

**APPENDIX O**

**FISH AND WILDLIFE SERVICE COORDINATION**



# United States Department of the Interior



## FISH AND WILDLIFE SERVICE

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August 18, 2016

Peter Wepler, Chief  
Environmental Analysis Branch  
U.S. Army Corps of Engineers  
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26 Federal Plaza  
New York, NY 10278-0090

Attn: Catherine Alcoba

Dear Mr. Wepler:

This letter transmits the U.S. Fish and Wildlife Service's (Service) Planning Aid Letter (PAL) for the U.S. Army Corps of Engineers (Corps) feasibility study entitled, "Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay" Project. The purpose of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) is to assure equal consideration and coordination of fish and wildlife resources. This PAL provides a preliminary description of: the fish and wildlife resources present within the study area; the studies and other projects occurring in the area; a description of the proposed action; preliminary potential impacts of the action; recommended study and surveys that should be undertaken; and potential avoidance, minimization, and mitigation measures. This PAL was developed in support of the Service's FWCA responsibilities in reviewing the Corps water resources development projects. Section 2(b) of the FWCA requires that the final report of the Secretary of the Interior: (1) determine the magnitude of the direct, indirect, and cumulative impacts of proposed projects on fish and wildlife resources, and (2) make specific recommendations as to measures that should be taken to conserve those resources. The Service continues to review these documents at this time, requesting additional detail as needed and providing recommendations. As a result, this PAL does not, at this time, constitute the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

## **Introduction**

### **Identification of Purpose, Scope, and Authority**

#### **Purpose**

The primary objective of the proposed study is to examine coastal storm risk management problems and opportunities for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Study Area (USACE 2016a). The Corps' goal is to identify solutions that will reduce Atlantic Ocean Shoreline and Jamaica Bay vulnerability to storm damage over time.

The purpose of the FWCA consultation is to document the potential impacts upon fish and wildlife resources expected from the implementation of the proposed project, and recommend measures to conserve and protect fish and wildlife resources.

#### **Scope**

The Corps identified the study area as "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" (USACE 2016a). In order to delineate the FWCA analysis area, the Service included all areas within and adjacent to the Corps' identified project area that would be directly or indirectly impacted by the proposed project. The eastern and western boundaries of the FWCA analysis area are East Rockaway Inlet and the Lower Bay adjacent to Coney Island. The southern boundary extends 1,640 feet (ft) south of the southern edge of the designated offshore dredging area as this is the potential migration distance of the sedimentation plume created by offshore dredging operations (Minerals Management Service 2001). The northern boundary of the FWCA analysis area will be determined based on the results of the hydrological changes stemming from the construction, and operations and maintenance of the storm surge barrier.

The temporal scope of the FWCA analysis extends from the short-term impacts due to the construction of the proposed project to the long-term impacts that may occur over the 50-year life of the project. Initial construction will occur from 2017 to 2019.

#### **Authority**

The East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Study was authorized by the House of Representatives dated September 27, 1997, as stated within the Congressional Record for the U.S. House of Representatives (USACE 2016a). 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."

## **Relevant Prior and On-Going Studies/Reports/Projects**

### **Federal Relevant Prior and On-Going Studies/Reports/Projects**

- *Rockaway Beach Erosion Control and Hurricane Protection Project*
- *Rockaway Hudson Raritan Estuary Project, Ecosystem Restoration Feasibility Study*
- *Spring Creek Park (North) Ecosystem Restoration Project*
- *Spring Creek South: Storm Resilience and Ecosystem Restoration Project*
- *East Rockaway Inlet Federal Navigation Project*
- *Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet, Long Beach Island, New York, Storm Damage Reduction Project*
- *Jamaica Bay Federal Navigation Channel*
- *Jamaica Bay, Marine Beach and Plumb Beach Ecosystem Restoration Feasibility Study*
- *Jamaica Bay Marsh Island Restoration: Elders East, Elders West, Yellow Bar Hassock, Black Wall, and Rulers Bar*
- *Plumb Beach Beneficial Use of Dredge Material Project*
- *Breezy Point Risk Mitigation System*
- *Fort Tilden Shore Access and Resiliency Project*
- *Sunset Cove's Salt Marsh and Upland Habitat*
- *Jamaica Bay Self-Sustaining Oyster Population*
- *West Pond Breach Repair*
- *Rockaway Boardwalk*
- *Flood Mitigation in Rail Yards - Rockaway Park Rail Yard - Queens*
- *Fresh Creek Coastal Protection*
- *Howard Beach Comprehensive Coastal Protection Study*
- *Upper Hawtree Flood Protection and Drainage Improvements*

### **State and Local Relevant Prior and On-Going Studies/Reports/Projects**

- *Breezy Point Cooperative Beach Scraping*

Refer to New York City's Department of Environmental Protection Jamaica Bay Watershed Protection Plan (NYCDEP 2014) for a description of the following New York City funded and implemented proposed/on-going and completed projects:

### **Proposed/On-Going Projects**

- *Jamaica Bay wastewater treatment plant upgrades*
- *Science and Resilience Institute at Jamaica Bay*
- *Jamaica Bay-Rockaway Parks Conservancy*
- *Clean Streets/Clean Beaches*
- *Ribbed Mussel Pilot*
- *Marsh Island Wave Attenuator Study*
- *Paerdegat Basin Restoration*
- *Belt Parkway Stormwater Control Measures*
- *Long Term Control Plan*
- *Green Infrastructure Program Implementation*

- *Springfield Gardens, Baisley Pond, and Area-wide Sewer Improvements*
- *Waterfront Revitalization Program*

### **Completed Projects**

- *Sea Lettuce (*ulva*) Harvesting Pilot*
- *Algal Turf Scrubber Pilot*
- *Oyster Bed Pilot*
- *Eel Grass (*Zostera marina*) Pilot*
- *Stormwater Pilot Monitoring Program*

### **Description of Study and FWCA Analysis Area**

The project area is comprised of the Rockaway Peninsula, Jamaica Bay, and Coney Island (Figure 1), and the designated offshore dredging area.



Figure 1: Project Area including the land and waters of the Rockaway Peninsula, Jamaica Bay, and Coney Island.

Rockaway Peninsula is a developed barrier peninsula comprised of extensive residential and commercial development and associated infrastructure, New York City-owned/managed beaches, a private beach community, private beach clubs, and National Park Service beaches including upland parcels that are part of the Gateway National Recreation Area (GNRA). The peninsula is approximately 11 miles in length and averages 0.4 miles in width. An estimated 7,900 residential and commercial structures on the peninsula fall within the Federal Emergency Management Agency (FEMA) regulated 100-year floodplain (USACE 2016a).

The Corps describes Jamaica Bay in their draft General Re-evaluation Report as: “the largest estuarine waterbody in the NYC metropolitan area covering an approximately 20,000 acres (17,200 of open water and 2,700 acres of upland islands and salt marsh). Jamaica Bay measures approximately 10 miles at its widest point east to west and four miles at the widest point north to south, being approximately 26 square miles in total. The mean depth of the Bay is approximately 13 feet with maximum depths of 60 feet in the deepest historical borrow pits. Navigation channels within the Bay are authorized to a depth of 20 feet. Jamaica Bay has a typical tidal range of 5 to 6 feet. The portions of NYC and Nassau County surrounding the waters of Jamaica Bay are urbanized, densely populated, and very susceptible to flooding. An estimated 41,000 residential and commercial structures are within the FEMA regulated 100-year Jamaica Bay floodplain” (USACE 2016a).

Coney Island is attached to Long Island and is approximately 4 miles long and 1 mile wide. This area is comprised of extensive residential and commercial development and associated infrastructure, New York City-owned/managed beaches, a wastewater treatment plant, and an amusement park.

The offshore dredging/borrow area is located approximately 2.0 miles south of Rockaway Peninsula and approximately 6 miles east of the Rockaway Inlet. The borrow area is approximately 2.6 miles long and 1.1 miles wide with depths between 36 and 58 ft (Alcoba Pers. Com. 2016). The borrow area covers approximately 1,830 acres of marine subtidal habitat.

### **Ecological Significance of Project Area**

The habitats within the project area are of regional and ecological significance as designated by federal and state entities. As described below, the project area provides valuable habitats to a suite of migratory birds, threatened and endangered species, and species of special concern.

### **Service Significant Habitat and Habitat Complex**

The Jamaica Bay and Breezy Point Complex encompasses the entire Jamaica Bay estuarine lagoon, park of the Rockaway Inlet, the western part of the Rockaway barrier beach, Plumb Beach, and most of the tidal creeks and undeveloped uplands adjacent to the Bay (USFWS 1997). This habitat complex is of regional importance due to the location and rich food resources found within the complex. The complex contains: beach and dune habitat for nesting bird and rare plant species, foraging areas for waterfowl, shorebirds, and colonial nesting waterbirds; important breeding and juvenile nursery habitat for finfish and shellfish, nesting habitats for gulls, terns, waterfowl, and herons, upland breeding habitat for grassland bird nesting and foraging areas; as well as butterfly concentration areas (USFWS 1997).

### **Gateway National Recreation Area**

The Gateway National Recreation Area (GRNA) is an urban park complex managed by the National Park Service. The park is comprised of 27,000 acres located in New York and New Jersey. Within New York, the park is broken into three distinct districts: Refuge District,

Breezy Point District, and North Shore District which are described below (National Park Service 2004):

### **Refuge District**

The Jamaica Bay Wildlife Refuge is a 9,155 acres refuge located on a marsh island in the middle of Jamaica Bay. The refuge provides diverse habitat to many species of birds, reptiles, and amphibians, and marine and aquatic species. The refuge is identified as a critical stopover area on the Eastern Flyway migration route with more than 325 species having been observed at the refuge. Within the refuge, the following habitats are present: salt marsh, freshwater, brackish ponds, upland woods, fields, beach, open water and bay islands.

### **Breezy Point District**

The Breezy Point District includes the following units: Breezy Point Tip, West Beach, Fort Tilden, and Jacob Riis which are located along the Atlantic Coast of Rockaway Peninsula. The Breezy Point Tip is comprised of more than 200 acres of sand dunes, salt and brackish marshes, and grasslands. The site hosts a number of breeding species including federal- and state-listed species: piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), least tern (*Sterna antillarum*), common tern (*Sterna hirundo*), black skimmer (*Rynchops niger*), and American oystercatcher (*Haematopus palliatus*). West Beach provides some limited grassland habitat to nesting killdeer (*Charadrius vociferous*) and cottontail rabbits. Fort Tilden provides habitat for nesting species of piping plover and American oystercatcher.

### **North Shore District**

The North Shore District includes the following units: Floyd Bennett Field, Canarsie Pier, Dead Horse Bay, Plum Beach, and Bergen Beach. Previously a municipal airport, Floyd Bennett Field provides 140 acres of grassland habitat for grasshopper sparrows (*Ammodramus savannarum*), meadowlarks (*Sturnella magna*), American kestrels (*Falco sparverius*), and northern harriers (*Circus cyaneus*). Canarsie Pier is surrounded by valuable salt marsh habitat. Plum Beach provides important foraging habitat to shorebirds and spawning habitat for horseshoe crabs (*Limulus polyphemus*). The habitat at Plum Beach includes tidal mud flats, low salt marsh areas, a tidal lagoon, and a fragile dune system.

### **Audubon Important Bird Areas (IBA)**

The IBA program identifies, monitors, and protects habitats critical to the success of bird populations (More information about Audubon IBA can be found at: <http://ny.audubon.org/conservation/what-important-bird-area>). Within the project area, the Jamaica Bay complex is a designated important bird area. The habitats present within the complex include the marine and tidal wetland portions of the bay itself as well as the barrier beach/dune system and some adjoining upland shrub and grassland. This IBA is an important site for wintering, breeding, and migrating birds. Observations have been made of black-bellied plovers (*Pluvialis squatarola*), red knots (*Calidris canutus rufa*), piping plovers, laughing gulls (*Leucophaeus atricilla*), roseate terns, common terns, Forster's terns (*Sterna forsteri*), least terns,

black skimmers, brant (*Branta bernicula*), greater scaup (*Aythya marila*), and peregrine falcons (*Falco peregrinus*) (National Audubon Society 2013).

### **New York State Department of State Significant Coastal Fish and Wildlife Habitats**

Jamaica Bay is designated as a New York State Department of State Significant Coastal Fish and Wildlife Habitat. The designated area includes the entire bay, salt marsh, fringing tidal marsh, tidal flats, dredge spoil islands, and adjacent upland areas which include open field, shrub thicket, developing woodlands, and beach grass dune (NYSDOS 1992). The designated habitat is of great significance as one of the largest coastal wetland ecosystems in New York State, the habitat provides nesting and foraging habitat for a number of state listed species (endangered, threatened) and state designated species of special concern including piping plover, common tern, northern harrier, diamondback terrapin (*Maclemys t. terrapin*), upland sandpiper (*Bartramia longicauda*), barn owl (*Tyto alba*), short eared owl (*Asio flammeus*), and grasshopper sparrow; a regionally important recreational fishing and birdwatching site; hosts wintering waterfowl concentration of statewide importance, and hosts the only population of breeding laughing gulls in New York State.

### **New York State Department of Environmental Conservation (NYSDEC) Critical Environmental Area**

The NYSDEC designates Critical Environmental Areas (CEA). In order for a site to be designated as a CEA, it must have an exceptional or unique character with respect to one or more of the following (More information about NYSDEC CEA can be found at <http://www.dec.ny.gov/permits/6184.html>):

- a benefit or threat to human health;
- a natural setting (e.g., fish and wildlife habitat, forest and vegetation, open space, and areas of important aesthetic or scenic quality);
- agricultural, social, cultural, historic, archaeological, recreational, or educational values; or
- an inherent ecological, geological, or hydrological sensitivity to change that may be adversely affected by any change.

Jamaica Bay, including the tributaries, tidal wetlands, and regulated adjacent areas, was designated by the NYSDEC as a CEA in order to protect the ecosystem and the large number of wildlife present within the site.

### **DESCRIPTION OF FISH AND WILDLIFE RESOURCES**

The project area is comprised of a number of habitats found in the marine, terrestrial, and estuarine systems. For the purposes of describing the fish and wildlife resources found within the project area, the communities are identified using "Ecological Communities of New York State Second Edition" (Edinger et al. 2014).

## Marine System

The marine system includes those habitats within the open ocean, the associated coastline, and the shallow coastal bays that are saline because they lack significant freshwater inflow. The limits extend from mean high water seaward, beyond the limits of rooted vascular vegetation (Edinger et al. 2014). For the purposes of this discussion, the marine system includes the offshore borrow area, subtidal, and intertidal habitat found along the shore of the Rockaway Peninsula.

## Invertebrates

The borrow area covering approximately 1,830 acres of subtidal habitat, would provide approximately 17 million cubic yards of suitable beach fill material for the initial construction of the project (Alcoba pers. comm. 2016). Invertebrate resources located within the borrow area are unknown at this time. However, resources identified at other borrow areas include the following species: worms (*Polygordius triestinus*), amphipods (*Gammarus oceanicus*, *Protohaustorius wigleyi*, *P. wigleyi*, and *Amphiporeia gigantea*), polychaete worms (*Magelona rosea*, *Spiophanes bombyx*, *Syllidae spp.*, and *Tharyx acutus*), crustaceans (*Leptochelia savignyi*), sand dollar (*Echinarachnius parma*), small clam (*Tellina agilis*), and surf clam (*Spisula solidissima*) (USACE 1999, USACE 2004).

Invertebrates located within the intertidal habitat are unknown at this time. However, invertebrates identified during surveys within similar habitat found the following dominant species: oligochaeta, nematoda, blue mussel (*Mytilus edulis*), and turbellaria flatworms. Dominant wrack line organisms may include: springtail (*Anurida maritima*), bivalves, amphipod beach fleas (*Talorchestia longicornis* and *orchestia grillus*), and common sea star (*Asterias forbesii*) (USACE 2005).

While it is likely that many of these species may be found within the proposed borrow area site, the Service recommends that the Corps undertake a study to inventory and understand the resources present within the project area. Please provide a copy of this report to the Service.

## Finfish

Common species found in the nearshore and offshore habitats include American sandlance (*Ammodytes americanus*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic croaker (*Micropogonias undulatus*), Atlantic herring (*Clupea harengus*), Atlantic mackerel (*Scomber scombrus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic silverside (*Menidia menidia*), Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), cunner (*Tautoglabrus adspersus*), northern kingfish (*Menticirrhus saxatilis*), spot (*Leiostomas xanthurus*), striped bass (*Morone saxatilis*), summer flounder (*Paralichthys dentatus*), tautog (*Tautoga onitis*), weakfish (*Cynoscion regalis*), windowpane flounder (*Scophthalmus aquosus*), and winter flounder (*Pseudopleuronectes americanus*) (USFWS 1997, Edinger et al. 2014, NYSDEC 2005).

## **Marine Turtles**

Sea turtle species that may be found within the open water of the project area are the Atlantic green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelysis coriacea*), and loggerhead (*Caretta caretta*) sea turtles (USFWS 1997, Edinger 2014).

## **Marine Mammals**

Marine mammals which may be present within the nearshore and offshore habitats include seals, whales, and dolphins. Common species of seal documented within the project area include harbor seal (*Phoca vitulina*) and gray seal (*Halichoerus grypus*). Common whale species observed within the project area include the finback (*Balaenoptera physalus*), minke whale (*B. acutorostrata*), and humpback whale (*Megaptera novaeangliae*) (USFWS 1997, Edinger et al. 2014). Common dolphin species include common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*), white-sided dolphin (*Lagenorhynchus acutus*), striped dolphin (*Stenella coeruleoalba*), and pilot whale (*Globicephala melaena*) (USFWS 1997, Edinger et al. 2014).

## **Avian**

Seabirds commonly observed in the New York Bight that may be present within the project area include coastal or nearshore birds and pelagic birds. Nearshore species include sea ducks, loons, grebes, and gulls; while pelagic species may include shearwaters, petrels, fulmars, gannets, phalaropes, skuas, kittiwakes, jaegers, and auks (USFWS 1997). Information about coastal breeding species including shorebirds and colonial nesting waterbirds can be found within the Terrestrial and Estuarine Systems sections below.

## **Terrestrial System**

The maritime beach, maritime dune, maritime grasslands, and maritime shrubland/forest ecosystems can be found throughout the project area. The maritime beach is a sparsely vegetated habitat above the mean high tide (Edinger et al. 2014). The maritime beach is bordered by the maritime dune or other maritime habitat such as maritime shrubland or maritime forests (Edinger et al. 2014). These beach and dune communities are found along the shore of the Rockaway peninsula and to a limited extent on Coney Island. The maritime forests can be found within the National Park Service Gateway properties on Rockaway Peninsula and the maritime grasslands located at Floyd Bennett Field. The majority of the upland habitat surrounding Jamaica Bay would be characterized as developed/urbanized.

## **Invertebrates**

Invertebrates found within the maritime beach and dune system may include brine fly (*Ephydriidae spp.*), ground beetle (*Clivina spp.*), and beach flea amphipods (*Talorchestia longicornis* and *T. megalophthalma*) (USACE 2005).

## Mammals

Terrestrial mammals found within Jamaica Bay and the surrounding mainland include: black-tailed jackrabbit (*Lepus californicus*), domestic/feral cat, eastern chipmunk (*Tamias striatus*), eastern cottontail rabbit (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), hoary bat (*Lasiurus cinereus*), house mouse (*Mus musculus*), little brown myotis (*Myotis lucifugus*), meadow vole (*Microtus pennsylvanicus*), muskrat (*Ondatra zibethicus*), Norway rat (*Rattus norvegicus*), opossum (*Didelphis virginiana*), raccoon (*Praxon lotor*), red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), and white-footed mouse (*Peromyscus leucopus*) (USFWS 1997, NYC Urban Park Rangers 2015 Final Report, NPS 2007, and Waldman 2008).

## Plants

Common plants found within the maritime beach community include beachgrass (*Ammonophila breviligulata*), sea rocket (*Cakile edentula ssp. edentuala*), seaside atriplex (*Atriplex patula*), seabeach atriplex (*A. arenaria*), seabeach sandwort (*Honckenya peploides*), salsola (*Salsola kali*), seaside spurge (*Chamaesyce polygonifolia*), seabeach knotweed (*Polygonum glaucum*), and seabeach amaranth (*Amaranthus pumilus*) (Edinger et al. 2014).

The maritime dune plant community is comprised of common species such as beachgrass (*Ammonophila breviligulata*), dusty miller (*Artemisia stelleriana*), beach pea (*Lathyrus japonicus* var. *maritimus*), sedge (*Carex silicea*), seaside goldenrod (*Solidago sempervirens*), and sand-rose (*Rosa rugosa*) (Edinger et al. 2014). In stabilized dune plant communities, common species include beach heather (*Hudsonia tomentosa*), bearberry (*Arctostaphylos uva-ursi*), beachgrass, cyperus (*Cyperus polystachyos* var. *macrostachyus*), seaside goldenrod, beach pinweed (*Lechea maritima*), jointweed (*Polygonella articulata*), common evening primrose (*Oenothera biennis*), sand rose, bayberry (*Myrica pensylvanica*), beach plum (*Prunus maritima*), poison ivy (*Toxicodendron radicans*), and the lichens (*Cladonia submitis* and *Centaria arenaria*) (Edinger et al. 2014).

Common plants found within the maritime grasslands include little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), seaside goldenrod (*Solidago sempervirens*) (Waldman 2008), common hairgrass (*Avenella flexuosa*), and poverty grass (*Danthonia spicata*) (Edinger et al. 2008). Other species that may be found within maritime grassland communities include Pennsylvania sedge (*Carex pensylvanica*), rush (*Juncus greenei*), Indian grass (*Sorghastrum nutans*), Atlantic golden aster (*Pityopsis flacata*), bushy rockrose (*Helianthemum dumosum*), hoary frostweed (*H. propinquum*), white-topped aster (*Sericocarpus asteroides*), pussy's-toes (*Antennaria plantaginifolia*), bitter milkwort (*Polygala polygama*), hyssop-leaved boneset (*Eupatorium hyssopifolium*), bayberry, shining sumac (*Rhus copallinum*), and northern dewberry (*Rubus flagellaris*) (Edinger 2014).

Common invasive/non-native plant species found within the terrestrial systems of the project area include common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) (Waldman 2008).

## **Avian**

Beach habitat also provides essential foraging and nesting habitats for nesting shorebirds, including the federally-listed threatened piping plover, endangered roseate tern, and State-listed threatened least tern, common tern, and species of special concern black skimmer. The federally-listed threatened red knot utilizes sandy beaches within the study area as stopover/foraging habitat during spring and fall migrations. However, this species is more concentrated in areas where horseshoe crab eggs and bivalves are available for forage, which is in the bay intertidal habitat discussed more below. Seabeach amaranth is a federally-listed (threatened) plant that grows in this beach habitat. Information about the federally- and state-listed species can be found below. The American oystercatcher is a ground-nesting shorebird which breeds within the ocean beach, dunes, terrestrial upland, bayside beach, and bay island habitats that many federally- and state-listed ground-nesting shorebird species breed in within the study area.

## **Estuarine System**

The estuarine system consists of deepwater tidal habitats, the adjacent tidal wetlands, and the marsh islands (Edinger et al. 2014). The estuarine intertidal extends from the highest tide level to the lowest tide level and includes the salt marshes and intertidal mudflats.

## **Estuarine Intertidal**

### **Salt Marsh**

Salt marshes are among the most productive communities known, providing important ecological services including wildlife habitat, shoreline erosion control, and water column filtration (Waldman 2008). Since the European colonization, approximately 12,000 acres of 16,000 acres of salt marsh has been lost (NYCDEP 2007, USFWS 1997, Waldman 2008). The loss of wetlands is due to a number of factors including: reduced sediment input, shoreline hardening, dredging, sea level rise, nitrogen pollution, and potential grazing by the salt marsh periwinkle (Waldman 2008). Rates of salt marsh loss have been estimated based on the analysis of aerial photographs. Between 1924 and 1974 the rate of loss was approximately 0.4% annually. Since 1974, the rate has increased to 1.4% annually (Hartig et al. 2002 in Waldman 2008).

Salt marsh cordgrass (*Spartina alterniflora*) is the dominant species found within low salt marsh. Dominant species found within the high salt marsh include: salt meadow cordgrass (*Spartina patens*), salt grass (*Distichlis spicata*), black grass (*Juncus gerardii*), glasswort (*Salicornia spp.*), and sea lavender (*Limonium carolinianum*).

## **Brackish and Freshwater Ponds**

Within Jamaica Bay Wildlife Refuge, there are two man-made freshwater ponds: East Pond and West Pond, and small freshwater ponds. The East and West Ponds were constructed and managed as waterfowl habitat. During Hurricane Sandy, the ponds were breached. The East

Pond was repaired by the Transit Authority as part of its efforts to restore train service to the Rockaways shortly after the storm. The National Park Service proposes to return West Pond back to its freshwater state by repairing the breach and the loop path, filling of the pond, and restoring the habitat. Common vegetation found within the emergent freshwater marshes include: pickerelweed (*Pontedaria cordata*), cattail (*Typha spp.*), bullrush (*Scirpus validus*), harbor sedges (*Carex spp.*), rushes (*Juncus spp.*), and water plantain (*Alisma spp.*) (Mack and Feller 1990 in Waldman 2008).

### **Horseshoe Crabs**

Although the draft Environmental Appendix of the Draft Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (GRR/EIS) states on page 4-99 that horseshoe crabs no longer spawn at Plum Beach since the 1990's, spawning has been documented in the eastern limits of Plum Beach, from just west of the comfort station to the eastern limit of the beach as the shoreline turns into Plum Beach Channel as recently as 2013, the most recent data available (Sclafani et al. 2014). Distribution of spawning data collected since 2010 indicates that Plum Beach had a total crabs/square meter value of 6 in 2011 (peak on May 30), 5 in 2012 (peak on May 20), and 7 in 2013 (peak on May 10) (Sclafani et al. 2014).

### **Estuarine Subtidal**

#### **Water Quality**

Jamaica Bay is a 31-square-mile water body with a broader watershed of approximately 142 square miles, which includes portions of Brooklyn, Queens, and Nassau County (NYCDEP 2007). The Bay has experienced extensive modifications to the freshwater and brackish creeks, the filling of salt marshes (approximately 12,000 acres lost), the dredging of the subtidal areas of the Bay (an estimated 125 million cubic yards removed), and modifications to the tidal inlet connections with Atlantic Ocean (NYCDEP 2007).

The majority of the bay's water inputs are primarily from the sewage treatment facilities which contribute between 259-287 million gallons of treated effluent per day (NYCDEP 2007, Waldman 2008). Water quality sampling and modeling show that Jamaica Bay is a eutrophic system, but in spite of this, water quality indicators suggest that the water quality of the bay remains good with the exception of seasonally specific geographic areas (NYCDEP 2007). The bay experiences annual algal blooms, depressed dissolved oxygen levels in select areas, and increased nutrient levels. Jamaica Bay and many of the tributaries are listed on the New York State Department of Environmental Conservation's Section 303(d) List of Impaired/TMDL Waters. The known and suspected sources of pollutants include Combined Sewer Overflows, Municipal discharge from NYC Wastewater Treatment Plants, urban/storm runoff, and other sanitary discharge sources.

#### **Contaminants**

The primary sediments found within the eastern and northern portions of the bay are characterized as muddy fine sand while the areas in the southern and western portions of the bay are characterized as fine to medium sands (USFWS 1997). Contaminants known or thought to

occur within the project area include: polychlorinated biphenyl (PCBs), dioxins, mercury and other heavy metals, pesticides (i.e. DDT) and polycyclic aromatic hydrocarbons (PAHs). Levels of these contaminants have decreased over the last several decades as a result of the passage of the Clean Water Act, the discontinued production of DDT and PCBs in the United States and improved sewage treatment (Steinberg et al. 2004). The Corps (2016b) states that the “contaminations adhere to organic compounds and settle into sediments; now found to exceed acceptable levels throughout the Bay (Steinberg et al. 2004).” However, it appears that Steinberg et al. (2004) indicates that the levels of DDT, mercury, cadmium, silver, dioxin, nickel and lead measured in 1998 are below the effects range-median for each respective contaminant. Other chemicals from wastewater treatment plants discharges, combined sewer overflows, non-point source discharges, chemical and oil spills are also known to occur within the project area. A study by Benotti and Brownawell (2007) identified 15 anthropogenic compounds in Jamaica Bay at least once, including 12 that were identified in most or all of the 24 sites which were surveyed. These compounds included: caffeine, cotinine, nicotine, paraxanthine, acetaminophen, carbamazepine, cimetidine, codeine, diltiazem, ketoprofen, metformin, ranitidine, and salbutamol. The Service believes there is a need for further testing of contaminants within the project area to determine current levels contaminants and to aid in the development of appropriate avoidance and mitigation measures.

### **Aquatic Plants and Algae**

Algae found within the subtidal and intertidal waters include: sea lettuce (*Ulva latuca*), brown kelp/bladderwrack (*Fucus vesiculosus*), cyanobacteria (*Nostoc*), diatom (*Asterionella*, *Flagilaria circular*, *Pseudomonas sp.*, and *Tabellaria sp.*), dinoflagellate (*Ceratium hirundinella* and *Peridinium sp.*), green algae (*Chlorella sp.*, *Chlorella vulgaris*, *Cladophora gromerata*, *Closterium moniliforme*, *Codium fragile*, *Draparnaldia glomerata*, *Enteromorpha intestinalis*, *Enteromorpha linza*, *Microcystis sp.*, *Mougeotia scalaris*, *Protoderma marinum*, *Rhizoclonium riparium*, *Rhodomonas sp.*, *Spirogyra porticalis*, *Ulva lactuca*, and *Volvox aureus*), red algae (*Ceramium sp. 1*, *ceramium sp. 2*, *Chondrus crispus*, *Gracilaria confervoides*, *Gracilaria foliifera*, and *Hildenbrandia prototypus*), and yellow-green algae (*Vaucheria compacta*) (Waldman 2008, NPS 2007).

### **Finfish and Shellfish**

The waters of Jamaica Bay provide important spawning, foraging, and nursery habitat for many finfish and shellfish species. Common species documented in the bay include: winter flounder, summer flounder, windowpane flounder, weakfish, bluefish, scup (*Stenotomus chrysops*), blueback herring (*Alosa aestivalis*), Atlantic cod (*Gadus morhua*), black sea bass, northern kingfish, tautog, Atlantic silversides (*Menidia menidia*), mummichog, striped killifish (*Fundulus majalis*), Atlantic menhaden, bay anchovy (*Anchoa mitchilli*), northern pipefish (*Syngnathus fuscus*), American shad (*Alosa sapidissima*), Atlantic sturgeon, searobin (*Prionotus spp.*), striped bass (*Morone saxatilis*), banded killifish (*Fundulus diaphanus*), cunner, inland silversides (*Menidia beryllina*), striped searobin (*Prionotus evolans*), white mullet (*Mugil curema*), and white perch (*Morone americana*) (NPS 2007, USFWS 1997, NYSDOS 1992).

Small populations of alewife (*Alosa pseudoharengus*) may be found in Hook and Motts Creeks (Waldman 2008). American eel (*Anguilla rostrata*) were once common in Jamaica Bay but has experienced range-wide declines (Haro et al. 2000 in Waldman 2008).

The bay supports shellfish populations of hard clams (*Mercenaria mercenaria*), soft clams (*Mya arenaria*), mussels, and rock crabs (*Cancer irroratus*) (NYSDOS 1992). At one time Jamaica Bay supported a large fishery for oyster (*Crassostrea virginica*), hard clam, softshell clam, and blue crab (*Callinectes sapidus*) (Waldman 2008). However due to threats of disease the fisheries were closed in 1921 (Waldman 2008). Oysters were once an abundant fishery producing upwards of 700,000 bushels of oysters per year at its peak (Grambo and Vega 1984 in Waldman 2008, Franz 1982 in Zarnoch and Schreiber 2012). Due to overfishing, habitat losses from dredging, filling, and pollution have led to a collapse of the fishery (Zarnoch and Schreiber 2012).

### **Avian**

Significant concentrations of wintering waterfowl can be found in Jamaica Bay. Large numbers of greater scaup, American black duck (*Anas rubripes*), brant, Canada goose (*Branta canadensis*), bufflehead (*Bucephala albeola*), canvasback (*Aythya valisneria*), mallard (*Anas platyrhynchos*), ruddy duck (*Oxyura jamaicensis*), red-breasted merganser (*Mergus serrator*), snow goose (*Chen caerulescens*), and American wigeon (*Anas americana*) have been documented since the late 1970's (NYSDOS 1992, USFWS 1997, Waldman 2008). Other species documented within the bay include horned grebe (*Podiceps auritus*), green-winged teal (*Anas crecca*), gadwall (*Anas strepera*), northern shoveler (*Anas clypeata*), and common goldeneye (*Bucephala clangula*) (USFWS 1997).

### **Reptiles**

Reptiles which may be found within Jamaica Bay include kemp's ridley, Atlantic green, loggerhead, and leatherback sea turtles and diamondback terrapin (USFWS 1997, and Waldman 2008).

### **Mammals**

Marine mammals that have been observed within the bay include bottlenose dolphin and harbor seal (Waldman 2008).

### **Jamaica Bay Marsh Islands**

The bay islands have many of the above described communities present, typically including low marsh, high marsh, and terrestrial uplands. Although many of the islands are man-made from dredge material placement, they provide important breeding habitat for shorebirds (tern colonies) and wading birds (heron rookeries).

## Insects, Moths, and Butterflies

The bay is located along the migration route of the monarch butterfly (*Danaus plexippus*) (Brower 2004 in Waldman 2008) and provides habitat for a number of insects, skippers, and butterflies including several regionally and state rare species: Appalachian azure (*Celastrina neglectamajor*), tawny emperor (*Asterocampa clyton*), white-m hairstreak (*Parrhasius m-album*), and checkered white butterfly (*Pontia protodice*). Additional information about the insects can be obtained in NPS (2007).

## Avian

The islands found within Jamaica Bay provide habitat for a number of nesting birds including: common terns, American oystercatcher, black skimmer (NYSDOS 1992), killdeer, spotted sandpiper (*Actitis macularia*), greater yellowlegs (*Tringa melanoleuca*), and ruddy turnstone (*Arenaria interpres*) (Waldman 2008).

The Islands also support a number of nesting wading birds including black-crowned night heron (*Nycticorax nycticorax*), green-back heron (*Butorides virescens*), yellow crowned night heron (*Nyctanassa violacea*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), and glossy ibis (*Plegadis falcinellus*) (NYSDOS 1992). For the last 31 years, New York City Audubon has been surveying select islands and mainland sites in the New York and New Jersey area for wading birds including herons, egrets and ibis, cormorants, gulls, and terns. During the 2015 survey of Elders Point East, Little Egg Marsh, Subway Island, and Canarsie Poll the following species were observed breeding: snowy egret, black-crowned night heron, great egret, glossy ibis, little blue heron, and tricolored heron (*Egretta tricolor*) (Winston 2015). Other species observed during the surveys include: double-crested cormorants (*Phalacrocorax auritus*), herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), laughing gull, clapper rail (*Rallus crepitans*), American oystercatcher, least sandpiper (*Calidris minutilla*), fish crow (*Corvus ossifragus*), red-winged blackbird (*Agelaius phoeniceus*), Canada goose, mallard, willet (*Tringa semipalmata*), ruddy turnstone, Forster's tern, gray catbird, song sparrow (*Melospiza melodia*), boat-tailed grackle (*Quiscalus major*), brant, dunlin (*Calidris alpina*), short-billed dowitcher (*Limnodromus griseus*), semipalmated sandpiper (*Calidris pusilla*), European starling (*Sturnus vulgaris*), spotted sandpiper, osprey, and northern harrier.

## Reptiles and Amphibians

Common species of reptiles and amphibians found within Jamaica Bay include: common garter snake (*Thamnophis sauritus sauritus*), diamondback terrapin (*Maclemys t. terrapin*), eastern box turtle (*Terrapene c. carolina*), eastern garter snake (*Thamnophis sauritus*), eastern hognose snake (*Heterodon platirhinos*), eastern milk snake (*Lampropeltis triangulum triangulum*), eastern painted turtle (*Chrysemys p. picta*), Fowler's toad (*Bufo woodhousii fowleri*), gray treefrog (*Hyla versicolor*), green frog (*Rana clamitans*), northern black racer (*Coluber c. constrictor*), northern brown snake (*Storeria d. dekayi*), painted turtle (*Chrysemys picta*), redback salamander (*Plethodon cinereus*), red-spotted newt (*Notophthalmus viridescens*), smooth green snake

(*Opheodrys vernalis*), snapping turtle (*Chelydra serpentina*), spotted salamander (*Ambystoma maculatum*), and spring peeper (*Pseudacris crucifer*) ( USFWS 1997, NPS 2007).

Prior to Hurricane Sandy, diamondback terrapin had been documented nesting at three sites within Jamaica Bay. After Hurricane Sandy modified the nesting habitat within the bay, Rodriquez (2006) documented diamondback terrapin nesting in new locations and an absence of nesting in previously documented locations.

## **Mammals**

Mammals found within the Bay islands include those terrestrial mammals summarized in the Terrestrial System described above.

## **Cultural Systems**

Contrasting the natural habitats, there is a number of ‘cultural systems’ present within the project area. Edinger et al. (2014) describes cultural communities as those communities created and maintained by human activities, or modified by human influence, to such a degree that the physical conformation of the substrate, or the biological composition of the resident community, is substantially different from the character of the substrate or community as it existed prior to human influence. Cultural communities present in the project area may include: Marine Submerged Artificial Structure/Reef, Marine Dredge Spoil Shore, Marine Riprap/Artificial Shore, Marine Dredge Excavation Pit/Channel, Mowed lawn, Railroad, Paved road/path, Maritime dredge spoil islands, Landfill/dump, and urban structure exterior. Urban development and alterations associated with the above mentioned systems change the form and function of the pre-existing habitats, ultimately restricting the ecosystem services, limiting habitat availability and habitat quality.

## **Federally- and State-listed Species**

Within the study area, the piping plover (federally-listed) and least tern (state-listed) nest in marine beach and maritime dune habitats along the ocean shoreline. Plovers forage on invertebrates primarily along the ocean and bay shorelines, while the least tern forages for fish in ocean and bay open waters. The roseate (federally-listed) and common terns (federally-listed) and black skimmers (state – Special Concern) breed on maritime beach/dune habitats and forage for fish in ocean and bay open waters. Common terns and black skimmers nest within the project area. Roseate terns had historically nested within the project area but not within the last 5 years.

These species grow/breed at three locations within the study area’s Atlantic Ocean shoreline: NYC Parks’ Arverne beaches (B19th street- B59th street); National Park Service’s GNRA parcels (Jacob Riis, Fort Tilden, and Breezy Point); and Breezy Point Cooperative (private beach community from B201-B222 streets). A summary of population trends over the last 5 years for piping plover and seabeach amaranth that breed/grow within each of these locations within the study area are listed as follows (NYSDEC Long Island Colonial Waterbird and Piping Plover Data 2011-2015, 2016 data not yet available at the time of the preparation of this document):

Year	NYC Park's Arverne Beaches		NPS's GNRA Beaches		Breezy Point Cooperative	
	Piping Plover pairs	Seabeach amaranth plant #'s	Piping Plover pairs	Seabeach amaranth plant #'s	Piping Plover pairs	Seabeach amaranth plant #'s
2015	16	166	20	78	8	279
2014	12	45	19	54	7	73
2013	11	17	16	42	10	166
2012	15	78	18	88	15	625
2011	10	467	15	161	10	1,015

Limiting factors in shorebird productivity include disturbances from recreational activities, flooding/inundation of nests, predation, beach stabilization practices, and loss of habitat from development. Limiting factors in seabeach amaranth growth include trampling from off-road vehicles and/or pedestrians, loss of habitat from development, beach stabilization practices which promote dense beach grass growth, burial of seed banks, and competition with perennial plants as beach habitat is stabilized (USFWS 1996).

### **Description of Alternatives**

The Corps is proposing the following components for the Tentatively Selected Plan (which is identified by the Corps as the plan likely to become the recommended plan) and Action Alternative. The Corps has identified two separate planning reaches: the Atlantic Ocean Shorefront Planning Reach and the Jamaica Bay Planning Reach.

### **Description of the Tentatively Selected Plan (TSP)**

#### **Atlantic Ocean Shorefront Planning Reach**

The Atlantic Ocean shorefront planning reach includes the following components: a reinforced dune (composite seawall), beach nourishment with a 4-year renourishment cycle, the extension of 5 existing groins, and construction of 13 new groins. Sand will be obtained from a borrow area located approximately 2 miles south of the Rockaway Peninsula and about 6 miles east of the Rockaway Inlet.

## Jamaica Bay Planning Reach

The Corps has provided two alignments/alternatives for the TSP. Alignment/Alternative C1-E and C2 are described below in brief. A more detailed description of the alignment/alternatives can be found in the Corps' Draft GRR and Enclosure 1. Enclosure 1 is an unpublished document the Corps provided to the Service for the purposes of this coordination.

### Storm Surge Barrier

The Corps has proposed two alignments for the storm surge barrier, alignment C-2 and C-1E as seen in Figure 2. The Corps stated in the GRR that C-1E would be preferred over C-1W as C-1E “would likely result in less impact to the Gil Hodges Memorial Bridge; would result in less real estate and aesthetic impacts to the Roxbury Community where alignment C-1W would tie in; is located in a more stable channel location; and avoids potential impacts to submerged cables” (Corps 2016a). C-1E would require a 3,970-foot storm surge barrier across Rockaway Inlet from near Jacob Riis Park to Floyd Bennet Field while C-2 would require a 5,715-foot storm surge barrier across Rockaway Inlet from Breezy Point to Sheepshead Bay/Kingsborough Community College.

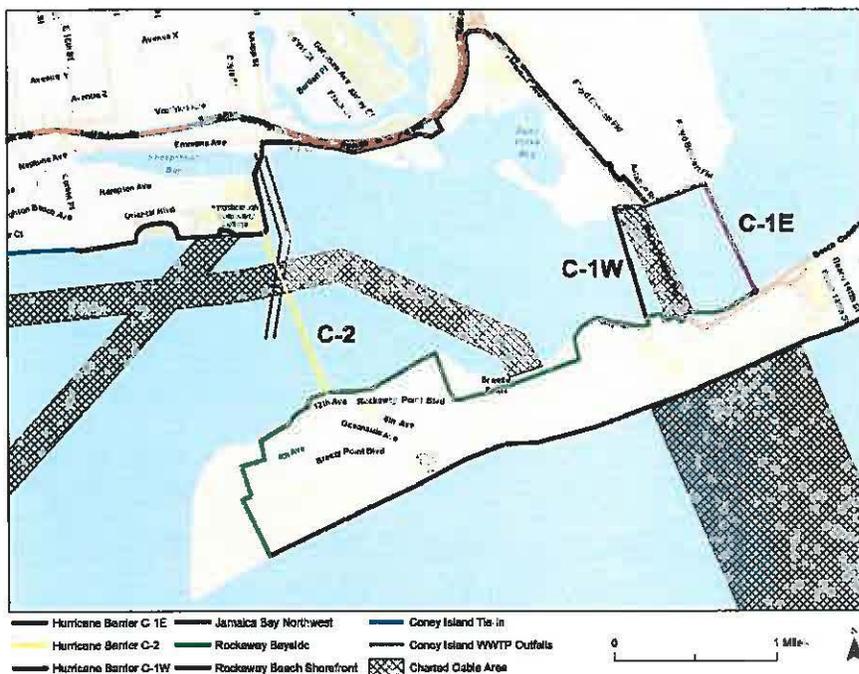


Figure 2: Depiction of the storm surge barrier alignments.

### Alignment/Alternative C1-E

Based on the selection of the storm surge barrier alignment C-1E, the following components are proposed for the remaining shoreline of the Jamaica Bay Planning Unit: reinforced dune, levee, concrete floodwalls, sector gates, elevated promenades (berm faced and vertical faced), seawall reconstruction, and the Coney Island tie-in (Figure 3).

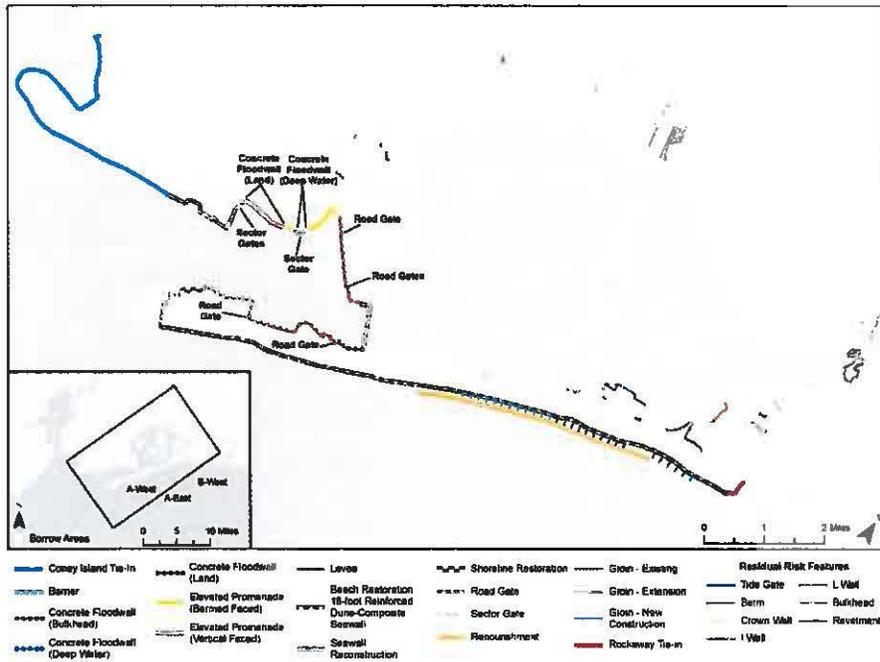


Figure 3: Depiction of the TSP with storm surge barrier alignment C-1E.

### Alignment/Alternative C2

Based on the selection of the storm surge barrier alignment C-2, the following components are proposed for the remaining shoreline of the Jamaica Bay Planning Unit: reinforced dune, levee, seawall reconstruction and the Coney Island tie-in.

### Description of the Action Alternative

The action alternative, also referred to as the Perimeter Plan, includes the optimized plan for the Atlantic Shoreline Planning Reach, two tie-ins (Coney Island and Rockaway Shorefront eastern tie-in), and the Jamaica Bay Northwest, Head of Bay, and Rockaway Bayside Coastal Storm Risk Management units. These units contain the following components: floodgates, roadway floodgates, railroad floodgate, the construction of vertical living shorelines, land-based floodwall, rip rap and a shallow foundation sheet pile or T-wall core, and roadway/beach access gates (Figure 4).



Figure 4: Depiction of the Action Alternative.

## PRELIMINARY DESCRIPTION OF IMPACTS ON FISH AND WILDLIFE RESOURCES

The proposed action has the potential to directly and indirectly adversely impact fish and wildlife resources within the project area and the condition of Jamaica Bay and Rockaway Peninsula, resulting from the Corps' proposed project. Preliminary anticipated impacts are summarized below. The Service will conduct a full impact analysis and present it in the Draft FWCA report.

Direct impacts include: Loss and habitat modification of the habitats present within the project area including the offshore borrow area, intertidal mudflats, intertidal marshes, and maritime beach and maritime dunes; the burial of marine intertidal and marine beach invertebrate species and temporal modification of intertidal, and marine habitats; the temporary increase in turbidity and sedimentation of offshore, intertidal and estuarine habitats; and alteration/modification of hydrological regime within Jamaica Bay.

Indirect impacts include: decreases in habitat values for federally and state-listed plant and animal species; alteration/modification to the sediment budget; accelerated vegetative succession on barrier island; decreased biodiversity at the community level; development of habitat preferred by mammalian and avian predators; and reduced habitat values for waterfowl and migratory shorebirds.

## RECOMMENDATIONS

As the Service conducts the impact analysis, we will develop a recommended, comprehensive mitigation plan with measures to avoid, minimize, and mitigate project impacts. In the interim, the Service provides preliminary avoidance, minimization, and mitigation measures listed as follows:

- Incorporate time of year restrictions into the construction timeline. Time-of-year restrictions should apply to both the initial beach fill and the renourishment cycles. The Service recommends a time of year restriction during which no work should be conducted between April 1 and September 30 to avoid adverse impacts to nesting shorebirds, spawning finfish, essential fish habitat, horseshoe crabs, and nesting diamondback terrapins. Additional restrictions for winter flounder should be included from January 15 to May 15. The Service will provide additional recommended restrictions for the Atlantic Shorefront Planning Reach and Jamaica Bay Planning Reach for migratory birds (including red knot), winter flounder, spawning fish, spawning horseshoe crabs, nesting diamondback terrapins and migrating anadromous/catadromous fish upon completion of surveys and/or description of proposed project components.
- Evaluate alternatives with less shore hardening components and/or incorporate natural and hybrid (natural and built) infrastructure into the project design. Traditional shoreline stabilization methods, or hard structures, result in adverse modification to natural resources: reduced or degraded habitat for breeding, spawning, nesting, feeding, growing; impaired movement of organisms between aquatic and terrestrial habitat; altered physical structure of the water's edge, with resultant changes to hydrology; increased infestation of invasive plants; local changes in water quality, including changes to temperature and increases in turbidity, nutrients and contaminants; and increased erosion of the adjacent natural shorelines and scouring in front of the structure (NYSDEC 2016). The last of the five principal planning objectives identified by the Corps is to “enhance natural storm surge buffers, also known as natural and nature-based features (NNBFs), and improve coastal resilience.” As identified by Sutton-Grier et al. (2015) and Cunniff and Schwartz (2015), the various infrastructures types (natural, built and hybrid) and nature-based measures have different strengths and weaknesses that may be combined to maximize the strengths and minimize the weaknesses of each type. The Coastal Green Infrastructure Research Plan for NYC identifies 6 coastal green infrastructure (CGI) strategies relevant in NYC Coastal Areas (Zhou et al. 2014): constructed wetlands and maritime forests; constructed reefs; constructed breakwater islands; channel shallowing; ecologically-enhanced bulkheads and revetments; and living shorelines (sill-type).
- Restore natural areas (wetlands and uplands) within the project area by promoting native species and managing/eliminating invasive species; restore shorebird and colonial waterbird habitat, and construct diamondback terrapin nesting mounds.
- There are numerous efforts to improve the water quality within Jamaica Bay. The Corps should explore opportunities to partner with local municipalities and state agencies to improve bay water quality through improved storm-water treatment, removal of floatables and improve flushing in tributaries and canals.
- Incorporate best management practices (BMPs) during construction to minimize sedimentation and turbidity.
- With respect to the offshore borrow area, the following measures are recommended: all offshore dredging activities should be coordinated with the National Marine Fisheries

Service in order to coordinate protection of resources under their jurisdiction; exposing and impacting various sediment types during dredging should be avoided, maintaining the same sediment type at the borrow area would increase the probability that the same pre-dredging benthic assemblage will re-establish after dredging, producing deep, steep-sided pits with little to no water circulation that may lead to silt and organic matter accumulation and hypoxic or anoxic conditions, should be avoided while broad, shallow pits with gently sloping sides are less likely to exhibit these effects; and leave as many untouched “islands” in the borrow area as possible to facilitate benthic invertebrate recovery (Rice 2009)

- During beach nourishment, beach fill material must be compatible, similar in color and grain size distribution with the native sediment on the existing beach. During the initial construction and after each renourishment cycle, the Corps should ensure that the beach is graded at a gentle uniform slope with no piles, ridges, or holes left in the final graded beach placement materials. Additional BMPs for dune nourishment proposed by Rice (2009) include: designing non-uniform berm height to allow waves, tides and overwash to penetrate the beach to varying degrees to create a diversity of topographical microhabitats; staging of heavy equipment and pipes should occur off the beach where possible; and renourishment episodes should not occur before the ecosystem has recovered from the previous episode to prevent permanent perturbations to the system.
- If the dunes are to be planted with vegetation, the Corps should consult with the Service on other native plant species that can be incorporated into the planting scheme in order to increase plant diversity and heterogeneity in the proposed project area. Plants should consist of native species that reflect the local plant communities for the appropriate planting zone (e.g., foredune, dune face, dune crest, back of dune) (Rice 2009).
- The Service recommends the Corps develop an adaptive management plan and post-construction monitoring protocols.

The Service is in the process of refining and further developing more specific information/recommendations and invites the Corps to coordinate with the Service in this regard.

### **Corps Proposed Mitigation Measures/Best Management Practices**

The Corps carried out the following evaluations to quantify environmental impacts: “Permanent and temporary impacts using an acreage metric. This provides a traditional measure of mitigation needs, and does not account for the level of ecological service and/or functions provided by the habitat types; and Evaluation for Planned Wetlands (EPW) was paired with a Benthic Index of Biological Integrity (B-IBI) to evaluate impacts to ecological functioning within coastal wetlands in in-water habitats.” The GRR states that the TSP with alignment C-1E would temporarily impact 128.9 acres and permanently impact 129.7 acres. The TSP with alignment C-2 would temporarily impact 86.2 acres and permanently impact 62.2 acres. The action alternative would temporarily impact 249.1 acres and permanently impact 247 acres (Corps 2016a).

In order to mitigate these impacts, the Corps proposed the following mitigation project in addition to the proposed use of BMPs for sedimentation:

*“Constructing the Dead Horse Bay and Duck Point projects are recommended as mitigation for Alternative C-2. Proposed mitigation for Alternative C-2 would provide 202 acres of habitat, which is an increase of 134 acres more than the existing condition. The mitigation requirements for Alternative C-1E are satisfied by a combination of constructing the Floyd Bennett Field Wetlands Habitat Creation project and the Elders Island project. Proposed mitigation for Alternative C-1E would provide 247 acres of habitat, which is an increase of 93 acres more than the existing condition. The combination of the Dead Horse Bay project and the Floyd Bennett Field Wetlands Habitat Creation project satisfies the mitigation requirements for the Perimeter Plan. Proposed mitigation for the Perimeter Plan would provide 341 acres of habitat, which is an increase of 227 acres more than the existing condition.”*

The Service requests a description of ecological modeling used to determine the acreage of impacted habitat, the quantity of each habitat impacted, a description of the proposed mitigation plan and engineering drawings of the above mentioned mitigation projects. Additionally, the Service requests a description of the measures the Corps proposes to incorporate into the project plan to avoid minimize and mitigate project related impacts.

## **STUDY NEEDS AND REQUEST FOR MORE INFORMATION**

The Corps (2016a) states that the “most current available data were used for environmental analyses of the study area, augmented by field visits to the study areas and reviews of habitat classification using the most recent aerial photographs.” The Service has provided updated information regarding species presence and distribution based on annual monitoring of nesting shorebirds, monitoring efforts conducted by New York City Audubon for long-legged wading birds, and from the National Park Service Bioblitz effort. However, available information regarding the presence, abundance, and distribution of species in the project area for many of the natural resources in the project area are outdated or were unavailable. In order for the Corps and the Service to better assess the project related impacts, the Service recommends that the Corps review recent/ongoing surveys/studies being conducted by federal, state, local and non-profit agencies, or conduct their own studies to determine species presence, abundance, and distribution for the following resources within the project area:

- The Service recommends surveys to determine the invertebrates located within the borrow area, the intertidal and upper beach habitats including shellfish. Additional surveys expanding on the survey efforts of NPS, NYC Audubon and Cornell Cooperative Extension to understand the distribution of spawning horseshoe crabs in order to understand how the construction of seawalls and bulkheads will affect these spawning sites.
- The information the Service provided regarding finfish was attained from NPS (2007), USFWS (1997), NYSDOS (1992). The most recent effort, carried out by NPS (2007), is nearly 10 years old and the effort was limited to Fort Tilden, Floyd Bennet Field and Jamaica Bay Refuge. The surveys which informed NYSDOS (1992) were conducted in 1974, 1983, and 1985. Surveys to identify the species present within the project area and

distribution should be undertaken. Both alewife and American eel have been documented within the project area and based on distribution may indicate opportunities to enhance habitat for these anadromous species.

- The Service has provided recent information for nesting shorebirds and long-legged wading birds that has been collected by the respective managers of the ocean front and Jamaica Bay Marsh islands. Surveys to determine the presence and distribution of red knots during the spring and fall migration should be undertaken throughout the project area.
- As discussed above, the nesting distribution of diamondback terrapins was altered after Hurricane Sandy. The Service recommends surveys to identify nesting locations of diamondback terrapin.

Additional testing for contaminants should be pursued in order to delineate contaminated sediments and identify appropriate avoidance and mitigation recommendations.

In June of 2016, the Corps provided the engineering drawings for Reaches 3-6 of the Atlantic Shoreline Planning Reach. The Corps should provide the Service with engineering drawings for the remaining reaches (1 and 2) in the Atlantic Shoreline Project Planning Reach and Jamaica Bay Planning Reach.

## **Conclusion**

The project area comprised of marine, terrestrial, and estuarine habitats provides habitat to over 214 species of special emphasis and listed species, 48 species of fish, and 120 species of birds year round and seasonally. The habitats within the project area have been identified as significant by the Service, the New York State Department of State, NYSDEC, and the National Audubon Society. The Service has summarized species that may be found within each habitat. Many of these species are federally- and/or state-listed species and species of concern. Due to the potential for the proposed project to affect federally-listed species that are known to, or that may, occur within the vicinity of the proposed project, the Service recommends that the Corps initiate consultation in accordance with Section 7 of the Endangered Species Act.

The proposed action has the potential to affect a number of the species found within the project area as a result of modification and loss of important spawning, breeding, nursery, and foraging habitat. The Service recommends that the Corps review recent surveys/studies (federal, state, and local agencies) and/or conduct their own studies to determine species presence, abundance, distribution, and potential project impacts as discussed above. The Service also recommends that the Corps consider carrying out contaminant tests. The Service is available to coordinate on these efforts and provide further guidance on what surveys/studies should be conducted.

The Service has requested the following additional information:

- anticipated impact to the hydrological regime within Jamaica Bay from construction of, and the operation of the storm surge barrier;
- a sediment budget for the maritime beach/dune system as well as for Jamaica Bay

- the engineering drawings for the Jamaica Bay Planning Reach, reaches 1 and 2 for the Atlantic Shorefront Planning Reach, and the proposed mitigation projects;
- a description of ecological modeling used to determine the acreage of impacted habitat, the quantity of each habitat impacted, a description of the proposed mitigation plan.

The Service has provided a preliminary list of anticipated impacts, but will provide a more comprehensive analysis upon receipt of the information requested above. Additionally, the Service has provided a preliminary list of mitigation measures that have been recommended for similar projects. Upon completion of the impact analysis, the Service will provide a comprehensive list of recommended avoidance, minimization, and mitigation measures.

The Service appreciates the opportunity to coordinate with the Corps on this study. We look forward to coordinating with the Corps as they further develop this project. If you have any questions or require additional information, please contact Terra Willi of the Long Island Field Office at 631-286-0485.

Sincerely,



*ACTION  
FOR*

David A. Stillwell  
Field Supervisor

Enclosure

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## ROCKAWAY AND JAMAICA BAY HSGRR 2016 TENTATIVELY SELECTED PLAN DESCRIPTION

The tentatively selected HSGRR Coastal Storm Risk Management 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) a line of protection along Jamaica Bay and Rockaway Inlet with a storm surge barrier at one of two identified currently identified locations, i.e. plan C1-E and C2; and 3) residual risk features in locations surrounding Jamaica Bay. Twenty-six (26) project residual risk feature locations have been identified for which five (5) have detail available at this time. In general, these features are intended to provide a design height of +6 ft NAVD through various methods to reduce frequent flooding. As additional residual risk features are further developed, additional NEPA documentation and resource agency coordination would be provided. This TSP 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.

If plan C1-E is selected for the barrier:

The TSP extends along approximately 152,000 linear feet of project area extending from the eastern end of the Rockaway peninsula at Inwood, Nassau County to the western end of the Rockaway peninsula, at Breezy Point, Queens, where the plan wraps around the existing shoreline past the Gil Hodges Memorial Bridge. Near Jacob Riis Park a storm surge barrier crosses Rockaway Inlet landing at Floyd Bennet Field, Brooklyn. The plan continues up Flatbush Avenue before turning west along the existing shoreline and continuing west until Norton Point. From Norton Point, the line of protection continues on the north side of Coney Island, crossing Coney Island Creek. From Coney Island Creek it continues north along the shoreline to high ground.

If the plan C2 is selected for the barrier:

The TSP extends approximately 111,800 linear feet of project area extending from the eastern end of the Rockaway peninsula at Inwood, Nassau County to the western end of the Rockaway peninsula, at Breezy Point, Queens, where the plan wraps around the existing shoreline. A storm surge barrier crosses Rockaway Inlet from Breezy Point to Sheepshead Bay/Kingsborough Community College, Brooklyn. The plan continues west until Norton Point. From Norton Point, the line of protection continues on the north side of Coney Island, crossing Coney Island Creek. From Coney Island Creek it continues north along the shoreline to high ground.

The plan along the Atlantic Ocean Shorefront consists of:

- A reinforced dune (composite seawall) with a structure crest elevation of +17 feet (NAVD88) and dune elevation of +18 feet (NAVD88), and a design berm width of 60 feet extending approximately 35,000 LF from Beach 9<sup>th</sup> to Beach 149<sup>th</sup>. The bottom of dune reinforcement extends up to 15 feet below the dune crest.
- A beach berm elevation of +8 ft NAVD and a depth of closure of -25 ft NAVD;
- A total beach fill quantity of approximately 804,000 cy for the initial placement, including tolerance, overfill and advanced nourishment with a 4-year renourishment cycle of approximately 1,021,000 cy, resulting in an advance berm width of 60 feet;
- Obtaining sand from borrow area located approximately 2 miles south of the Rockaway Peninsula and about 6 miles east of the Rockaway Inlet. It is about 2.6 miles long, and 1.1 miles wide, with depths of 36 to 58 feet and contains approximately 17 million cy of suitable beach fill material, which exceeds the required initial fill and all periodic renourishment fill operations.
- Extension of 5 existing groins; and  
Construction of 13 new groins.

If the C1-E plan is selected, the alignment along Jamaica Bay and Rockaway Inlet consists of:

- Reinforced Dune along the shoreline in Reaches 1 and 2 of the Atlantic Coast Planning Reach, from Beach 149<sup>th</sup> to Breezy Point.

- Levee and from approximately B227th St. north overland across Breezy Point, thence eastward from B222nd St. to B201st St. Approximately 450,000 cy of sediment required for levee construction.
- Concrete floodwall south along B201st St. extending east along north side of Rockaway Blvd to B184th St., thence north to existing shoreline. Concrete floodwall continues east to storm surge barrier approximately 2300 ft. east of the Gil Hodges Memorial Bridge/Marine Parkway Bridge.
- A 3,970-foot storm surge barrier across Rockaway Inlet from near Jacob Riis Park to Floyd Bennet Field;
- A concrete floodwall on land running north along Flatbush Avenue towards the Belt Parkway;
- A berm-faced elevated promenade running west along the waterside of the Belt Parkway to a concrete floodwall at Gerritsen Inlet;
- A sector gate across Gerritsen Inlet, which ties in to a concrete floodwall;
- Elevated promenades (berm faced and vertical faced) extend from Gerritsen Inlet around Plumb Beach westward to the inlet at Sheepshead Bay;
- A sector gate across Sheepshead Bay
- Seawall reconstruction around the eastern end of Coney Island at Kingsborough Community College;
- A reinforced dune across sandy beach at Kingsborough Community College/Oriental and Manhattan Beach, and
- Seawall reconstruction from Manhattan Beach to approximately Corbin Place,
- The Coney Island tie-in, where the line of protection continues west until Norton Point. From Norton Point, the line of protection continues on the north side of Coney Island, crossing Coney Island Creek. From Coney Island Creek it continues north along the shoreline to high ground.

If the C2 plan is selected, the alignment along Jamaica Bay and Rockaway Inlet consists of:

- Reinforced Dune along the shoreline in Reaches 1 and 2 of the Atlantic Coast Planning Reach, from Beach 149<sup>th</sup> to Breezy Point.
- Levee from approximately B227th St. north overland across Breezy Point, to approximately B218th St.
- A 5,715-foot storm surge barrier across Rockaway Inlet from Breezy Point to Sheepshead Bay/Kingsborough Community College;
- Seawall reconstruction from the base of the surge barrier at Sheepshead Bay/Kingsborough Community College to Kingsborough College/Oriental Beach;
- A reinforced dune across sandy beach at Kingsborough Community College/Oriental and Manhattan Beach, and
- Seawall reconstruction from Manhattan Beach to approximately Corbin Place,
- The Coney Island tie-in, where the line of protection continues west until Norton Point. From Norton Point, the line of protection continues on the north side of Coney Island, crossing Coney Island Creek. From Coney Island Creek it continues north along the shoreline to high ground.

The plan for the 5 residual risk feature project areas currently identified (of up to 26 residual risk features) consists of:

**1) Edgemere - contains 2 features (berm and bulkhead) in an area with an existing ground elevation of +4 ft. NAVD, with a design height of +6 ft. NAVD)**

- A berm with one section that is approximately 225' long from intersection of northern portion of Conch Place terminating at Norton Ave and Beach 45th Street,
- A second berm section approximately 3400' long along the eastern shore approximately at Beach 43rd St. extending along the shoreline terminating roughly at the northern corner of beach 35th St.
- A bulkhead approximately 600' from terminus of Beach 44th St. around northern tip of point, to eastern shore approximately at Beach 43rd St.

**2) Norton Basin - contains 2 features (bulkhead and I-wall) in an area with an existing ground elevation of +4 ft NAVD, with a design height of +6 ft NAVD)**

- A bulkhead approximately 200' from the intersection between Norton Drive and Coldspring Rd, extending parallel to Norton Drive along the shoreline.
- An I-Wall from the eastern end of the bulkhead along Norton Drive and north on Westbourne Ave, terminating at intersection with Dunbar St. with a length of 2070 ft.

**3) Mott Basin - contains 2 features (berm and bulkhead) in an area with an existing ground elevation of +4 ft NAVD, with a design height of +6 ft NAVD)**

- A berm section beginning near the northern end of Eggert Pl. running along the shoreline, extending inland to terminus of McBride St. and along Battery road and Pinson St., terminating roughly at intersection between Horton Ave. and Pinson St. with a length: 1360 ft.
- A bulkhead extending from a location approximately 80' from terminus of Dickens St. parallel to Enright road, then running northward parallel to and on the nearest side to Peari Street and terminating at the shoreline.

**4) Brookville Boulevard - contains 2 features (road raising and two sections of I-wall) in an area with an existing ground elevation of +4 ft NAVD, with a design height ranging from +5.5 ft NAVD to +6 ft NAVD)**

- A road raising segment approximately 2800' long, along Brookville Boulevard, starting from a location approximately 200' north of intersection with Rockaway Boulevard extending northward terminating at Brookville Boulevard and 149th Ave.
- An I-Wall western segment, which is approximately 410' long starting at 231-08 148th Ave and running north, past end of 148th Ave along high ground to 147-51 231st St.
- An I-Wall western segment, which is approximately 1090 ft. long starting at 148-74 Brookville Blvd and running northward along high ground at rear of properties until northern terminus at 148-99 235th St.

**5) Canarsie contains 1 feature (revetment) in an area with an existing ground elevation of +4 ft NAVD, with a design height of +6 ft NAVD)**

- A revetment extending approximately 240' from intersection between E 108th St. and Flatlands 1st St. and extending along the shoreline a length of 410 ft.