawall protects against erosion and wave attack and also limits storm surge inundation and cross-peninsula flooding (Figures 7 and 8). The structure crest elevation is +17 feet (NAVD88), the dune elevation is +18 feet (NAVD88), and the design berm width is 60 feet. The armor stone in horizontally composite structures significantly reduces wave breaking pressure, which allows smaller steel sheet pile walls to be used in the design if the face of the wall is completely protected by armor stone. The composite seawall may be adapted in the future to rising sea levels by adding 1-layer of armor stone and extending the concrete cap up to the elevation of the armor stone.

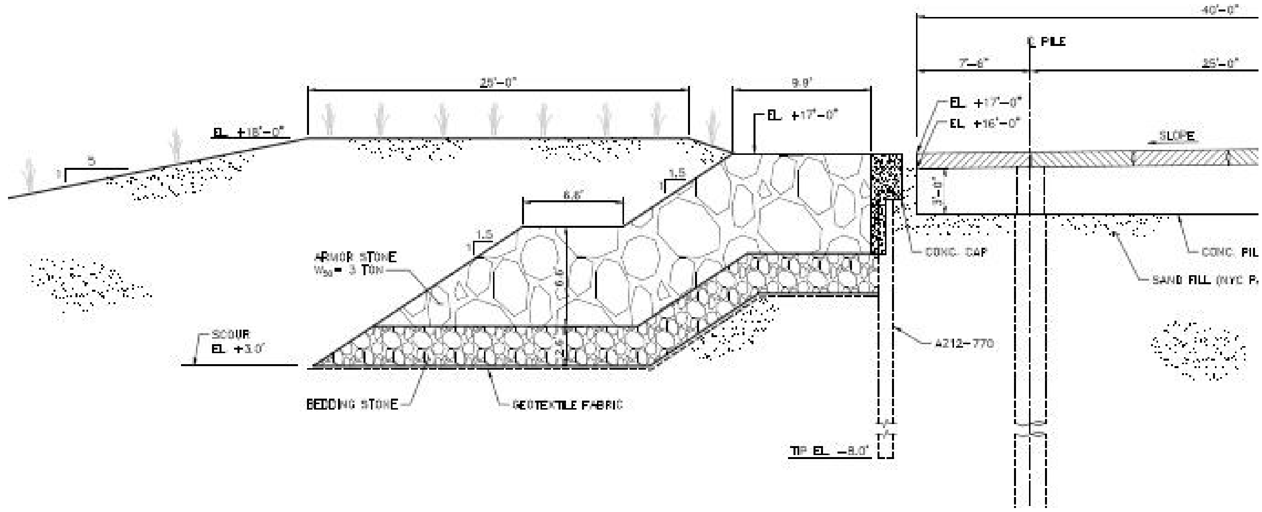

Figure 7: Composite Seawall Beach 19th St. to Beach 126th St

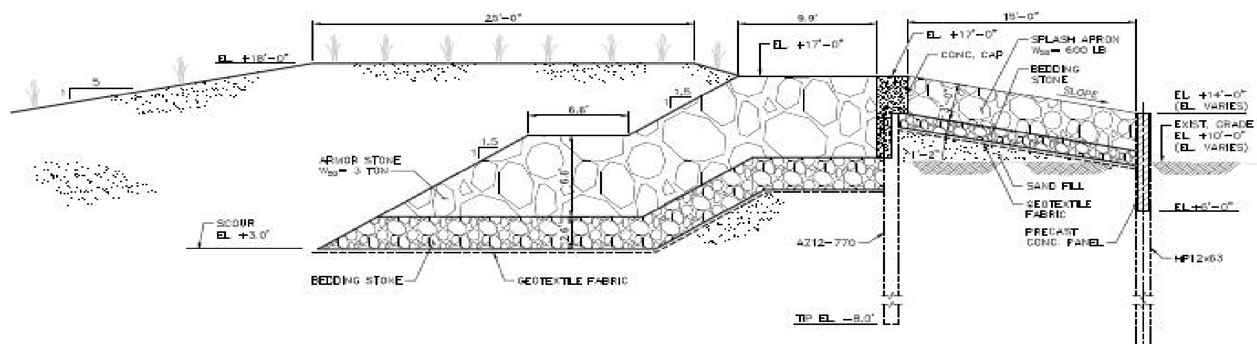

Figure 8: Composite Seawall Beach 126th St. to Beach 149th St.

2.5.1 The Atlantic Shorefront Beachfill

The selected storm damage reduction plan including changes from the authorized project, comprises approximately 152,000 If of dune and beach fill and generally extends from the eastern end of the barrier island at Beach 19th street to the western boundary of Breezy Point. This component of the Project includes the following: 1) a dune with a top elevation of +18 ft above NAVD88, a top width of 25 ft, and landward and seaward slopes of 1V:5H that will extend along the entire footprint (1V:3H on landward slope fronting the boardwalk).

All beachfill quantities include an overfill factor of 11% based on the compatibility analysis for the borrow areas. In addition, the initial construction quantities include an additional 15% for construction tolerance. It is noted that the advance fill and renourishment quantities do not include tolerance since the purpose of the advance fill and renourishment is to place a specific volume of sediment to offset anticipated losses between renourishment operations, rather than build a specific template. Beachfill quantities required for initial construction of each alternative are estimated based on the expected shoreline position in June of 2018. It is impossible to predict the exact shoreline position in June 2018 since the wave conditions vary from year to year and affect shoreline change rates. The shoreline position in June of 2018 was estimated based on a 2.5 year GENESIS-T simulation representative of typical wave conditions.

Table 5: Initial Construction Beachfill Quantities

Reach	Reach Length (ft)	Recommended Plan Fill Quantity (CY)
West Taper		306,000
Reach 3	10,320	356,000
Reach 4	5,380	294,000
Reach 5	10,650	321,000
Reach 6a	3,730	250,000
Reach 6b	2,000	20,000
East Taper		49,000
Total		**1,596,000**

2.5.2 Atlantic Shorefront: Construction of New Groins and Groin Extensions

Three types of groin measures are considered in the alternative analysis: new groin construction, groin extension, and groin shortening. The exact dimensions and stone sizes of the existing groins at Rockaway is not available. Therefore, it is assumed that the existing groins in Reaches 5 and 6 are similar to the proposed new groin designs. Generally, a groin is comprised of three sections: 1) horizontal shore section (HSS) extending along the design berm; (2) an intermediate sloping section (ISS) extending from the berm to the design shoreline, and (3) an outer sloping section (OS) that extends from the shoreline to offshore. The head section (HD) is part of the OS and is typically constructed at a flatter slope than the trunk of the groin and may require larger stone due to the exposure to breaking waves.

The spacing between groins in this study is based on the existing spacing in Reach 5 (720 ft) and Reach 6a (780 ft). The required lengths of the new groins is based on the GENESIS-T model simulations.

The Project requires the immediate construction of a 12 new groins in reach 3 and 4 (between 92nd Street to 121st Street) and an additional groin in reach 6a (34th street). The 5 groin extension are located in Reach 6a (between 37th Street – 49th Street). The extension of the groin lengths vary and range from 75 ft to 200 ft. Groin widths will be 13 ft. See Table 6.

Table 6: Summary of Groin Lengths

Reach	Number	Street	HSS (ft)	ISS (ft)	OS (ft)	Total (ft)	Notes:
6a	1	34th St	90	108	328	526	New
6a	2	37th St	90	108	328	526	Extension
6a	3	40th St	90	108	328	526	Extension
6a	4	43rd St	90	108	228	426	Extension
6a	5	46th St	90	108	228	426	Extension
6a	6	49th St	90	108	228	426	Extension
4	1	92nd St	90	108	128	326	New
4	2	95th St	90	108	128	326	New
4	3	98th St	90	108	128	326	New
4	4	101st St	90	108	128	326	New
4	5	104th St	90	108	128	326	New
4	6	106th St	90	108	128	326	New
4	7	108th St	90	108	128	326	New
3	8	110th St	90	108	153	351	New
3	9	113th St	90	108	178	376	New
3	10	115th St	90	108	178	376	New
3	11	118th St	90	108	178	376	New
3	12	121st St	90	108	128	326	New

2.5.3 Sand Removal from Offshore Borrow Area

An offshore borrow area which is 2.6 miles long and 1.1 miles wide, located approximately 2 miles south of East Rockaway (Figure 9) between 35 feet mean low water and about 60 feet mean low water, has been identified as a potential source of sand material for beach fill and dune construction activities. The borrow area contains approximately 17,000,000 CY of suitable beach fill material.

Figure 9: Location of the East Rockaway Borrow Area

2.6 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions of the Project include beach renourishments and maintenance of beach access locations. Renourishments will be conducted every 4-years or as needed over the 50-year life of the Project. During each renourishment, approximately 1,100,000 CY of sand will be added to the beach from the borrow area located approximately 2 miles offshore to the south of East Rockaway. Inlet maintenance dredging (115,000 cy/yr) is included in the 1.1 million cy of material needed for the renourishment.

3 EFH DESIGNATIONS AND LIFE HISTORIES OF MANAGED FISH SPECIES

The species and life stages that have designated EFH in the project area were determined using the *Guide to Essential Fish Habitat Designations in the Northeastern United States* found on the NMFS website[1] (NMFS 2016b), as well as publicly available GIS data. The 10' x 10' squares of latitude and longitude within which the project area falls were selected and Tables 7 through 9 were generated. Table 7 details the 10' x 10' square coordinates and is followed by a short but detailed description of the selected squares, including landmarks along the coastline. Tables 8 and 9 list the designated EFH species for the project area, specific to the Atlantic Shoreline and Jamaica Bay project reaches as described above. The notation "X" indicates that EFH has been designated within the 10' x 10' square for a given species and life stage.

Table 7: 10' x 10' EFH Designated Coordinates

Cell	Coordinates			
	North	East	South	West
Square 1	40º 40.0' N	73º 50.0' W	40º 30.0' N	74° 00.0' W
Square 2	40º 40.0' N	73º 40.0' W	40º 30.1' N	73º 50.0' W

Square 1 Description: Atlantic Ocean waters within the square within the Hudson River estuary affecting the following: western Rockaway Beach, western Jamaica Bay, Rockaway Inlet, Barren I., Coney I. except for Norton Pt., Paerdegat Basin, Mill Basin, southwest of Howard Beach, Ruffle Bar, and many smaller islands.

Square 2 Description: Atlantic Ocean waters within the square within Great South Bay estuary affecting the following: Western Long Beach, NY., Hewlett, NY., Woodmere, NY., Cedarhurst, NY., Lawrence, NY., Inwood, NY., Far Rockaway, NY., East Rockaway Inlet, eastern Jamaica Bay, Brosewere Bay, Grassy Bay, Head of Bay, Grass Hassock Channel, eastern Rockaway Beach, Atlantic Beach, Howard Beach, J. F. K. International Airport, Springfield, NY., and Rosedale, NY., along with many smaller islands.

[1] https://www.habitat.noaa.gov/protection/efh/newInv/index.html

Table 8: Designated EFH Species and Life Stages – Atlantic Shorefront

	EFH	Species	Eggs	Larvae	Juveniles	Adults
1	NE	Atlantic salmon (*Salmo salar*)				X
2	NE	pollock (*Pollachius virens*)			X	
3	NE	Atlantic Cod (*Gadus morhua*)				X
4	NE	red hake (*Urophycis chuss*)	X	X	X	X
5	NE	winter flounder (*Pleuronectes americanus*)	X	X	X	X
6	NE	windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
7	NE	Atlantic herring (*Clupea harengus*)			X	X
8	NE	monkfish (*Lophius americanu*s)	X	X		x
9	NE	little skate (*Leucoraja erinacea*)			X	
10	NE	winter skate (*Leucoraja ocellata*)			X	X
11	MA	bluefish (*Pomatomus saltatrix*)			X	X
12	MA	long finned squid (*Loligo pealei*)	X			
13	MA	Atlantic butterfish (*Peprilus triacanthus*)				X
14	MA	Atlantic mackerel (*Scomber scombrus*)			X	X
15	MA	summer flounder (*Paralicthys dentatus*)		X	X	X
16	MA	scup (*Stenotomus chrysops*)	X	X	X	X
17	MA	black sea bass (*Centropristus striata*)			X	X
18	CMPS	king mackerel (*Scomberomorus cavalla*)	X	X	X	X
19	CMPS	Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
20	CMPS	cobia (*Rachycentron canadum*)	X	X	X	X
21	HMS	sand tiger shark (*Odontaspis taurus*)		X		
22	HMS	Bluefin tuna (*Thunnus thynnus*)			X	
23	HMS	dusky shark (*Charcharinus obscurus*)		X		
24	HMS	sandbar shark (*Charcharinus plumbeus*)			X	X
25	HMS	white shark (*Carcharodon carcharias*)		X	X	X
26	HMS	Skipjack tuna (*Katsuwonus pelamis*)				X
27	HMS	Smoothhound Shark (Atlantic Stock)		X	X	X

NE= New England Species;

MA = Mid-Atlantic Species;

CMPS = Coastal Migratory Pelagic Species;

HMS = Highly Migratory Species

Table 9: Designated EFH Species and Life Stages – Jamaica Bay

	EFH	Species	Eggs	Larvae	Juveniles	Adults
1	NE	Atlantic salmon (*Salmo salar*)				X
2	NE	pollock (*Pollachius virens*)			X	
3	NE	clearnose skate (Raja eglanteria)			X	X
4	NE	red hake (*Urophycis chuss*)	X	X	X	X
5	NE	winter flounder (*Pleuronectes americanus*)	X	X	X	X
6	NE	windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
7	NE	Atlantic herring (*Clupea harengus*)		X	X	X
8	NE	monkfish (*Lophius americanus*)	X	X		
9	NE	Little skate (*Leucoraja erinacea*)				X
10	NE	Winter skate (*Leucoraja ocellata*)			X	X
11	NE	Yellowtail flounder (Limanda ferruginea)				X
11	MA	bluefish (*Pomatomus saltatrix*)			X	X
12	MA	long finned squid (*Loligo pealei*)	X			
13	MA	Atlantic butterfish (*Peprilus triacanthus*)			X	X
14	MA	Atlantic mackerel (*Scomber scombrus*)			X	X
15	MA	summer flounder (*Paralicthys dentatus*)			X	X
16	MA	scup (*Stenotomus chrysops*)			X	X
17	MA	black sea bass (*Centropristus striata*)			X	X
18	MA	spiny dogfish (*Squalus acanthias*)			X	X
19	CMPS	king mackerel (*Scomberomorus cavalla*)	X	X	X	X
20	CMPS	Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
21	CMPS	cobia (*Rachycentron canadum*)	X	X	X	X
22	HMS	sand tiger shark (*Odontaspis taurus*)		X		
23	HMS	white shark (*Carcharodon carcharias*)		X		
24	HMS	smoothhound Shark (Atlantic Complex) (*Mustelus mustelus*)		X	X	X
25	HMS	sandbar shark (*Charcharinus plumbeus*)				X

NE= New England Species;

MA = Mid-Atlantic Species;

CMPS = Coastal Migratory Pelagic Species;

HMS = Highly Migratory Species

As shown on Tables 8 and 9, the project site has been identified as EFH for 27 species of fish for the Atlantic Shoreline project reach, and 25 species of fish for the Jamaica Bay project reach, respectively. The life stages of the Highly Migratory Species are broken down into neonates, juveniles, and adults. There are no 'egg' designations and neonates correspond to the "larvae" heading.

The following text provides a description of general habitat parameters of all identified designated EFH species and the applicable life stages specific to the EFH assessment. The habitat parameters were obtained from the *Guide to Essential Habitat Descriptions* and where necessary, supplemented by the *EFH Tables* (NMFS 2016c). If more than one geographic region was given in a description, the habitat parameters for the geographic region associated with the project area were used.

3.1 New England Species

3.1.1 Atlantic salmon (*Salmo salar*)

Eastern portions of the Atlantic Ocean along Long Island are designated as EFH habitat for salmon adults in the seawater salinity zone, mixing water/brackish salinity zone, and the tidal freshwater salinity zone. The habitat parameters for the applicable life stages are as follows.

Adults: Generally, the following conditions exist where Atlantic salmon adults are found migrating to the spawning grounds: streams with water temperatures below 22.8°C and dissolved oxygen above 5 parts-per-million (ppm). Oceanic adult Atlantic salmon are primarily pelagic and range from the waters of the continental shelf off southern New England north throughout the Gulf of Maine.

3.1.2 pollock (*Pollachius virens*)

The project site, for both planning reaches, is designated as EFH for pollock juveniles. The habitat parameters for the applicable life stages are as follows.

Juveniles: Generally, the following conditions exist where most pollock juveniles are found: water temperatures below 18°C, water depths between 0 and 250 meters, and salinities greater than 29 and 32%.

3.1.3 clearnose skate (*Raja eglanteria*)

The project site is designated as EFH for clearnose skate juveniles and adults within the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows.

Juveniles: Bottom habitats with a sandy or gravelly substrate or mud, generally found from the shore to depths of 137 meters, with the highest abundance from 73-91 meters. Most juveniles are found between in water with temperatures of 4-15°C.

Adults: bottom habitats with a sandy or gravelly substrate or mud within the same range as the juveniles.

3.1.4 Atlantic cod (*Gadus morhua*)

The project site is designated as EFH for Atlantic Cod adults in the Atlantic Shoreline project reach. The habitat parameters for the applicable life stage is as follows:

Adult: Bottom habitats with a substrate of rocks, pebbles, or gravel. Generally, the following conditions exist where cod adults are found: water temperatures below 10° C, depths from 10 - 150 meters, and a wide range of oceanic salinities.

3.1.5 red hake (*Urophysic chuss*)

The project site is designated as EFH for red hake eggs, larvae, juveniles, and adults for both planning reaches. The habitat parameters for the applicable life stages are as follows.

Eggs: Generally, the following conditions exist where hake eggs are found: sea surface water temperatures below 10°C along the inner continental shelf with salinities less than 25%. Red hake eggs are most often observed during the months from May to November, with peaks in June and July.

Larvae: Generally, the following conditions exist where red hake larvae are found: sea surface water temperatures below 19°C, water depths less than 200 meters, and salinities greater than 0.5%. Red hake larvae are most often observed from May through December, with peaks in September and October.

Juveniles: Generally, the following conditions exist where red hake juveniles are found: water temperatures below 16°C, water depths less than 100 meters, and a salinity range from 31 to 33%.

Adults: Bottom habitats in depressions with a substrate of sand and mud. Generally, the following conditions exist where red hake adults are found: water temperatures below 12° C, depths from 10 - 130 meters, and a salinity range from 33 – 34%.

3.1.6 winter flounder (*Pleutonectes americanus*)

The project site is designated as EFH for winter flounder eggs, larvae, juveniles, and adults in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Eggs: Generally, the following conditions exist where winter flounder eggs are found: water temperatures less than 10°C, salinities between 10 to 30%, and water depths less than 5 meters. Winter flounder eggs are often observed from February to June.

Larvae: Generally, the following conditions exist where winter flounder larvae are found: sea surface water temperatures less than 15°C, salinities between 4 and 30‰, and water depths less than 6 meters. Winter flounder larvae are often observed from March to July.

Juveniles: Generally, the following conditions exist where winter flounder young-of-the-year are found: water temperatures below 28°C, water depths from 0.1 to 10 meters, and salinities between 5 and 33‰. Generally, the following conditions exist where juvenile winter flounder are found: water temperatures below 25°C, water depths from 1 to 50 meters, and salinities between 10 and 30%.

Adults: Generally, the following conditions exist where winter flounder adults are found: water temperatures below 25°C, water depths from 1 to 100 meters, and salinities between 15 and 33%.

3.1.7 windowpane flounder (*Scopthalmus aquosus*)

The project site is designated as EFH for windowpane flounder eggs, larvae, juveniles, and adults in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Eggs: Generally, the following conditions exist where windowpane flounder eggs are found: sea surface water temperatures less than 20°C and water depths less than 70 meters. Windowpane flounder eggs are often observed from February to November with peaks in May and October.

Larvae: Generally, the following conditions exist where windowpane flounder larvae are found: sea surface water temperatures less than 20°C and water depths less than 70 meters. Windowpane flounder larvae are often observed from February to November with peaks in May and October.

Juveniles: Generally, the following conditions exist where windowpane flounder juveniles are found: water temperatures below 25°C, water depths from 1 to 100 meters, and salinities between 5.5 and 36%.

Adults: Generally, the following conditions exist where windowpane flounder adults are found: water temperatures below 26.8°C, water depths from 1 to 75 meters, and salinities between 5.5 and 36%.

3.1.8 Atlantic herring (*Clupea harengus*)

The project site is designated as EFH for Atlantic herring larvae, juveniles and adults in the Jamaica Bay planning reach, and juveniles and adults in the Atlantic Shorefront planning reach. The habitat parameters for the applicable life stages are as follows.

Larvae: Generally, the following conditions exist where Atlantic herring larvae are found: sea surface temperatures below 16° C, water depths from 50 - 90 meters, and salinities around 32‰. Atlantic herring larvae are observed between August and April, with peaks from September through November.

Juveniles: Generally, the following conditions exist where Atlantic herring juveniles are found: water temperatures below 10°C, water depths from 15 to 135 meters, and a salinity range from 26 to 32%.

Adults: Generally, the following conditions exist where Atlantic herring adults are found: water temperatures below 10°C, water depths from 20 to 130 meters, and salinities above 28%.

3.1.9 monkfish (*Lophius americanus*)

The project site is designated as EFH for monkfish eggs and larvae in both planning reaches, and adults in the Atlantic Shorefront planning reach. The habitat parameters for the applicable life stages are as follows.

Eggs: Generally, the following conditions exist where monkfish egg veils are found: sea surface water temperatures below 18°C and water depths from 15 to 1000 meters. Monkfish egg veils are most often observed during the months from March to September.

Larvae: Generally, the following conditions exist where monkfish larvae are found: water temperatures 15°C and water depths from 25 to 1000 meters. Monkfish larvae are most often observed during the months from March to September.

Adults: Bottom habitats with substrates of a sand-shell mix, algae covered rocks, hard sand, pebbly gravel, or mud. Generally, the following conditions exist where monkfish adults are found: water temperatures below 15° C, depths from 25 - 200 meters, and a salinity range from 29.9 - 36.7‰.

3.1.10 little skate (*Leucoraja erinacea*)

The project site is designated as EFH for little skate juveniles in the Atlantic Shorefront, and adults in the Jamaica Bay planning reaches. The habitat parameters for the applicable life stages are as follows.

Juveniles: Bottom habitats with a sandy or gravelly substrate or mud, generally found from the shore to depths of 137 meters, with the highest abundance from 73-91 meters. Most juveniles are found between in water with temperatures of 4-15°C.

Adults: bottom habitats with a sandy or gravelly substrate or mud within the same range as the juveniles.

3.1.11 winter skate (*Leucoraja ocellata*)

The project site is designated as EFH for winter skate juveniles and adults in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Juveniles: Sand and gravel or mud shoreline to about 400 meters and are most abundant at depths less than 111 meters. The temperature range for these skates is from - 1.2 - 21 °C, with most found from 4-16 °C, depending on the season.

Adults: Sand and gravel or mud substrate found from shoreline to 371 meters, but are most abundant at less than 111 meters. The temperature range is also very similar, with a range from –1.2 - 20 °C, with most found in water with temperatures ranging from 5-15 °C.

3.1.12 yellowtail Flounder (*Limanda ferruginea*)

The project site is designated as EFH for yellowtail flounder adults in the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows

Adult: Bottom habitats with a substrate of sand or sand and mud. Generally, the following conditions exist where yellowtail flounder adults are found: water temperatures below 15° C, depths from 20 - 50 meters, and a salinity range from 32.4 - 33.5‰.

3.2 Mid-Atlantic Species

3.2.1 bluefish (*Pomatomus saltatrix*)

The project site is designated as EFH for bluefish juveniles and adults in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Juveniles: Generally juvenile bluefish occur in estuaries from May through October. Typical conditions for juveniles are: water temperatures between 19°C and 24°C and salinities between 23 and 36%.

Adults: Adult bluefish are found in Mid-Atlantic estuaries from April through October. Typical conditions for adults are: water temperatures from 14°C to 16°C and salinities greater than 25%.

3.2.2 long finned squid (*Loligo pealei*)

The project site is designated as EFH for long-finned squid eggs in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Eggs: EFH for long finned squid eggs occurs in inshore and offshore bottom habitats from Georges Bank southward to Cape Hatteras, generally where bottom water temperatures are between 10°C and 23°C, salinities are between 30 and 32 ppt, and depth is less than 50 meters. Eggs have also been collected in bottom trawls in deeper water at various places on the continental shelf. Like most loliginid squids, their egg masses or "mops" are demersal and anchored to the substrates on which they are laid, which include a variety of hard bottom types (e.g., shells, lobster pots, piers, fish traps, boulders, and rocks), submerged aquatic vegetation (e.g., *Fucus* sp.), sand, and mud.

3.2.3 Atlantic butterfish (*Peprilus triacanthus*)

The project site is designated as EFH for Atlantic butterfish juveniles, and adults for the Jamaica Bay planning reach, and only adults in Atlantic Shorefront planning reach. The habitat parameters for the applicable life stages are as follows.

Juveniles: Generally, juvenile butterfish occur in water depths between 10 and 365 meters, water temperatures between 3°C and 28°C, and a salinity range of 3 to 37%.

Adults: Generally, adult butterfish occur in water depths between 10 and 365 meters, water temperatures between 3°C and 28°C, and a salinity range of 4 to 26%.

3.2.4 Atlantic mackerel (*Scomber scrombrus*)

The project site is designated as EFH for Atlantic mackerel juveniles and adults for both planning reaches. The habitat parameters for the applicable life stages are as follows.

Juveniles: Generally, juvenile Atlantic mackerel occur in water depths between the shore and 320 meters, water temperatures between 4°C and 22°C, and salinities less than 25%.

Adults: Generally, adult Atlantic mackerel occur in water depths between the shore and 380 meters, water temperatures between 4°C and 16°C, and salinities less than 25%.

3.2.5 summer flounder (Paralichthys denntatus)

The project site is designated as EFH for summer flounder larvae, juveniles, and adults in the Atlantic Shorefront planning reach, and only juveniles and adults in the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows.

Larvae: In general, summer flounder larvae are most abundant nearshore at water depths between 10 and 70 meters, in water temperatures between 9°C and 12°C, and salinities between 23 to 33‰. They are most frequently found from September to February.

Juveniles: In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 11°C, water depths from 0.5 to 5 meters, and salinities ranging from 10 to 30%.

Adults: Generally, summer flounder occur in water depths between the shore and 25 meters. Seasonally, they inhabit shallow coastal and estuarine waters during warmer months and move offshore on the outer Continental Shelf at depths of 150 meters in colder months.

3.2.6 scup (*Stenotomus chrysops*)

The project site is designated as EFH for scup eggs, larvae, juveniles, and adults in the Atlantic Shorefront planning reach, and only juvenile and adults in the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows.

Eggs: In general, scup eggs are found from May through August, in water temperatures between 13°C and 23°C, water depths less than 30 meters, and salinities less than 15%.

Larvae: In general, scup larvae are most abundant nearshore from May through September, in water temperatures between 13°C and 23°C, water depths less than 20 meters, and salinities less than 15%.

Juveniles: In general, juvenile scup during the summer and spring are found in estuaries and bays, in association with various sands, mud, mussel, and eelgrass bed type substrates, between the shore and water depths of 38 meters. Typical conditions are: water temperatures less than 7°C and salinities less than 15%.

Adults: Generally, adult scup are found in water temperatures less than 7°C, water depths between 2 and 185 meters, and salinities less than 15%. Seasonally, wintering adults (November through April) are usually offshore.

3.2.7 black sea bass (*Centropristus striata*)

The project site is designated as EFH for black sea bass juveniles and adults for both planning reaches. The habitat parameters for the applicable life stages are as follows.

Juveniles: Juvenile black sea bass are usually found in association with rough bottom, shellfish and eelgrass beds, and man-made structures in sandy-shelly areas. Typical conditions are: water temperatures less than 6°C, water depths between 1 and 38 meters, and salinities less than 18%.

Adults: Structured habitats (natural and man-made), sand and shell are usually the substrate preference of adult black sea bass. Typical conditions are: water temperatures less than 6°C, water depths between 20 and 50 meters, and salinities less than 20%.

3.2.8 spiny dogfish (*Squalus acanthias*)

The project site is designated as EFH for spiny dogfish juveniles (i.e., sub-female) and adult male in the Atlantic Shorefront planning reach. The habitat parameters for the applicable life stages are as follows

Female Sub-Adults (36-79 cm): Pelagic and epibenthic habitats throughout the region. Sub-adult females are found over a wide depth range in full salinity seawater (32-35 ppt) where bottom temperatures range from 7 to 15°C. Sub-adult females are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 15°C.

Male Adults (≥60 cm): Pelagic and epibenthic habitats throughout the region. Adult males are found over a wide depth range in full salinity seawater (32-35 ppt) where bottom temperatures range from 7 to 15°C. They are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 15°C.

3.3 Coastal Migratory Pelagic Species

The project site is designated as EFH for coastal migratory pelagic eggs, larvae, juveniles, and adults for the three species listed below for both planning reaches. These species are found in sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward. In addition, all coastal inlets and state-designated nursery habitats are of particular importance to these coastal migratory pelagics.

3.3.1 king mackerel (*Scomberomorus cavalla*)

In general, king mackerel are found in water temperatures less than 20°C and salinities less than 30%.

3.3.2 spanish mackerel (*Scomberomorus maculates*)

In general, Spanish mackerel are found in water temperatures less than 20°C and salinities less than 30%.

3.3.3 cobia (*Rachycentron canadum*)

In addition to the general habitat of the coastal migratory pelagics, Cobia are also found in high salinity bays, estuaries, and seagrass habitat. Typical conditions are: water temperatures less than 20°C and salinities less than 25%.

3.4 Highly Migratory Species

3.4.1 sand tiger shark (*Odontaspis taurus*)

The project site is designated as EFH for sand tiger shark neonates in both planning reaches. The habitat parameters for the applicable life stages are as follows.

Neonates/early juveniles: Neonates/early juveniles are found in shallow coastal waters to the 25-meter isobath.

3.4.2 dusky shark (*Charcharinus obscurus*)

The project site is designated as EFH for dusky shark neonates in the Atlantic Shorefront planning reach. The habitat parameters for the applicable life stages are as follows.

Neonate/early juveniles: Neonates/early juveniles are found in shallow coastal waters, inlets, and estuaries to the 25-meter isobath.

3.4.3 sandbar shark (*Charcharinus plumbeus*)

The project site is designated as EFH for sandbar shark juveniles and adults in the Atlantic Shorefront planning reach, and only adults in the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows.

Neonates/early juveniles: Neonates/early juveniles are found in shallow coastal areas to the 25-meter isobath. Typical conditions are: salinities greater than 22% and water temperatures greater than 21°C.

Late juveniles/subadults: Late juveniles/subadults are found offshore.

Adults: Adults are found in shallow coastal areas from the coast to the 50-meter isobath.

3.4.4 white shark (*Carcharodon carcharias*)

The project site is designated as EFH for white shark neonates, juveniles and adults in the Atlantic Shorefront planning reach, and only adults in the Jamaica Bay planning reach. The habitat parameters for the applicable life stages are as follows.

It is a migratory species, spending winters in southern waters and summers in northern waters. Sandbar sharks are found near shore at depths of 65.6 to 213.3 feet. In the northern hemisphere, mating occurs from May to June. Average length of gestation range from eight (8) to 12 months and is dependent on geological location. Litter size ranges from six (6) to 13 pups. In the western Atlantic, pups are born from June to August. Sandbar shark diet consists of bottom fish, shellfish, skates, stingrays, squid, shrimp, crabs, mollusks, and other smaller sharks (Florida Museum of Natural History, 2016).

3.4.5 smoothhound shark (Atlantic Complex) (*Mustelus mustelus*)

The project site is designated as EFH for smoothhound shark neonates, juveniles and adults in the both planning reaches. NMFS does not provide information pertaining to suitable habitat characteristics that support these life stages.

3.4.6 skipjack tuna (*Katsuwonus pelamis*)

The project site is designated as EFH for skipjack tuna adults in the Atlantic Shorefront planning reach. Its habitat is the pelagic surface waters. It is an extremely fast, ever moving species.

3.4.7 bluefin tuna (*Thunnus thynnus*)

The project site is designated as EFH for bluefin tuna juveniles in the Atlantic Shorefront planning reach. Their habitat is primarily surface water, also found in inshore and pelagic waters.

4 EFFECTS ON EFH SPECIES IN THE PROJECT AREA

The identified EFH species (Tables 8 and 9 shown above) potentially could occur in either or both of the planning reaches (i.e., Atlantic Shorefront and Jamaica Bay) at different times of the year. To support the evaluation of effect on these species, a separate EFH Assessment Worksheet has been prepared for each planning reach and are included as Appendix A. It is recognized that there are temporary impacts that could result to different life stages of the identified species due to the proposed construction given their potential presence in the project area. However, it is noted that the project is anticipated to have a long-term benefit on EFH designated fisheries through the proposed actions.

Effects on EFH designated species through the Recommended Plan, including both planning reaches, can be grouped into four distinct impact categories: impingement and/or entrainment, burial and sedimentation, habitat loss and alteration, and hydroacoustics. Each are discussed below specific to the two planning reaches. This is section is followed by a summary of identified direct, indirect, and cumulative effects on the EFH designated species. In addition, a comprehensive survey of the proposed mitigation is also provided.

4.1 Impingement and/or Entrainment

4.1.1 Atlantic Shorefront

The potential for impingement and/or entrainment of eggs and larvae is only specific to the dredging of sand within the proposed borrow area. As discussed below for habitat fragmentation, dredging of sand in shoals will focus on flatter areas surrounding the prominent shoals. Initial analysis completed by USACE has removed prominent shoal habitat from consideration for sand dredging. This was accomplished by avoiding sites with prominent shoal habitat such as the “Seaside Lumps” and “Fish Heaven”, which are considered important sport and commercial fishing grounds (Long and Figley 1984).

It is recognized that the dredging activities could have adverse effects on EFH due to the entrainment of early life stages. The EFH designated species most likely to suffer mortality from dredging are juvenile winter flounder and windowpane flounder. Mortality of young-of-the-year (YOY) juvenile windowpane and winter flounder would be highest in the spring, just after they settle to the bottom and metamorphose. However, mortalities of small flounder would be minimized if dredging was restricted to the fall (October-December), after they are larger and start to move into deeper water (Pereira et al. 1999) and would be less plentiful on shallow borrow areas. Dredging and in water construction activities in the fall would also minimize any possible impacts on pelagic fish eggs and larvae produced by EFH- designated species since most of them spawn in the spring.

The USACE anticipates that construction activities will occur in the fall and winter. These dates align to minimize impacts to EFH, while also being protective of terrestrial species protected under jurisdiction of U.S. Fish and Wildlife Service.

4.1.2 Jamaica Bay

There will be no impacts associated with impingement and entrainment for proposed features of the Jamaica Bay planning reach.

4.2 Burial and Sedimentation

4.2.1 Atlantic Shorefront

The dredging of sand can lead to increased suspended sediment levels, and which could smoother (i.e., bury) immobile benthic organisms or juvenile demersal fish (i.e., flounder). As noted above, USACE anticipates a construction window (i.e., fall or winter) that would minimize impacts on pelagic fish eggs and larvae. The temporary impacts by removal and/or burial of a benthic community could have adverse effects on benthic food-prey organisms present in the borrow area. However, the impacts to EFH designed fish species is expected to be minimal as the borrow area is a relatively small when compared to the overall area of the larger Atlantic Shoreline. In addition, the borrow area is anticipated to be recolonize by benthic communities following dredging operations within 2 years. Finally, it is recognized that the suspended sediment can also impact foraging or migratory species; however, these larger, motile species are expected to alter behavior to avoid the construction area and utilize adjacent, more suitable habitats.

The near-shore beaches where sand will be placed, and groins constructed or enlarged, will also be susceptible to short-term increased suspended sediments as well as burial of existing habitats. It is recognized that EFH can be adversely impacted temporarily through water quality impacts such as increased turbidity and decreased dissolved oxygen content within and proximate to the construction work areas. These impacts would subside upon cessation of construction activities. Construction activities in the near shore environment will employ Best Management Practices (BMPs) to minimize construction impacts within open waters (i.e., construction scheduling). Similar to the discussion for dredging impacts, sand placement and groin construction could also bury benthic habitats and have indirect effects on EFH designated fish species. However, it is noted these impacts will be temporary and short term.

Finally, it is noted that an objective of the project is to protect these beach and near-shore habitats from future coastal storms while at the same time minimizing required maintenance and thereby reducing long-term cumulative impacts.

4.2.2 Jamaica Bay

It is recognized that benthic habitat can vary within the Jamaica Bay planning reach. Submerged aquatic vegetation beds have not been identified within the project area. In general, the intertidal and subtidal areas are flat, featureless sediment-dominated habitats devoid of vegetation or habitat structure. While lacking habitat structure, these large sediment areas support valuable habitat for numerous benthic invertebrates (e.g., worms, clams). These species in turn serve as prey species for fish, crabs, birds, and other faunal life.

Resuspension of sediments within Jamaica Bay planning reach due to in-water activities (i.e., bulkhead construction, rock sills) will have variable impacts on fish depending on species and life stage. To directly address this, construction activities in the near shore environment will employ BMPs to minimize construction impacts within open waters, and which will subside upon cessation of construction activities. For example, construction occurring at low tide and in-the-dry will minimize and/or avoid significant resuspension of sediment. It is also anticipated that during construction activities, if present, larger more motile fish species will modify their behavior and relocate to other more suitable habitats with no significant impact to the population or individual.

It is recognized that lethal levels of water column solids vary widely among species; one study found that the tolerance of adult fish for suspended sediment ranged from 580 milligrams per liter (mg/L) to 24,500 mg/L (Shrek et al. 1975 as cited in NMFS 2003). Common impacts to fish are the abrasion of gill membranes (resulting in inability to collect oxygen), impairment of feeding, reduction in dissolved oxygen, and fatal impacts to early life stages.

Larval stage fish also have wide suspended sediment tolerance ranges; however, the reported data is generally thought to represent tolerance levels for only relatively short exposure periods (e.g., less than 24 hours) (Morgan and Levings 1989). The project is not anticipated to have prolonged suspended solids for extended periods (i.e., less than 24 hours). Beyond that timeframe, mortality can occur at concentrations as low as 1,300 mg/L (Morgan et al. 1983). Kiorboe et al. 1981, (as cited in Clarke and Wilber 2000) indicate that hatching of striped bass can be delayed if daily sediment concentrations reach 100 mg/L. Wilbur and Clarke, 2001 (as cited in NMFS 2003), indicate that hatching is delayed for striped bass and white perch at concentrations of 800 and 100 mg/L, respectively. In a 2003 biological opinion, NMFS indicated that total suspended solids concentrations below 100 mg/L are not likely to affect eggs and larvae, at least over short durations (NMFS 2003).

Consistent with the discussion for dredging impacts, rock sill construction and potentially near shoreline construction (i.e., bulkheads) could bury benthic habitats and have indirect effects on EFH designated fish species. It is noted these impacts to benthic habitats will be temporary and short term as these areas will be quickly recolonized. There could be burial of eggs or larvae that result in mortality, but the anticipated construction schedule is intended to minimize or avoid these impacts. Finally, from a long-term perspective, the overall project is intended to enhance benthic habitat and in-water habitat complexity through incorporation of NNBFs as part of the HRFRRF. These will provide enhanced habitats for benthic communities, as well as the identified EFH fish species. A further discussion of ecological benefits associated with NNBFs is provided below.

4.3 Habitat Loss and Fragmentation

4.3.1 Atlantic Shorefront

It is anticipated that there will be alterations of the benthic and open water habitats associated with the borrow site. One major concern with respect to physical changes involves the potential loss of prominent offshore sandy shoal habitat within borrow sites due to sand dredging for the beach replenishment. It is generally regarded that prominent offshore shoals are areas that are attractive to fish, including the federally managed species, and are frequently targeted by recreational and commercial fishermen. Despite this, there is little specific information to determine whether shoals of this type have any enhanced value for fish. However, it is reasonable to expect that the increased habitat complexity at the shoals and adjacent bottom would be more attractive to fish than the flat featureless bottom that characterizes much of the mid-Atlantic coastal region (U.S. Fish and Wildlife Service 1999a). Since dredging of sand in shoals may result in a significant habitat alteration, it is proposed that these areas be avoided or the flatter areas surrounding the prominent shoals be mined. Initial analysis has removed prominent shoal habitat from consideration.

Other physical alterations to EFH within the borrow area involve substrate modifications. An example would be the conversion of a soft sandy bottom into a hard clay bottom through the removal of overlying sand strata. This could result in a significant change in the benthic community composition after recolonization, or it could provide unsuitable habitat required for surf clam recruitment or spawning of some finfish species. This could be avoided by correlating vibracore strata data with sand thickness to restrict dredging depths to avoid exposing a different substrate. Based on vibracore data, dredging depths would be considered to minimize the exposure of dissimilar substrates.

The removal of sand also leaves a depression or hole (borrow pit) in the sea floor that can persist for years. The rate at which borrow pits fill up will depend on the amount of sediment that is available and the direction and strength of currents in the area. Borrow pits can modify the habitat for benthic, bottom-feeding fishes since they are deeper than the surrounding sea floor and act as traps for fine grained sediments. Accumulation of mud can cause a change in benthic community structure that favors certain species of fish. Also, if circulation of bottom water in the pits is reduced, DO can fall to low enough levels (<2-3 ppm) that fish will avoid them all together. High organic contents of mud accumulating in pits could also cause oxygen depletion.

In terms of the near shore environment, it is recognized that construction of groins will alter the existing habitat. Constructed groins will create in water habitat areas suitable for recruitment and protection for numerous fish species. Beneficial impacts to the fish community would include the increase in food source, spawning beds, and shelter in the project area. Construction of groins would also provide living spaces for the food resource on which fish species rely. In addition to creating living spaces and increasing food availability of the project area, the proposed would potentially provide shelter for fish from wave attacks during large coastal storm events.

It is noted that recent literature has shown direct adverse effects of shoreline armoring on mobile upper shore invertebrates (Dugan et al 2008, Dugan 2011). Specific to this project, the upper shore is heavily utilized and historically disturbed by continuous recreational activities. As such, research of natural shorelines may not be comparable to this heavily urbanized beach. It is recognized that while certain benthic invertebrate populations may be displaced by the proposed in water features (i.e., groins), it is expected that the habitat complexity will support a diverse assemblage of benthic species that would continue to function as prey for both aquatic and terrestrial wildlife that utilize this shoreline.

4.3.2 Jamaica Bay

The recommended project will have both permanent and temporary impacts to shoreline habitats within the Jamaica Bay planning area and are summarized in Tables 10 and 11. These will result from construction of the HFFRRFs, and specific to EFH designated species focus on in-water activities (i.e., bulkhead construction, rock sill placement).

To account for these impacts, a series of NNBFs were developed as part of the proposed HFFRRFs to not only control erosion and help manage coastal storm risk, but also to provide opportunities for habitat restoration and enhancement which would offset unavoidable permanent impacts to Federal and state regulated areas and species. Table 12 presents proposed restoration / creation, as well as enhancement efforts associated with the NNBFs. While the project will result in unavoidable impacts to 3.74 acres of federal and state regulated waters and wetlands[2], the project includes 7.65 acres of wetland restoration or creation, and 0.472 acres of wetland enhancement, and restoration of 1.35 acres.

[2] Conservatively assumed to include the following habitat types: beach/shoreline, freshwater wetlands, intertidal wetlands, mudflats, and subtidal bottom.

While the project area includes EFH designated species in all life stages, the scope of the in-water activities is expected to only have minor, short-term impacts. These short-term impacts are directly tied to the objective to enhance ecological functioning of these shorelines, and with direct benefits to EFH designated species. The restored wetlands, and constructed sills will have direct benefits to spawning, nursery, foraging, and shelter habitats that are critical to supporting the identified EFH designated species.

Table 10: Permanent Habitat Impacts - Acreage

Habitat Type	CL	MRE	MRA	MRH	TOTAL
Beach / Unvegetated Shoreline	0.000	0.036	0.773	0.000	0.809
Freshwater Wetland	0.000	0.000	0.000	0.056	0.056
Intertidal Wetlands	0.108	0.875	1.675	0.115	2.817
Mudflats	0.046	0.000	0.015	0.000	0.061
Subtidal Bottom	0.000	0.000	0.000	0.000	0.000
Maritime Forest	0.318	0.000	1.487	0.000	1.806
Upland Ruderal	0.000	0.000	0.000	0.000	0.000
Urban	0.000	0.000	0.000	0.000	0.000
Total	**0.472**	**0.910**	**3.950**	**0.171**	**5.549**
Total Waters/Wetlands	**0.154**	**0.910**	**2.463**	**0.171**	**3.743**

CL: Cedarhurst-Lawrence MRE: Mid-Rockaway Edgemere Area
MRA: Mid-Rockaway Arverne Area MRH: Mid-Rockaway Hammels Area

Table 11: Temporary Habitat Impacts – Acreage

Habitat Type	CL	MRE	MRA	MRH	TOTAL
Beach / Unvegetated Shoreline	0.000	0.000	0.273	0.114	0.388
Freshwater Wetland	0.000	0.000	0.000	0.000	0.000
Intertidal Wetlands	0.005	0.051	0.013	0.000	0.069
Mudflats	0.440	0.000	1.917	0.015	2.371
Subtidal Bottom	0.058	3.985	7.191	0.000	11.234
Maritime Forest	0.000	0.000	0.000	0.000	0.000
Upland Ruderal	0.218	8.457	6.746	0.922	16.970
Urban	0.018	1.726	4.641	3.038	9.617
Total	**0.739**	**14.219**	**20.781**	**4.089**	**40.648**
Total Waters/Wetlands	**0.503**	**4.036**	**9.394**	**0.129**	**14.062**

CL: Cedarhurst-Lawrence MRE: Mid-Rockaway Edgemere Area
MRA: Mid-Rockaway Arverne Area MRH: Mid-Rockaway Hammels Area

Table 12: Restoration, Creation & Enhancement – Acreage

Habitat Type	Restoration / Creation		Enhancement	
	Mid-Rockaway Edgemere Area	Mid-Rockaway Arverne Area	Mid-Rockaway Edgemere Area	Mid-Rockaway Arverne Area
Intertidal Wetland	3.042	4.606	0.468	0.000
Maritime Forest	0.000	1.348	0.000	0.000

4.4 Hydroacoustics

4.4.1 Atlantic Shorefront

Ambient noise levels will be temporarily impacted as a result of in-water construction associated with dredging, sand placement, and groin construction. Intense sound can result in mortality, injury, and/or behavioral response. Generally, sounds in exceedance of 206 dB re 1 µPa (sound, expressed in decibels relative to one (1) micro-Pascal) are considered to be fatal to most fish species. This level of sound is rare and often associated with sheet pile construction, impact hammer, and no sound attenuating devices (e.g., bubble curtains). Other potential effects include rupture of the swim bladder (the bubble of air in the abdominal cavity of most fish species that is involved in maintenance of buoyancy), barotraumas, and oscillations of the swim bladder (leading to nearby organ damage). In other words, an animal that has had physical or physiological damage may be less likely than an animal without damage to avoid a predator or find food. Sounds above RMS 150 dB are often associated with behavioral impacts. These impacts could range from a fish altering its course of travel to avoiding an area during construction.

The type of construction proposed is not anticipated to cause sound levels that could result in mortality or injury. However, it is assumed that constructional activities could have behavioral impacts due to hydroacoustics. These impacts would be focused on fish changing a course of travel and avoiding a construction area, with limited to no impact on the survival of that individual or sustainability of the population.

4.4.2 Jamaica Bay

The potential impacts within the Jamaica Bay planning reach with respect to hydroacoustics are consistent with those discussed above for the Atlantic Shorefront. The type of construction proposed is not anticipated to cause sound levels that could result in mortality or injury. However, it is assumed that constructional activities could have behavioral impacts due to hydroacoustics. These impacts would be focused on fish changing a course of travel and avoiding a construction area, with limited to no impact on the survival of that individual or sustainability of the population.

5 POTENTIAL DIRECT/INDIRECT IMPACTS, CUMULATIVE, AND MITIGATION

The proposed activity would have immediate, short-term, direct and indirect impacts on EFH for some of the designated fish species and life history stages that occur in the immediate vicinity of the project areas. Dredging and placement activities in the project area are not expected to have any significant or long-term lasting effects on the “spawning, breeding, feeding, or growth to maturity” of the designated EFH species that occupy the both planning reaches. In fact, the Recommended Action is intended to have long term benefits to EFH by creating additional nearshore habitat structure and preserving or restoring native shoreline habitats. This section identifies the direct and indirect impacts that could result from the proposed project and makes recommendations for minimizing these impacts.

5.1 Direct Impacts

5.1.1 Atlantic Shorefront

Due to the mobility of larger fish, direct impacts from dredging and near shore construction activities (i.e., sand placement, and groin construction) would be limited to eggs, larvae, small fish, and benthic invertebrates or shellfish which would be removed, buried, or displaced. Specifically, dredging activities could have direct impacts to eggs, larvae, and potential juvenile EFH due to impingement or entrainment. The EFH designated species most likely to suffer mortality from dredging are juvenile winter flounder and windowpane flounder. These impacts will be minimized through construction scheduling (i.e., late fall or early winter). In addition, borrow pits left behind after dredging ceases would eventually provide good spawning habitat for winter flounder since the sand that would accumulate in them would provide substrate for eggs. In terms of benthic invertebrates and less mobile shellfish, it is assumed there will be direct impacts due to burial from suspended solids within the water column. Given the limited footprint size of in-water work, and ability of species to quickly recolonize disturbed habitats, these direct impacts are assumed to be minor, and short-term.

Minor short-term direct impact on benthic feeding fish species (e.g., windowpane, summer and winter flounder) would also be experienced due to temporary displacement during dredging or construction of groins (potentially due to water quality, hydroacoustics, burial, or habitat disturbance). It is anticipated that the substrates will return to pre-construction conditions as discussed above. As such, impacts to benthic communities are considered short-term because benthic invertebrate species are expected to fully recolonize the disturbed areas. While some areas will be permanently buried due to groin construction, this footprint is relatively small and will provide additional habitat structure important to EFH along this reach of shoreline. Finally, impacts from both dredging and nearshore or in water construction are considered minor and short-term because benthic feeding fish species are expected to avoid construction areas and feed in the surrounding area as result of water quality or hydroacoustics; and therefore, would not be adversely affected by the temporary localized reduction in available benthic food sources.

5.1.2 Jamaica Bay

Direct impacts due burial or sedimentation are possible as a result of in-water construction (i.e., bulkheads, rock sills). Construction activities in the near shore environment will employ BMPs (i.e., silt curtains, construction schedule) to minimize construction impacts within open waters. Rock sill construction could have direct effect on early life stages of EFH, as well as benthic habitats due to permanent burial of subtidal habitats. There could be burial of eggs or larvae that result in mortality, but construction BMPs will be intended to minimize or avoid these impacts can be employed. In addition, the small footprint relative to the overall habitats within Jamaica Bay will not affect the long-term sustainability of an EFH designated species. In fact, from a long-term perspective, the overall project of the project is intended to enhance in-water habitat complexity through incorporation of NNBFs as part of the HRFRRF. These will provide enhanced habitats for benthic communities, as well as the identified EFH fish species.

There would also be direct impacts to wetlands, mudflats, and other habitats that support multiple life stages of the identified EFH species. However, while there are direct impacts associated with the overall HFFRRFs, the NNBFs have been incorporated to offset these impacts and provide enhanced ecological functioning along these shorelines.

There would also be short-term direct impacts to larger foraging, transient, or migratory fish species within the project area as a result of water quality or hydroacoustics. However, it is assumed that these larger, mobile species will alter their behavior to avoid construction areas and utilize the surrounding area with no long-term impact to an individual or population.

5.2 Indirect Impacts

5.2.1 Atlantic Shorefront

As a result of dredging, placement of the material, and nearshore and in water construction activities, the most immediate, indirect effect on EFH areas would be the loss of benthic invertebrate prey species within the construction footprint of the proposed project. Small motile and sedentary epifaunal species (*e.g.*, small crabs, snails, tube- dwelling amphipods), and all infaunal species (*e.g.*, polychaetes), would be most vulnerable to suction dredging and burial from construction activities. However, impacts would be short term as infaunal organisms are likely to recolonize the area from nearby communities and re-establish to a similar community.

The EFH designated species most vulnerable to the loss of prey organisms are winter flounder, windowpane flounder, scup, and black sea bass. Winter flounder are obligate bottom feeders, preying primarily on infaunal polychaetes and tube-dwelling amphipods. The removal of benthic prey organisms will affect them more directly than any other EFH species. Windowpane flounder have larger mouths than winter flounder and feed primarily on small crustaceans (*i.e.*, mysid and decapod shrimp) and fish larvae. These are motile prey organisms that live in the water column or near the bottom and could, to some extent, avoid being removed by the dredge. Scup and black sea bass feed on a variety of benthic infaunal and epifaunal organisms that would be affected by dredging. The immediate impact of prey removal would be negligible since bottom feeding EFH species would re- locate to nearby areas with intact benthic food resources. It would also be a temporary condition, lasting only as long as it takes for benthic organisms to re-colonize the dredged area.

Studies performed in the Lower Bay of New York Harbor have shown that benthic community structure is disrupted by dredging but can reach a new equilibrium fairly rapidly. Cerrato and Scheier (1984) found that the borrow pits on the West Bank of the Ambrose Channel had distinctly different habitats from a nearby undredged control site. The benthic fauna at the control site was more diverse (*i.e.*, more species) and, in general, more stable (less susceptible to seasonal shifts in species composition and abundance) through time, whereas there were fewer species in the borrow pits, but some of them were very abundant. In a related study, Conover *et al.* (1985) found that fish, including some EFH-designated species, were actually more abundant in borrow pits. Of the EFH designated species, butterfish (mostly juveniles) were more abundant in the borrow pits, as were winter flounder (in the fall). Red hake were more abundant in one of the borrow pits and the largest catches of windowpane flounder were made in one of the pits in the spring. Summer flounder were generally more abundant in the borrow pits as well.

In addition, Conover *et al.* (1985) also examined the stomach contents of winter flounder in the three sampling sites and related them to benthic populations identified by Cerrato and Scheier (1984). The results indicated that, despite changes in the species composition of benthic communities after dredging, the feeding success of winter flounder in the pits was not affected. Winter flounder, like many other bottom-feeding species, are selective feeders that adapt their diets to whatever prey species are readily available. These results suggest that the feeding success of other bottom-feeding EFH species is also likely to not be affected by changes in benthic community structure caused by dredging.

The degree to which water quality is degraded, or temperature and salinity changes in borrow pits depends on the depth of the pit, the circulation of water through the pit, and the amount of fine sediment and organic matter that accumulates in the pit. Conover *et al.* (1985) determined that summer water temperatures tended to be lower in borrow pits and salinities consistently higher (generally by 1-3 ppt, but by 7.3 ppt in January). More importantly, DO concentrations measured between June and November did not vary between sites.

Bottom currents along the project area shore are strong, thus it is likely that DO levels near the bottom of borrow pits in the project area would not be reduced. There is, in fact, so much sand that is transported west along the outer New York coast that any hole created by dredging would likely fill in naturally within a very short time. If fine sediments accumulate in them, the benthic invertebrate community will change from a sand-dominated to a mud-dominated fauna. However, as long as water quality is not degraded, there would be no adverse impact on EFH. In fact, if summer water temperatures in borrow pits are lower than on adjacent shoal areas, EFH might be improved.

5.2.2 Jamaica Bay

Consistent with conclusions for the Atlantic Shorefront planning reach, indirect effects on EFH areas would be the loss of benthic invertebrate as well as shellfish prey species due to burial or temporary habitat disturbance. During and immediately after construction, EFH species are expected to alter their behavior and utilize adjacent, more suitable habitats within Jamaica Bay. The expected footprint that will result in burial (i.e., rock sills) is relatively small. Temporarily disturbed habitats are expected to quickly recover. Finally, the rock sills and other portions of the NNBFs are expected to provide enhanced ecological services to EFH species by protecting shoreline habitats as well as in-water habitat structure.

There also could be indirect effects as a result of impacts to shoreline habitats, with emphasis on wetlands. Tidal wetlands are essential to healthy fisheries, and provide an essential food, refuge, and nursery habitats for many EFH designated species. While the project will result in habitat disturbances that could have short term indirect impacts on the EFH species that utilize them, the long-term benefits of the project through construction of NNBFs are expected to offset these short-term impacts. The restored wetlands, and constructed sills will have direct benefits to spawning, nursery, foraging, and shelter habitats that are critical to supporting the identified EFH designated species.

5.3 Cumulative Impacts

Given the growth capacity of EFH-designated fish populations within the project area, the expected recolonization rates of benthic prey species, the ecological benefits associated with NNBFs as well as groin construction, there would be no expected cumulative effects. The overall objective of the project is to provide coastal protection, resiliency of these shoreline habitats, as well as enhanced ecological services where possible.

In summary, the cumulative impacts on EFH are not considered significant consistent with previous consultations with NMFS. Like the benthic environment, the impacts to EFH are temporary in nature and do not result in a permanent loss in EFH. Impacts to benthic communities are considered short-term and minor because benthic invertebrate species are expected to recolonize quickly. Infaunal organisms are likely to recolonize the area from nearby communities and re-establish to a similar community within a 2 - 6.5 month period (USACE 2001). Impacts to fish community assemblages are considered minor (USACE 2001), given the large extent of the Atlantic Ocean and Jamaica Bay compared to the project construction footprint, and recolonization rates of benthic communities. Only short-term adverse impacts would occur because of short-term changes to water quality during construction, including resuspension of sediments in the water column and changes to the quality or quantity of soft bottom substrates.

The borrow sites proposed for this project do not contain prominent shoal habitat features, wrecks and reefs, or any known hard bottom features that could be permanently lost due to the impacts from dredging. These types of habitat were avoided through careful site selection and coordination with fishery resource agencies. Some minor and temporary impacts would result in a loss of food source in the affected areas with each periodic nourishment. This impact would affect demersal or bottom-feeding EFH species such as summer flounder and windowpane. Cumulative losses of EFH can be avoided by not dredging deep holes, and leaving similar sandy substrate (with 3 feet of sand or more) for recruitment.

Steps taken to minimize impacts during construction are generally standardized across the District’s projects. Dredging windows are employed when necessary, dredging is conducted in a manner to avoid creating deep pits, dredging locations within borrow areas are rotated when possible to reduce impacts, buffer areas are established around cultural targets within borrow areas, and borrow areas are chosen to minimize impacts to shellfish and fisheries resources. With the inclusion of these measures in all projects, cumulative impacts for the Recommended Plan are expected to be minimized to the greatest extent possible.

5.4 Mitigation

As noted throughout this report, a series of NNBFs were developed as part of the proposed HFFRRFs to not only control erosion and help manage coastal storm risk, but also to provide opportunities for habitat restoration and enhancement which would offset unavoidable permanent impacts to Federal and state regulated areas. Specifically, these NNBFs provide the following ecological benefits and were incorporated in the feasibility design to also recognize future federal, state, and city permitting requirements:

5.4.1 Restoration / Creation of Low and High Marsh Habitats

For purposes of habitat accounting and recognizing the difficulty in differentiating between low and high marsh habitats during mapping, these habitats have been categorized as "intertidal wetlands". Specifically, these NNBF efforts target the following:

- Restoration of low marsh habitat in existing mudflat areas proximate to highly erosional shorelines; and
- Restoration and/or creation of high marsh habitat in adjacent uplands that are dominated by common reed (*Phragmites australis*) and other invasive species.

5.4.2 Creation of Rock Sill Features

Creation of rock sill features provides protection for the subtidal and intertidal habitats, as well as provide a hard bottom habitat for increased ecological production. These features provide additional opportunities for shellfish habitat creation.

5.4.3 Evaluation of Planned Wetland Analysis

Evaluation of Planned Wetlands (Bartoldus et al. 1994) was also used to characterize the functional impacts and benefits within intertidal wetlands associated with each HFFRRF. The assessment results provide estimates of current resource value loss, and the potential increase in resource value through implementation of NNBFs. EPW provides a quantitative measure for capacity of an intertidal wetland to perform the following five functions:

- Shoreline bank erosion control – capacity to provide erosion control and dissipate erosive forces at the shoreline bank
- Sediment stabilization – capacity to stabilize and retain previously deposited sediments
- Water quality – capacity to retain and process dissolved or particulate materials to the benefit of downstream surface water quality
- Fish (tidal) – degree to which a wetland habitat meets the food/cover, reproductive, and water quality requirements for fish
- Wildlife – presence of characteristics that distinguish a wetland as unique, rare, or valuable.

Within each function, numerous elements (i.e., physical, chemical, and biological characteristics) are evaluated in order to identify a wetland's capacity to perform a given function. Element scores (unitless numbers ranging from 0.0 to 1.0, where 1.0 represents the optimal score) were assessed for the existing condition and proposed NNBFs. The scores were combined to produce a Functional Capacity Index (FCI) value from 0.0 to 1.0, which provides a relative index of a reference site's capacity to perform a given function. Total acreage of proposed intertidal wetland restoration, creation, or enhancement at the site is then multiplied by the FCI value to produce a wetland functional capacity unit (FCU), which represents the site's capacity to perform each wetland function (Bartoldus *et al.* 1994). Although no specific values are given to maritime or coastal buffer habitats with EPW, the wetland numbers are enhanced by having the adjacent buffer.

A summary of the analysis and the numerical results of the EPW functional assessment is provided in Tables 13 and 14. In summary, Table 13 shows that the project will result in the loss of 8.59 FCU's across the five functions. However, Table 14 shows that the NNBFs will result in the gain of 34.51 FCUs across the five functions. Similar to the acreage metric evaluation, the EPW functional assessment shows significant gains to the shoreline ecosystem through the incorporation of NNBFs.

Table 13: EPW Functional Assessment – FCU Losses

Function	CL	MRE	MRA	MRH	TOTAL
Shoreline Bank Erosion	0.000	-0.420	-1.014	0.000	-1.456
Sediment Stabilization	-0.108	-0.643	-1.255	-0.129	-2.168
Water Quality	-0.100	-0.776	-1.415	-0.101	-2.43
Fish (tidal)	-0.075	-0.444	-0.890	-0.065	-1.498
Wildlife	-0.048	-0.365	-0.558	-0.045	-1.038
Total	**-0.330**	**-2.648**	**-5.132**	**-0.340**	**-8.589**

CL: Cedarhurst-Lawrence
MRE: Mid-Rockaway Edgemere Area
MRA: Mid-Rockaway Arverne Area
MRH: Mid-Rockaway Hammels Area

Table 14: EPW Functional Assessment – FCU Gains

Function	CL	MRE	MRA	MRH	TOTAL
Shoreline Bank Erosion	0.000	3.542	4.606	0.000	8.148
Sediment Stabilization	0.000	3.513	4.606	0.000	8.119
Water Quality	0.000	3.443	4.606	0.000	8.049
Fish (tidal)	0.000	2.470	3.224	0.000	5.694
Wildlife	0.000	1.965	2.533	0.000	4.498
Total	**0.000**	**14.933**	**19.574**	**0.000**	**34.507**

CL: Cedarhurst-Lawrence
MRE: Mid-Rockaway Edgemere Area
MRA: Mid-Rockaway Arverne Area
MRH: Mid-Rockaway Hammels Area

6 EFH CONSERVATION MEASURES AND CONCLUSION

The District plans to continue coordination with NMFS on appropriate EFH conservation and mitigation measures for the project. Currently, the District's best management practices, including seasonal restrictions (i.e. no-dredge windows on Atlantic Shorefront between September and 1 March), natural resource protective state and city mandated Special Conditions under their Clean Water Act (CWA) and Coastal Zone Management Act (CZMA) jurisdictions, as well as USFWS recommendations to ensure protection of species under their jurisdiction, will likely offer significant protections for potentially-affected EFH managed species.

To summarize potential impacts; a minor increase in turbidity and sedimentation would be generated by the proposed construction activities. If EFH species eggs and larvae are present during construction, they could be affected. During the construction period, adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance. Also, for a short period of time after construction, there would be a reduction in benthic organisms immediately adjacent to the in-water construction footprint; however, this area would be recolonized quickly. These impacts would occur over comparatively small, discrete areas and would not adversely impact local water flow and circulation. Therefore, implementation of the Recommended Plan may adversely affect EFH, but likely would result in minimal adverse effects as the resulting changes to EFH and its ecological functions would be relatively small and insignificant. In addition, it is anticipated that ecosystem restoration efforts as part of this Recommended Plan would result in long-term, net benefits to managed species (all life stages), associated species, and EFH. In summary, the District concludes that the federal project will not cause significant adverse effects to EFH or EFH species. The finding of no significance adverse effects to EFH or EFH species was concurred upon by NMFS on December 4, 2018 (concurrence in Appendix I – Pertinent Correspondence).

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APPENDIX A. EFH ASSESSMENT WORKSHEETS

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD Consultation website will assist you in completing this worksheet.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation Study (hereafter Project)

DATE: 07/25/2018

PROJECT NO.:

LOCATION (Water body, county, physical address):
Specific to the Atlantic Shoreline project reach of the Project

PREPARER: U.S. Army Corps of Engineers, New York District

Step 1: Use to generate the list of designated EFH for federally-managed species life stages for the geographic area of interest. Use this list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS		
EFH Designations	**Yes**	**No**
Is the action located in or adjacent to EFH designated for eggs? **List the species:** Red hake, winter flounder, windowpane flounder, monkfish, long finned squid, scup, king mackerel, Spanish mackerel, cobia. See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	
Is the action located in or adjacent to EFH designated for larvae? **List the species:** Red hake, winter flounder, windowpane flounder, monkfish, summer flounder, scup, king mackerel, Spanish mackerel, cobia. In addition, sand tiger shark, dusky shark, white shark, and smoothhound shark (Atlantic stock). [The life stages of the Highly Migratory Species are broken down into neonates, juveniles, and adults. There are no 'egg' designations and neonates are assumed to correspond to the "larvae" heading.] See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	
Is the action located in or adjacent to EFH designated for juveniles? **List the species:** Pollock, red hake, winter flounder, windowpane flounder, Atlantic herring, little skate, winter skate, bluefish, Atlantic mackerel, summer founlder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, bluefin tuna, sanbar shark, white shark, and smoothhound shark (Atlantic Stock). See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	

Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species: Atlantic salmon, Atlantic cod, red hake, winter flounder, windowpane flounder, Atlantic herring, monkfish, winter skate, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, king mackerel, Spanish mackerel, cobia, sandbar shark, white shark, skipjack tuna, and smoothhound shark (Atlantic Stock). See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	☐

If you answered 'no' to all questions above, then an EFH consultation is not required - go to Section 5.

If you answered 'yes' to any of the above questions, proceed to Section 2 and complete the remainder of the worksheet.

Step 2: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	Their are two components to this phase of the project: 1. Borrow source for sand will occur is sub-tidal waters. 2. Sand placement and groin construction will occur in intertidal waters.
What are the sediment characteristics?	1. Borrow source area is sand. Valuable sandy shoal habitat will be avoided and flatter areas focused on. 2. Beach and near-shore area is best characterized as sand.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	No in response to both project areas. The near-shore area is heavily disturbed due to historic and current recreational use of the beach areas.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	No. Wetlands are not mapped, and have not been identified in the field, within the Atlantic Shorefront area of the project.

Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	With regards to the borrow area, there could be surf clams and other shellfish present. This is addressed in greater depth in Sections 4 and 5 of the attached EFH Assessment Report.
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	No.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	No.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	No.
What is the typical salinity, depth and water temperature regime/range?	1. Borrow source. Unknown. 2. Beach and near shore. Ocean salinity is generally 32 parts per thousand within three miles of Long Island. Temperature ranges from 37 to 77 degrees Fahrenheit throughout the year. Depths range in this near shore environment, but are generally pretty shallow.
What is the normal frequency of site disturbance, both natural and man-made?	1. For the borrow source area, these areas are typically not recently disturbed from a physical perspective. It is recognized that commercial or recreational fishing may occur in the area. 2. For the beach and near-shore area, these areas are continually disturbed as a result of recreational activities and human utilization of the shoreline.
What is the area of proposed impact (work footprint & far afield)?	The project area is described in Section 2 of the attached EFH Assessment Report. Maps of the project area are included.

Step 3: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			The USACE anticipates that construction activities will occur from 2 September through 31 March. These dates align with potential protective areas for sensitive fish species such as the winter flounder, and also are protective of terrestrial species protected under jurisdiction of U.S. Fish and Wildlife Service. While the activities are further described in the attached EFH Assessment Report, the following activities will occur: 1. Dredging of sand from the borrow area. 2. Placement of sand and construction of buried seawall along the Atlantic Shoreline project reach. 3. Construction of 13 new groins and extension of 5 existing groins along the Atlantic Shoreline project reach. Construction of the groins is intended to reduce the long-term maintenance (i.e., sand placement) within the project area.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	✓		The benthic communities will be disturbed in both project areas (i.e., borrow site and near shore areas). It is recognized that there would be an indirect effect on identified EFH species due to the temporary loss of benthic food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations within 2 to 2.5 years. Impacts to fish community assemblages are considered minor given the large extent of the Atlantic Ocean compared to the project construction footprint, and recolonization rates of benthic communities. In addition, construction of groins could also provide living spaces for benthic communities on which fish species rely. In addition to potentially creating living spaces and increasing food availability of the project area, the proposed would potentially provide shelter for fish from wave attacks during large coastal storm events.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.	☐	✓	No.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?	☐	✓	No.

Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?		✓	No.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact? Provide details of any shellfish survey conducted at the site.	✓		Yes. It is recognized that shellfish such as surf clams could temporarily impacted as result of the sand mining, or construction in the near shore environment. Specific to the borrow source, USACE will evaluate potential steps to restrict dredging depths to exposure of a different hardened substrate that would be unsuitable to shellfish. Impacted areas are expected to be recolonized quickly given the limited extent of in-water construction footprint. Finally, impacts to shellfish as considered minor given the large extent of the Atlantic Ocean compared to the project construction footprint, and recolonization rates of shellfish and benthic communities. Finally, construction of groins could also provide living spaces for shellfish (i.e., mussels).
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?		✓	
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	✓		The project is being undertaken as a coastal storm risk management project, and is specifically designed be protective from coastal flooding and wave climates. It is expected that the placement of sand and construction of groins will alter near shore sediment transport. However, these changes are assumed to provide benefits to the near shore ecosystem by protecting these beaches from future coastal storms while also minimizing long-term maintenance requirements that could have cumulative effects.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	✓		Construction activities under the Recommended Plan would employ Best Management Practices (BMPs) to reduce construction impacts with emphasis on turbidity. It is recognized that sand mining as well as near shore construction will cause a short-term increase in turbidity. However, grain size of material is anticipated to be coarse and not create as much turbidity as fine grain sands. If eggs and larvae are present during construction, they could be affected. However defined construction windows should minimize this impact. In addition, during the construction period, it is assumed that adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance.

Will water depth change? What are the current and proposed depths?	✓		The water depths will change within the borrow area. The depth of sand mining is unknown at this time. As discussed in the attached EFH Assessment Report, special consideration will be taken to maintain a consistent substrate in these borrow areas to minimize impacts to benthic and shellfish communities.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.		✓	
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.	✓		The project is being undertaken as a coastal storm risk management project, and is specifically designed be protective from coastal flooding and wave climates. Similar to discussion relative to sediment transport, it is expected that the placement of sand and construction of groins will provide benefits to the near shore ecosystem by protecting these beaches from future coastal storms while also minimizing long-term maintenance requirements that could have cumulative effects.
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	✓		Water quality will be temporarily impacted as a result of in-water construction associated with sand mining, sand placement, and groin construction. Water quality impacts are assumed to primarily focus on turbidity and suspended sediments. Construction activities under the Recommended Plan would employ BMPs to reduce construction impacts with emphasis on turbidity. If eggs and larvae are present during construction, they could be affected. However defined construction windows should minimize this impact. In addition, during the construction period, it is assumed that adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	✓		Ambient noise levels will be temporarily impacted as a result of in-water construction associated with sand mining, sand placement, and groin construction. The type of construction proposed is not anticipated to cause sound levels that could result in mortality or injury. However, it is assumed that they could have behavioral impacts. These primarily would be focused on fish changing a course of travel and avoiding a construction area, with limited to no impact on the survival of that individual or sustainability of the population.
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	✓		As discussed above, there will be temporary impacts to the benthic communities in both the borrow area as well as near shore environment. As such, it is recognized that there would be an indirect effect on identified EFH and EFH designated species due to the temporary loss of benthic food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations occurs within 2 to 2.5 years. Impacts to fish community assemblages are considered minor given the large extent of the Atlantic Ocean compared to the project construction footprint, and recolonization rates of benthic communities. In addition, construction of groins could also provide living spaces for benthic communities on which fish species rely. In addition to potentially creating living spaces and increasing food availability of the project area, the proposed would potentially provide shelter for fish from wave attacks during large coastal storms.

Step 4: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. should be used during this assessment to determine the ecological parameters/ preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT

Functions and Values	Y	N	Describe habitat type, species and life stages to be adversely impacted
Will functions and values of EFH be impacted for:			
Spawning **If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**	✓	☐	Unlike any of the other EFH-designated species, winter flounder deposit their eggs on the bottom in nearshore waters in depths of 1 to 15 feet on mud, sand, and gravel substrates along the Atlantic coast of New York during the winter (peak spawning in February and March) (Pereira et al. 1999). There is a high probability that dredging on borrow areas in the winter would cause the mortality of winter flounder eggs. As such, USACE will try an restrict dredging to the fall or early winter, and risk of removing winter flounder eggs would be eliminated or minimized.
Nursery **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			The project is not anticipated to adversely affect nursery habitat that supports identified EFH designated species. It is recognized that larvae and juveniles could be present within the work area. However, it is recognized that scheduling will be considered to minimize adverse effects as discussed in the attached EFH Assessment Report. In addition, these highly motile species are expected to avoid the construction area and seek more suitable habitat in near proximity.
Forage **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	✓		As discussed above, there will be temporary impacts to the benthic communities in both the borrow area as well as near shore environment. As such, it is recognized that there would be an indirect effect on identified EFH species due to the temporary loss of benthic food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations occurs within 2 to 2.5 years. It is also recognized that foraging or transient migratory fish will alter their behavior as a result of construction activities. However, it is assumed that these highly motile fish will find suitable habitat in near proximity and not have an adverse impact on either the individual or population.
Shelter **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			The project will not result in impacts to any habitat that provides shelter to EFH species. In fact, the construction of groins will provide additional near-shore habitat that fish could utilize for shelter or additional foraging.

Will impacts be temporary or permanent? Please **box and describe the duration of the impacts.**			
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	☐	✓	Mitigation for the overall project is described in Section 5 of the attached EFH Assessment Report to account for both temporary and permanent impacts to federal and state regulated waters and wetlands. In addition, BMPs will be employed as necessary to avoid and/or minimize impacts to sensitive species of concern. Overall, the objective of the Atlantic Shoreline component of this project is to provide coastal storm protection, but also to minimize long-term maintenance of these beaches that could have cumulative effects on EFH designated species.

Step 5: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

		Federal Agency's EFH Determination
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**	☐	**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required.**
	✓	**The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
	☐	**The adverse effect on EFH is substantial.** **This is a request for an expanded EFH consultation.**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	Anadromous species such as alewife (Alosa pseudoharengus), blueback herring (Alosa aestivalis), American shad (Alosa sapidissima), and striped bass transit the inlet of the project area to reach spawning and nursery habitat in the freshwater portions of the system. Alewife and blueback herring, collectively known as river herring, spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. They would be present in the project area as transients, and are likely to alter their behavior to avoid the construction area.
American eel	American eel (Anguilla rostrata) spawn in the Sargasso Sea, transit inlets as elvers and move into estuarine and freshwater habitats within coastal embayments. They inhabit these areas until they return to the sea through those inlets as adults. Given they would likely be adults within the project area, it is expected that these species will modify behavior to avoid the project area.
American shad	See discusion for alewife above.
Atlantic menhaden	Could be present within the project area, but would likely alter behavior to avoid the construction area.
blue crab	Will likely alter behavior to avoid the construction area. Construction of groins could provide long-term benefits to the species.
blue mussel	See discussion above for impacts to benthic and shellfish communities. Localized foot print could have temporary impacts, but project should provide long-term benefits to benthic communities including the blue mussel.
blueback herring	See alewife above.

Eastern oyster	N/A
horseshoe crab	The project is not expected to occur during breeding season. Individuals will avoid the construction area. Overall, the project could have long-term benefits to the species by further protection of near shore beach habitats.
quahog	See discussion above for impacts to benthic and shellfish communities.
soft-shell clams	See discussion above for impacts to benthic and shellfish communities. Construction of groins could provide long-term benefits to the species.
striped bass	Expected to avoid the construction area as adults or juveniles. No adverse impacts.
other species:	

Useful Links

National Wetland Inventory Maps

EPA's National Estuaries Program

Northeast Regional Ocean Council (NROC) Data

Mid-Atlantic Regional Council on the Ocean (MARCO) Data

Maine

Eelgrass maps

Maine Office of GIS Data Catalog

Casco Bay Estuary Partnership

Maine GIS Stream Habitat Viewer

New Hampshire

New Hampshire's Statewide GIS Clearinghouse, NH GRANIT

New Hampshire Coastal Viewer

Massachusetts

Eelgrass maps

MADMF Recommended Time of Year Restrictions Document

Massachusetts Bays National Estuary Program

Buzzards Bay National Estuary Program

Massachusetts Division of Marine Fisheries

Massachusetts Office of Coastal Zone Management

Rhode Island

Eelgrass maps

Narraganset Bay

Rhode Island Division of Marine Fisheries

Rhode Island Coastal Resources Management Council

CT DEEP Office of Long Island Sound Programs and Fisheries

CT Bureau of Aquaculture Shellfish

Maps CT River Watershed Council

New York

Eelgrass report

Peconic Estuary Program

NY/NJ Harbor Estuary

New Jersey

Submerged Aquatic Vegetation mapping

Barnegat Bay Partnership

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Maryland

Submerged Aquatic Vegetation mapping

MERLIN

Virginia

Submerged Aquatic Vegetation mapping

NOAA FISHERIES
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
Essential Fish Habitat (EFH) Consultation Guidance
EFH ASSESSMENT WORKSHEET

Introduction:

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) mandates that federal agencies conduct an essential fish habitat (EFH) consultation with NOAA Fisheries regarding any of their actions authorized, funded, or undertaken that may adversely affect EFH. An adverse effect means any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

This worksheet has been designed to assist in determining whether a consultation is necessary and in preparing EFH assessments. This worksheet should be used as your EFH assessment or as a guideline for the development of your EFH assessment. At a minimum, all the information required to complete this worksheet should be included in your EFH assessment. If the answers in the worksheet do not fully evaluate the adverse effects to EFH, we may request additional information in order to complete the consultation.

An expanded EFH assessment may be required for more complex projects in order to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. While the EFH worksheet may be used for larger projects, the format may not be sufficient to incorporate the extent of detail required, and a separate EFH assessment may be developed. However, regardless of format, the analysis outlined in this worksheet should be included for an expanded EFH assessment, along with additional information that may be necessary. This additional information includes:

- the results of on-site inspections to evaluate the habitat and site-specific effects
- the views of recognized experts on the habitat or the species that may be affected
- a review of pertinent literature and related information
- an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Your analysis of adverse effects to EFH under the MSA should focus on impacts to the habitat for all life stages of species with designated EFH, rather than individual responses of fish species. Fish habitat includes the substrate and benthic resources (e.g., submerged aquatic vegetation, shellfish beds, salt marsh wetlands), as well as the water column and prey species.

Consultation with us may also be necessary if a proposed action results in adverse impacts to other NOAA-trust resources. Part 6 of the worksheet is designed to help assess the effects of the action on other NOAA-trust resources. This helps maintain efficiency in our interagency coordination process. In addition, further consultation may be required if a proposed action impacts marine mammals or threatened and endangered species for which we are responsible. Staff from our Greater Atlantic Regional Fisheries Office, Protected Resources Division should be contacted regarding potential impacts to marine mammals or threatened and endangered species.

Instructions for Use:

Federal agencies must submit an EFH assessment to NOAA Fisheries as part of the EFH consultation. Your EFH assessment must include:

1) A description of the proposed action.
2) An analysis of the potential adverse effects of the action on EFH, and the managed species.
3) The federal agency's conclusions regarding the effects of the action on EFH.
4) Proposed mitigation if applicable.

In order for this worksheet to be considered as your EFH assessment, you must answer the questions in this worksheet fully and with as much detail as available. Give brief explanations for each answer.

Federal action agencies or the non-federal designated lead agency should submit the completed worksheet to NOAA Fisheries Greater Atlantic Regional Fisheries Office, Habitat Conservation Division (HCD) with the public notice or project application. Include project plans showing existing and proposed conditions, all waters of the U.S. on the project site, with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked and sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom habitat areas and shellfish beds, as well as any available site photographs.

For most consultations, NOAA Fisheries has 30 days to provide EFH conservation recommendations once we receive a complete EFH assessment. Submitting all necessary information at once minimizes delays in review and keeps review timelines consistent. Delays in providing a complete EFH assessment can result in our consultation review period extending beyond the public comment period for a particular project.

The information contained on the HCD Consultation website will assist you in completing this worksheet.

EFH ASSESSMENT WORKSHEET FOR FEDERAL AGENCIES (modified 3/2016)

PROJECT NAME: East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation Study (hereafter Project)

DATE: 07/25/2018

PROJECT NO.:

LOCATION (Water body, county, physical address):
Specific to the Jamaica Bay portion of the Project

PREPARER: U.S. Army Corps of Engineers, New York District

Step 1: Use to generate the list of designated EFH for federally-managed species life stages for the geographic area of interest. Use this list as part of the initial screening process to determine if EFH for those species occurs in the vicinity of the proposed action. The list can be included as an attachment to the worksheet. Make a preliminary determination on the need to conduct an EFH consultation.

1. INITIAL CONSIDERATIONS

EFH Designations	Yes	No
Is the action located in or adjacent to EFH designated for eggs? List the species: Red hake, winter flounder, windowpane flounder, monkfish, long finned squid, king mackerel, Spanish mackerel, cobia. See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	☐
Is the action located in or adjacent to EFH designated for larvae? List the species: Red hake, winter flounder, windowpane flounder, Atlantic herring, monkfish, king mackerel, Spanish mackerel, cobia. In addition, sand tiger shark, white shark, and smoothhound shark (Atlantic stock). [The life stages of the Highly Migratory Species are broken down into neonates, juveniles, and adults. There are no 'egg' designations and neonates are assumed to correspond to the “larvae” heading.] See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	☐
Is the action located in or adjacent to EFH designated for juveniles? List the species: Pollock, clearnose skate, red hake, winter flounder, windowpane flounder, Atlantic herring, winter skate, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, spiny dogfish, king mackerel, Spanish mackerel, cobia, sandbar shark, and smoothhound shark (Atlantic Stock). See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	☐

Is the action located in or adjacent to EFH designated for adults or spawning adults? List the species:		
Atlantic salmon, Clearnose skate, red hake, winter flounder, windowpane flounder, Atlantic herring, little skate, winter skate, yellowtail flounder, bluefish, Atlantic butterfish, Atlantic mackerel, summer flounder, scup, black sea bass, spiny dogfish, king mackerel, Spanish mackerel, cobia, sandbar shark, and smoothhound shark (Atlantic Stock). See Tables 8 & 9 in attached EFH Assessment Report. Table is inclusive of scientific nomenclature.	✓	☐

If you answered 'no' to all questions above, then an EFH consultation is not required - go to Section 5.

If you answered 'yes' to any of the above questions, proceed to Section 2 and complete the remainder of the worksheet.

Step 2: In order to assess impacts, it is critical to know the habitat characteristics of the site before the activity is undertaken. Use existing information, to the extent possible, in answering these questions. Identify the sources of the information provided and provide as much description as available. These should not be yes or no answers. Please note that there may be circumstances in which new information must be collected to appropriately characterize the site and assess impacts. Project plans that show the location and extent of sensitive habitats, as well as water depths, the HTL, MHW and MLW should be provided.

2. SITE CHARACTERISTICS

Site Characteristics	Description
Is the site intertidal, sub-tidal, or water column?	The project will occur in both intertidal and sub-tidal areas. The shoreline protection features will be in the intertidal zone, where the rock sills are assumed to occur within the sub-tidal area.
What are the sediment characteristics?	The shoreline and near shore environment within the Jamaica Bay project area is best characterized as fine silts and sands. The shoreline is heavily disturbed in some areas and characteristically has a rocky, cobble substrate.
Is there submerged aquatic vegetation (SAV) at or adjacent to project site? If so describe the SAV species and spatial extent.	No.
Are there wetlands present on or adjacent to the site? If so, describe the spatial extent and vegetation types.	Yes. The project will have temporary impacts to 0.07 acres of intertidal wetlands that will be restored in-kind and in-place. The project will have permanent impacts to 2.82 acres of intertidal wetlands.

Is there shellfish present at or adjacent to the project site? If so, please describe the spatial extent and species present.	Yes. Shellfish are expected to occur within the project area, and likely have temporary impacts to these communities. Impacts are likely focused on burial, physical disturbance, and/or water quality (i.e., turbidity).
Are there mudflats present at or adjacent to the project site? If so please describe the spatial extent.	Yes. The project will have permanent impacts to 0.06 acres, and temporary impacts to 2.37 acres of mudflats. Temporary impacts are primarily the result of construction (temporary) easements associated with construction of shoreline features.
Is there rocky or cobble bottom habitat present at or adjacent to the project site? If so, please describe the spatial extent.	Yes. In the most highly disturbed shorelines there is a rocky or cobble hard bottom habitat along the shoreline.
Is Habitat Area of Particular Concern (HAPC) designated at or near the site? If so for which species, what type habitat type, size, characteristics?	No.
What is the typical salinity, depth and water temperature regime/range?	It is recognized that temperatures and salinity will vary throughout the Jamaica Bay portion of the project. Data was reviewed for the USGS station 01311875 at Rockaway Inlet near Floyd Bennett Field. Temperatures range from 30 to 75 Fahrenheit throughout the year. Salinities range from approximately 28 to 30 parts per thousand.
What is the normal frequency of site disturbance, both natural and man-made?	These shorelines are heavily used and are continually disturbed by both anthropogenic disturbances, as well as waves associated with large storm events.
What is the area of proposed impact (work footprint & far afield)?	The project area is described in the attached EFH Assessment Report. Maps of the project area are included.

Step 3: This section is used to describe the anticipated impacts from the proposed action on the physical/chemical/biological environment at the project site and areas adjacent to the site that may be affected.

3. DESCRIPTION OF IMPACTS

Impacts	Y	N	Description
Nature and duration of activity(s). Clearly describe the activities proposed and the duration of any disturbances.			While the activities are further described in the attached EFH Assessment Report, the following activities will occur: 1. Construction of hardened shoreline features such as bulkheads, floodwalls, or revetments. These primarily occur in locations where they already exist. 2. Construction of NNBFs that include rock sills and wetland restoration along the intertidal, and subtidal zones.
Will the benthic community be disturbed? If no, why not? If yes, describe in detail how the benthos will be impacted.	✓		The benthic communities will be temporarily disturbed in the project areas. This could result from temporary in water work associated with bulkhead construction, or construction of rock sills in the subtidal zone. It is recognized that there would be an indirect effect on identified EFH species due to the temporary loss of benthic food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations occurs within 2 to 2.5 years. Impacts to fish community assemblages are considered minor, given the large extent of Jamaica Bay compared to the project construction footprint, and recolonization rates of benthic communities. In addition, construction of rock sills will provide living spaces for shellfish and benthic communities on which fish species rely. USACE will evaluate further opportunities to include oyster and mussel restoration as part of these rock sills. In addition to potentially creating living spaces and increasing food availability of the project area, the proposed would potentially provide shelter for fish from wave attacks during large coastal storm events.
Will SAV be impacted? If no, why not? If yes, describe in detail how the SAV will be impacted. Consider both direct and indirect impacts. Provide details of any SAV survey conducted at the site.		✓	No.
Will salt marsh habitat be impacted? If no, why not? If yes, describe in detail how wetlands will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?	✓		Yes. The project will have temporary impacts to 0.07 acres of intertidal wetlands that will be restored in-kind and in-place. The project will have permanent impacts to 2.82 acres of intertidal wetlands. These impacts will result from construction of the proposed High Frequency Flood Risk Reduction Features (HRFRRF). It should be noted that the NNBFs that are included in this project will restore and/or create 7.65 acres of new intertidal wetlands, and an additional 0.47 acres of wetland enhancement. In addition, long-term additional wetland areas are expected to be restored as a result of rock sills. Utilizing the Evaluation of Planned Wetlands, the project will have a net benefit on ecological services provided by intertidal wetlands. This specifically includes a function identified specific to tidal fish communities. A comprehensive description of mitigation is included in Section 5 of the attached EFH Assessment Report.

Will mudflat habitat be impacted? If no, why not? If yes, describe in detail how mudflats will be impacted. What is the aerial extent of the impacts? Are the effects temporary or permanent?	✓	☐	Yes. The project will have permanent impacts to 0.06 acres, and temporary impacts to 2.37 acres of mudflats. These impacts will result from construction of the proposed HRFRRF. Temporary impacts are primarily the result of construction (temporary) easements associated with construction of shoreline features. These features will be restored to pre-existing elevation; restoring in-place and in-kind.
Will shellfish habitat be impacted? If so, provide in detail how the shellfish habitat will be impacted. What is the aerial extent of the impact? Provide details of any shellfish survey conducted at the site.	✓	☐	Yes. It is recognized that shellfish could temporarily impacted as result of in-water construction activities associated with the HRFRRFs. Impacted areas are expected to be recolonized quickly given the limited extent of in-water construction footprint, and past results that have showed quick recolonization of disturbed intertidal areas. Overall, it is expected that with the inclusion of the NNBFs, the project will have a net-benefit on the shellfish, and overall ecological functioning, of these shorelines.
Will hard bottom (rocky, cobble, gravel) habitat be impacted at the site? If so, provide in detail how the hard bottom will be impacted. What is the aerial extent of the impact?	✓	☐	Yes. It is recognized that some of the most heavily disturbed shorelines have this habitat. However, due to continual disturbance in these areas, the project is expected to have little to no impact on this habitat type.
Will sediments be altered and/or sedimentation rates change? If no, why not? If yes, describe how.	✓	☐	The project is being undertaken as a coastal storm risk management project, and is specifically designed be protective from coastal flooding and wave climates. It is expected that the construction of rock sills will alter sediment transport. However, it is expected these features will promote sediment accretion and stabilize eroding shorelines. It is also recognized that hardened shorelines can have long-term impacts on bathymetry through exaggerated erosion. However, the proposed features will be constructed in areas where a hardened shoreline already exists and likely not result in significant long-term impacts beyond the existing site conditions.
Will turbidity increase? If no, why not? If yes, describe the causes, the extent of the effects, and the duration.	✓	☐	Construction activities under the Recommended Plan would employ Best Management Practices (BMPs) to reduce construction impacts with emphasis on turbidity. It is recognized that near shore construction will cause a short-term increase in turbidity. However, grain size of material is anticipated to be coarse and not create as much turbidity as fine grain sands. If eggs and larvae are present during construction, they could be affected. However defined construction windows should minimize this impact. In addition, during the construction period, it is assumed that adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance.

Will water depth change? What are the current and proposed depths?		✓	Not expected. Some sediment accretion is expected behind the rock sills, but this will promote the sustainability of existing intertidal wetlands.
Will contaminants be released into sediments or water column? If yes, describe the nature of the contaminants and the extent of the effects.		✓	
Will tidal flow, currents, or wave patterns be altered? If no, why not? If yes, describe in detail how.	✓		The project is being undertaken as a coastal storm risk management project, and is specifically designed be protective from coastal flooding and wave climates. Similar to discussion relative to sediment transport, it is expected that the construction of rock sills will provide benefits to the near shore ecosystem by protecting these eroding shorelines from future coastal storms.
Will water quality be altered? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration of the impact.	✓		Water quality will be temporarily impacted as a result of in-water construction associated with in water construction of the HRFRRFs. Water quality impacts are assumed to primarily focus on turbidity and suspended sediments. Construction activities under the Recommended Plan would employ BMPs to reduce construction impacts with emphasis on turbidity. If eggs and larvae are present during construction, they could be affected. However defined construction windows should minimize this impact. In addition, during the construction period, it is assumed that adult and juvenile fish would leave the area of construction and move to nearby suitable locations outside the area of disturbance. With the restoration of intertidal wetlands, and potential oyster and mussel restoration as part of the rock sills, the project could have a long term benefit on water quality.
Will ambient noise levels change? If no, why not? If yes, describe in detail how. If the effects are temporary, describe the duration and degree of impact.	✓		Ambient noise levels will be temporarily impacted as a result of in-water construction associated with the HRFRRFs. The type of construction proposed is not anticipated to cause sound levels that could result in mortality or injury. However, it is assumed that they could have behavioral impacts. These primarily would be focused on fish changing a course of travel and avoiding a construction area, with limited to no impact on the survival of that individual or sustainability of the population.
Does the action have the potential to impact prey species of federally managed fish with EFH designations?	✓		As discussed above, there will be temporary impacts to the benthic communities in the near shore environment. As such, it is recognized that there would be an indirect effect on identified EFH species due to the temporary loss of benthic food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations occurs within 2 to 2.5 years. Overall, the project will have a net benefit on EFH through the inclusions of NNBFs that strategically target wetland restoration as well as in water habitat structures.

Step 4: This section is used to evaluate the consequences of the proposed action on the functions and values of EFH as well as the vulnerability of the EFH species and their life stages. Identify which species (from the list generated in Step 1) will be adversely impacted from the action. Assessment of EFH impacts should be based upon the site characteristics identified in Step 2 and the nature of the impacts described within Step 3. should be used during this assessment to determine the ecological parameters/ preferences associated with each species listed and the potential impact to those parameters.

4. EFH ASSESSMENT

Functions and Values	Y	N	Describe habitat type, species and life stages to be adversely impacted
Will functions and values of EFH be impacted for:			
Spawning **If yes, describe in detail how, and for which species. Describe how adverse effects will be avoided and minimized.**	✓		A number of identified EFH-designated species spawn in estuarine and coastal waters, and likely could occur in Jamaica Bay. The range of spawning times is specific to species, and varies through the year based upon list provided. While many of the listed species have buoyant eggs, it is noted that winter flounder deposit their eggs on the bottom in nearshore waters in depths of 1 to 15 feet on mud, sand, and gravel substrates along the Atlantic coast of New York during the winter (peak spawning in February and March) (Pereira et al. 1999). For other species with eggs listed as a critical life history stage protected under EFH, the impacts with proposed construction is anticipated to be minor and short term. Overall, the project will have a positive long-term impact on these species by enhancing existing spawning habitats and providing additional protection through in water habitat.
Nursery **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			It is recognized that the project will have temporary impacts to coastal wetlands, and near shore environments. There could be temporary impacts to nursery habitats. However, the NNBFs that have been included in the design will provide a net positive long-term benefit to ecological functioning. These features will provide enhanced nursery habitat to EFH designated fish by restoring intertidal wetlands, as well as providing additional protection and in water habitat structure through construction of rock sills.
Forage **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**	✓		As discussed above, there will be temporary impacts to the benthic communities and forage fish due to proposed in water construction. As such, it is recognized that there would be an indirect effect on identified EFH species due to the temporary loss of food prey items. However, these effects on the benthic food-prey organisms is considered to be temporary as as benthic studies have demonstrated recolonization following dredging operations occurs within 2 to 2.5 years. Forage fish are anticipated to return almost immediately following construction. It is also recognized that foraging fish will alter their behavior as a result of construction activities. However, it is assumed that these highly motile fish will find suitable habitat in near proximity and not have an adverse impact on either the individual or population.
Shelter **If yes, describe in detail how and for which species. Describe how adverse effects will be avoided and minimized.**			The project will not result in impacts to any habitat that provides shelter to EFH species. In fact, the construction of in water rock sills and intertidal wetlands will provide additional near-shore habitat that fish could utilize for shelter or additional foraging.

Will impacts be temporary or permanent? Please box and describe the duration of the impacts.			
Will compensatory mitigation be used? If no, why not? Describe plans for mitigation and how this will offset impacts to EFH. Include a conceptual compensatory mitigation plan, if applicable.	☐	✓	Mitigation for the overall project is described in Section 5 of the attached EFH Assessment Report to account for both temporary and permanent impacts to federal and state regulated waters and wetlands. In addition, BMPs will be employed as necessary to avoid and/or minimize impacts to sensitive species of concern. Overall, the inclusion of NNBFs as part of the project design was intended to offset any unavoidable impacts to sensitive habitat, while also providing enhanced resiliency of these shoreline ecosystems.

Step 5: This section provides the federal agency's determination on the degree of impact to EFH from the proposed action. The EFH determination also dictates the type of EFH consultation that will be required with NOAA Fisheries.

Please note: if information provided in the worksheet is insufficient to allow NOAA Fisheries to complete the EFH consultation additional information will be requested.

5. DETERMINATION OF IMPACT

Federal Agency's EFH Determination		
Overall degree of adverse effects on EFH (not including compensatory mitigation) will be: **(check the appropriate statement)**	☐	**There is no adverse effect on EFH or no EFH is designated at the project site.** **EFH Consultation is not required.**
	✓	**The adverse effect on EFH is not substantial. This means that the adverse effects are either no more than minimal, temporary, or that they can be alleviated with minor project modifications or conservation recommendations.** **This is a request for an abbreviated EFH consultation.**
	☐	**The adverse effect on EFH is substantial.** **This is a request for an expanded EFH consultation.**

Step 6: Consultation with NOAA Fisheries may also be required if the proposed action results in adverse impacts to other NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats as part of the Fish and Wildlife Coordination Act Some examples of other NOAA-trust resources are listed below. Inquiries regarding potential impacts to marine mammals or threatened/endangered species should be directed to NOAA Fisheries' Protected Resources Division.

6. OTHER NOAA-TRUST RESOURCES IMPACT ASSESSMENT

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	Anadromous species such as alewife (Alosa pseudoharengus), blueback herring (Alosa aestivalis), American shad (Alosa sapidissima), and striped bass transit the inlet of the project area to reach spawning and nursery habitat in the freshwater portions of the system. Alewife and blueback herring, collectively known as river herring, spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. They would be present in the project area as transients, and are likely to alter their behavior to avoid the construction area.
American eel	American eel (Anguilla rostrata) spawn in the Sargasso Sea, transit inlets as elvers and move into estuarine and freshwater habitats within coastal embayments. They inhabit these areas until they return to the sea through those inlets as adults. Given they would likely be adults within the project area, it is expected that these species will modify behavior to avoid the project area.
American shad	See discusion for alewife above.
Atlantic menhaden	Could be present within the project area, but would likely alter behavior to avoid the construction area.
blue crab	Will likely alter behavior to avoid the construction area. Construction of rock sills could provide long-term benefits to the species.
blue mussel	See discussion above for impacts to benthic and shellfish communities. Localized foot print could have temporary impacts, but project should provide long-term benefits to benthic communities including the blue mussel.
blueback herring	See alewife above.

Eastern oyster	See discussion above for impacts to benthic and shellfish communities. Localized foot print could have temporary impacts, but project should provide long-term benefits to benthic communities including the oyster populations. In fact, USACE will explore opportunities for oyster restoration as part of the rock sills.
horseshoe crab	The project is not expected to occur during breeding season. Individuals will avoid the construction area. Overall, the project could have long-term benefits to the species by further protection of near shore beach habitats.
quahog	See discussion above for impacts to benthic and shellfish communities.
soft-shell clams	See discussion above for impacts to benthic and shellfish communities. Construction of rock sills could provide long-term benefits to the species.
striped bass	Expected to avoid the construction area as adults or juveniles. No adverse impacts.
other species:	

Useful Links

National Wetland Inventory Maps

EPA's National Estuaries Program

Northeast Regional Ocean Council (NROC) Data

Mid-Atlantic Regional Council on the Ocean (MARCO) Data

Maine

Eelgrass maps

Maine Office of GIS Data Catalog

Casco Bay Estuary Partnership

Maine GIS Stream Habitat Viewer

New Hampshire

New Hampshire's Statewide GIS Clearinghouse, NH GRANIT

New Hampshire Coastal Viewer

Massachusetts

Eelgrass maps

MADMF Recommended Time of Year Restrictions Document

Massachusetts Bays National Estuary Program

Buzzards Bay National Estuary Program

Massachusetts Division of Marine Fisheries

Massachusetts Office of Coastal Zone Management

Rhode Island

Eelgrass maps

Narraganset Bay

Rhode Island Division of Marine Fisheries

Rhode Island Coastal Resources Management Council

CT DEEP Office of Long Island Sound Programs and Fisheries

CT Bureau of Aquaculture Shellfish

Maps CT River Watershed Council

New York

Eelgrass report

Peconic Estuary Program

NY/NJ Harbor Estuary

New Jersey

Submerged Aquatic Vegetation mapping

Barnegat Bay Partnership

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Maryland

Submerged Aquatic Vegetation mapping

MERLIN

Virginia

Submerged Aquatic Vegetation mapping