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**CLEAN WATER ACT SECTION 404(b)(1)  
EVALUATION  
APPENDIX**

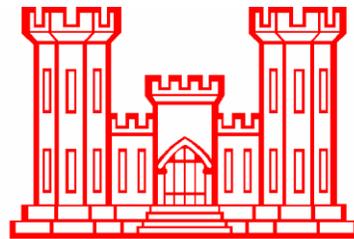
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**NASSAU COUNTY BACK BAYS  
COASTAL STORM RISK MANAGEMENT  
FEASIBILITY STUDY**

**PHILADELPHIA, PENNSYLVANIA**

**APPENDIX G5**

**August 2021**



**U.S. Army Corps of Engineers  
Philadelphia District**

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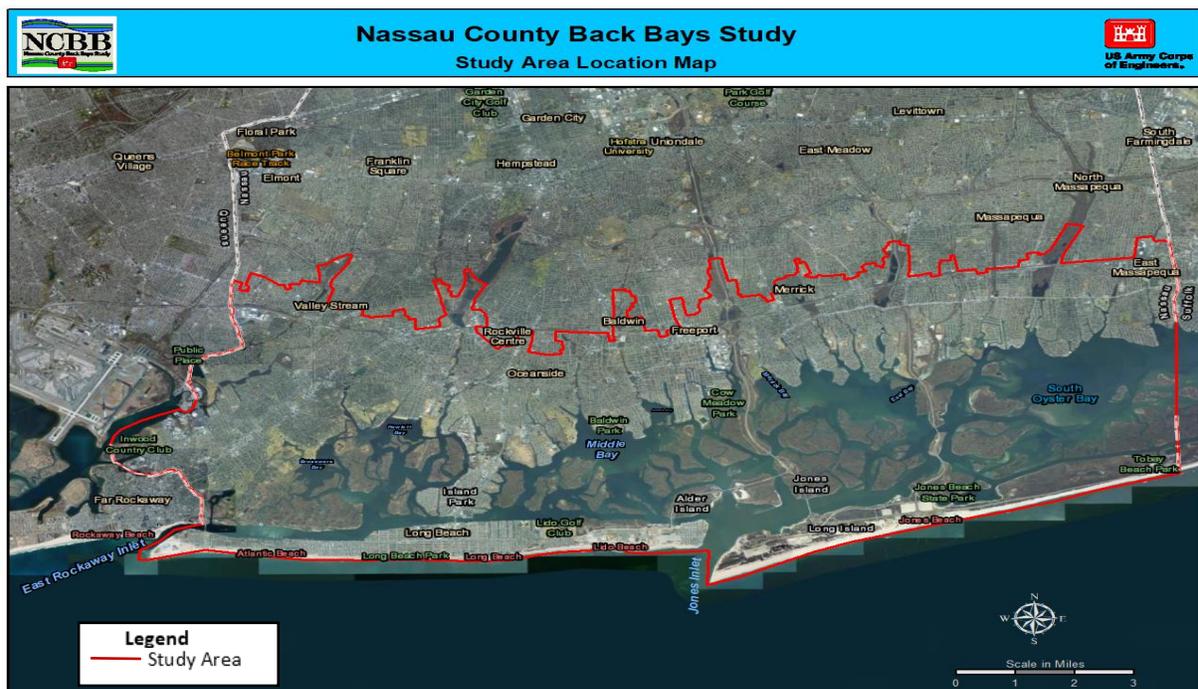
## 1.0 Project Description

### 1.1 Location

The study area covers Nassau County (east to west) along the south shore of Long Island, directly east of New York City (Figure 1 - ). The study area encompasses the areas that are tidally influenced bays and estuaries, hydraulically connected to the south shore of Nassau County on the Atlantic Ocean. Specifically, the towns within the study area in Nassau County include East Massapequa, Long Beach, Bellmore, Oceanside, East Rockaway, Massapequa, Atlantic Beach, Merrick, Island Park, Lynbrook, Seaford, Lido Beach, Freeport, Rockville Center, Hewlett, Jones Beach, Wantagh, Baldwin, West Hempstead, Woodmere, Cedarhurst, Lawrence, Far Rockaway, Inwood, Valley Stream, and West Hempstead. The back bay area of Nassau County has hydraulic connections to areas to the west in Queens County, NY, and Suffolk County NY to the east. 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 (USACE 2015).

The study area is located in the Atlantic Coastal Plain Physiographic Province (Pickman 1993). Topography is low-lying, flat terrain with elevations less than 100 feet above Mean Sea Level (MSL), but primarily less than 20 ft above MSL. Dominant landforms consist of shallow brackish lagoons and low relief sandy barrier islands and associated dunes.

The action area included in this assessment is defined as all areas that may be affected directly or indirectly by the Federal action and not limited to merely the immediate area of the study area. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action.



## 1.2 General Description

The Atlantic Coast of New York is fronted by an effective Federal Coastal Storm Risk Management (CSRM) program (USACE, 2013). However, the Nassau County Back Bays (NCBB) region currently lacks a comprehensive CSRM program. As a result, the NCBB region experienced major impacts and devastation during Hurricane Sandy and subsequent coastal events thus damaging property and disrupting millions of lives owing to the low elevation of the landscape and the presence of highly developed residential and commercial infrastructure along the coastline.

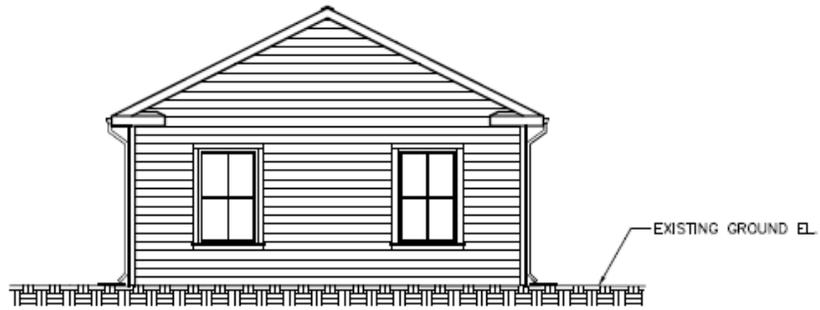
The NCBB is one of nine focus areas identified in the North Atlantic Coast Comprehensive Study (NACCS), whose goals are to:

- a. Provide a risk management framework, consistent with National Oceanic and Atmospheric Administration (NOAA)/US Army Corps of Engineers (USACE) Infrastructure Systems Rebuilding Principles; and
- b. Support resilient coastal communities and robust, sustainable coastal landscape systems, considering future sea level and climate change scenarios, to reduce risk to vulnerable populations, property, ecosystems, and infrastructure.

While the NACCS provides a regional scale analysis, the NCBB CSRM Study will employ NACCS outcomes and apply The NACCS CSRM Framework to formulate a more refined and detailed watershed scale analysis to include potential municipal or community level implementation opportunities, strategies and measures to assist in enabling communities to understand and manage their short-term and long-term coastal risk in a systems context.

The *Non-Structural Countywide Plan* (NS plan) was selected as the Tentatively Selected Plan (TSP) for the Nassau County Back Bays Coastal Storm Risk Management Feasibility Study. The NS plan includes elevating (Figure 2) 14,183 residential structures to the modeled 1% AEP non-structural design water surface elevation, which includes intermediate sea level change projected to 2080. In addition, 2,667 industrial/commercial structures will be floodproofed with an assumed vertical construction of 3 feet for floodproofing measures (Figures 3 & 4).

# EXISTING HOME



# ELEVATED HOME

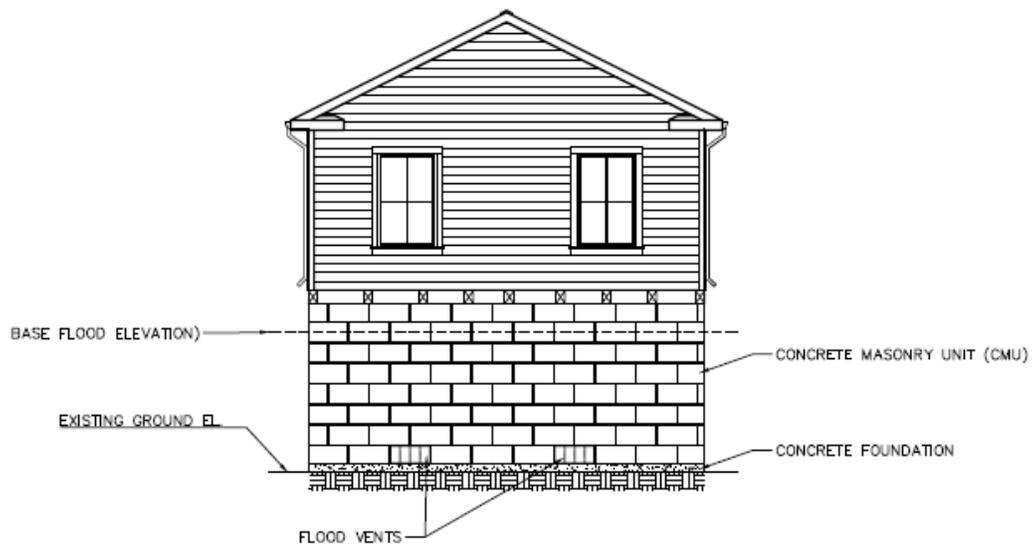


Figure 2 - Example Residential Structure Elevation

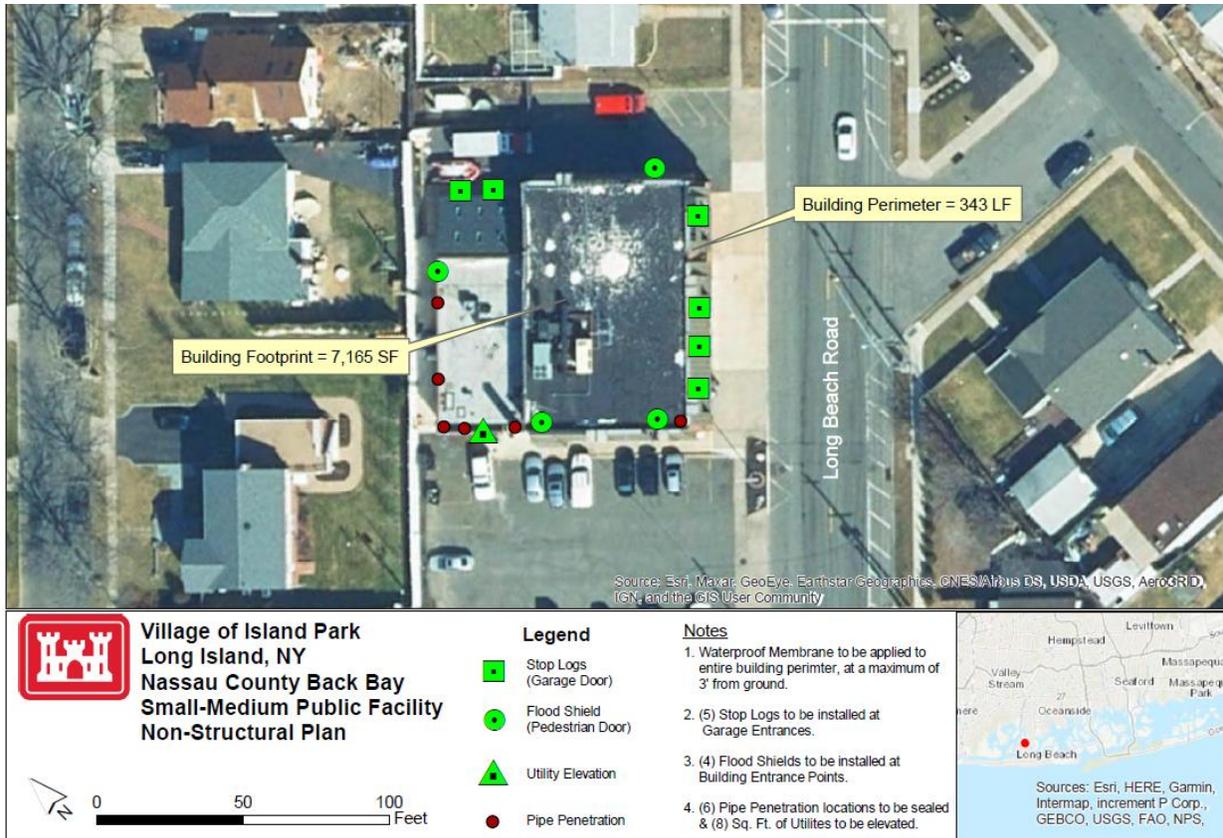


Figure 3 - Plan View Example of Dry Flood Proofing



Figure 4 - Street View Example of Dry Flood Proofing

The NS plan was selected as the TSP because it is the plan that reasonably maximizes National Economic Development benefits. In addition, all plans in the focused array (except for the No Action Plan) provided positive Regional Economic Development, Other Social Effects and Environmental Quality benefits by providing consistent CSRSM benefits to residential and industrial/commercial structures.

However, USACE will continue to evaluate impacts of the *Localized Structural Critical Infrastructure & Non-Structural Plan* (CI & NS Plan) given its high potential to increase community resilience and minimize environmental degradation by more effectively reducing damages and/or disruption to large-scale critical infrastructure.

The TSP would be constructed entirely in uplands with no associated placement of materials in the aquatic environment. However, alternatives are still under consideration that would require placement of materials in the aquatic environment. These alternatives are the CI & NS Plan and Natural and Nature-based Features (NNBF) (discussed in detail in alternatives discussion). Therefore, this 404(b)1 evaluation is being completed to evaluate those proposals in the event that they are included in the final recommended plan.

### 1.3 Purpose

The purpose of the study is to determine the feasibility of a project to reduce the risk of coastal storm damage in the back bays of Nassau County, New York, while contributing to the resilience of communities, important infrastructure, and the natural environment. Nassau County is a highly developed, low-lying region in the New York City metropolitan area that is home to over 700,000 residents and thousands of businesses. The area includes significant critical infrastructure at risk to future flooding and coastal storms including: Long Island Rail Road (serving 31.5 million annual rides); over 2 dozen police, fire and emergency support service facilities; 3 major hospitals; energy facilities; communication and information technology facilities; water and wastewater facilities; and public housing (including that for low-income senior citizens). Additionally, the study area includes important habitat for federally threatened and endangered species including piping plover (*Charadrius melodus*) (threatened), red knot (*Calidris canutus rufa*) (threatened), sandplain gerardia (*Agalinis acuta*) (endangered), and seabeach amaranth (*Amaranthus pumilus*) (threatened) as well as other sensitive species such as the saltmarsh sparrow (*Ammospiza caudacuta*), least terns (*Sterna antillarum*), and eastern black rail (*Laterallus jamaicensis jamaicensis*).

### 1.4 Alternatives Considered

Alternative development started with the consideration of management measures:

- Structural: floodwalls (permanent, deployable or crown walls), levees, bulkheads, storm surge barriers (inlet closures and cross bay barriers), beach nourishment, seawalls and revetments;
- Non-structural: Physical non-structural measures (buyout/acquisition, dry flood proofing, wet flood proofing, elevation and relocation), and non-physical, non-structural measures (evacuation plans, flood emergency preparedness plans, floodplain mapping, land use regulation, risk communication, zoning, flood insurance and flood warning systems); and
- NNBF: living shorelines, reefs, wetland restoration, submerged aquatic vegetation (SAV) restoration and green stormwater management.

The draft Environmental Impact Statement provides the full plan formulation description. After extensive alternatives formulation and evaluation, a focused array of alternatives was determined:

1. No Action Plan/Future Without Project condition – required under NEPA
2. Non-Structural (NS) Countywide Plan (Figure 5)
  - Elevation of 14,183 residential structures to the modeled 1% AEP non-structural design water surface elevation (which includes intermediate sea level change projected to 2080).
  - Dry flood proofing of 2,667 industrial/commercial (non-residential) structures from the ground surface up to 3 feet above ground.

This is the TSP.

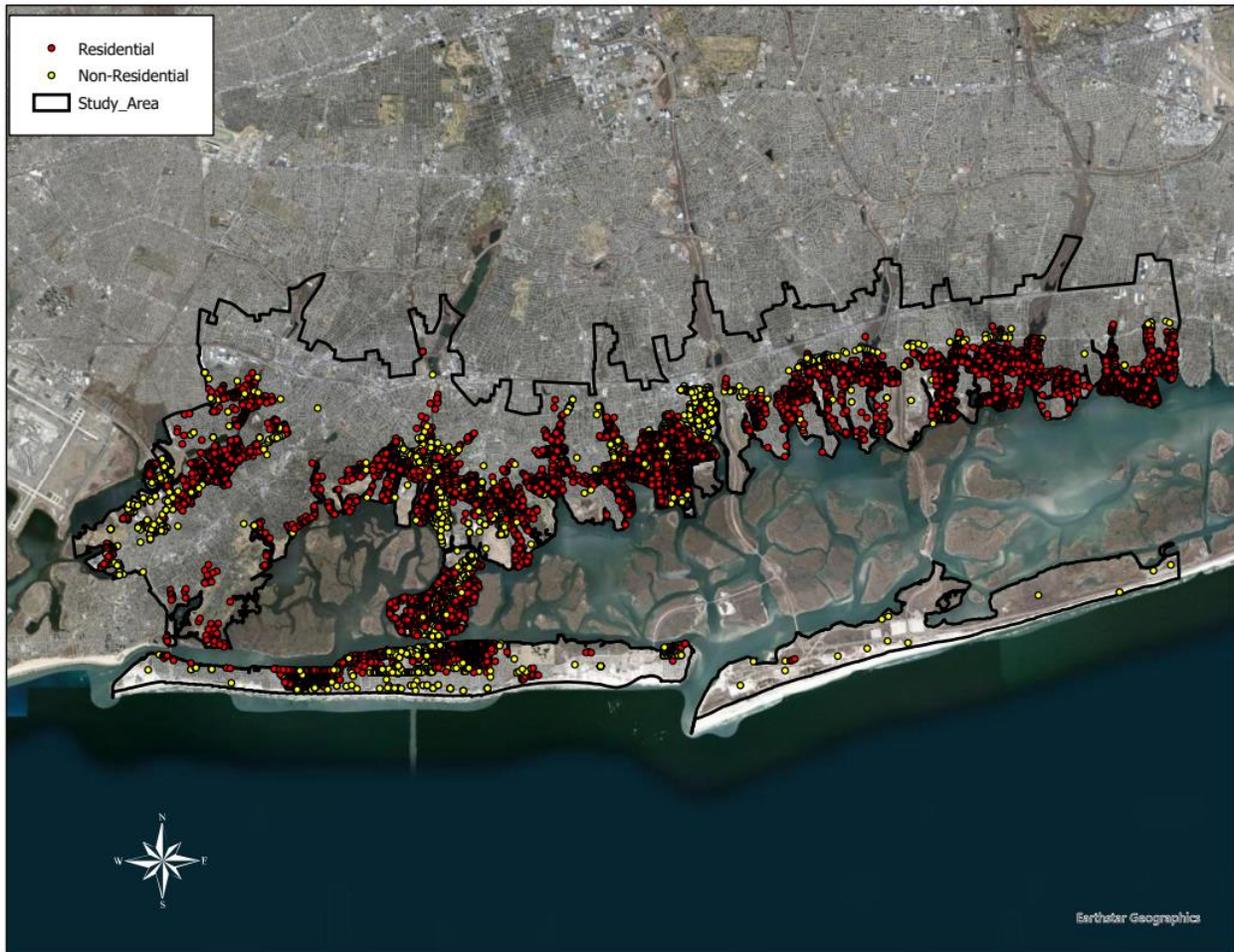


Figure 5 - Non-Structural County-wide Plan

*Pre-construction*-- Prior to construction a detailed investigation of the eligibility of individual structures for non-structural measures would be conducted.

*Construction*-- Nonstructural measures involve a significant construction effort whether it be from building retrofits such as elevation (including raising a structure on fill or foundation elements such as

solid perimeter walls, pier, posts, columns, or pilings) or buyout/ relocations that are likely to involve demolition, grading, and soil stabilization/revegetation. Most of the construction would occur within the footprint of the existing structure and would most likely be in upland urbanized settings.

*Operations and Maintenance*-- It is assumed that required maintenance would be similar to construction methods, but on a smaller scale.

### 3. Comprehensive Structural Highly Vulnerable Area (HVA) & NS Plan

- Comprehensive Floodwall at the City of Long Beach
  - 46,400 linear feet of floodwall construction at elevation +16 feet NAVD88
  - Floodwall Type – Type B & Type C (Figure 6 and Figure 7)

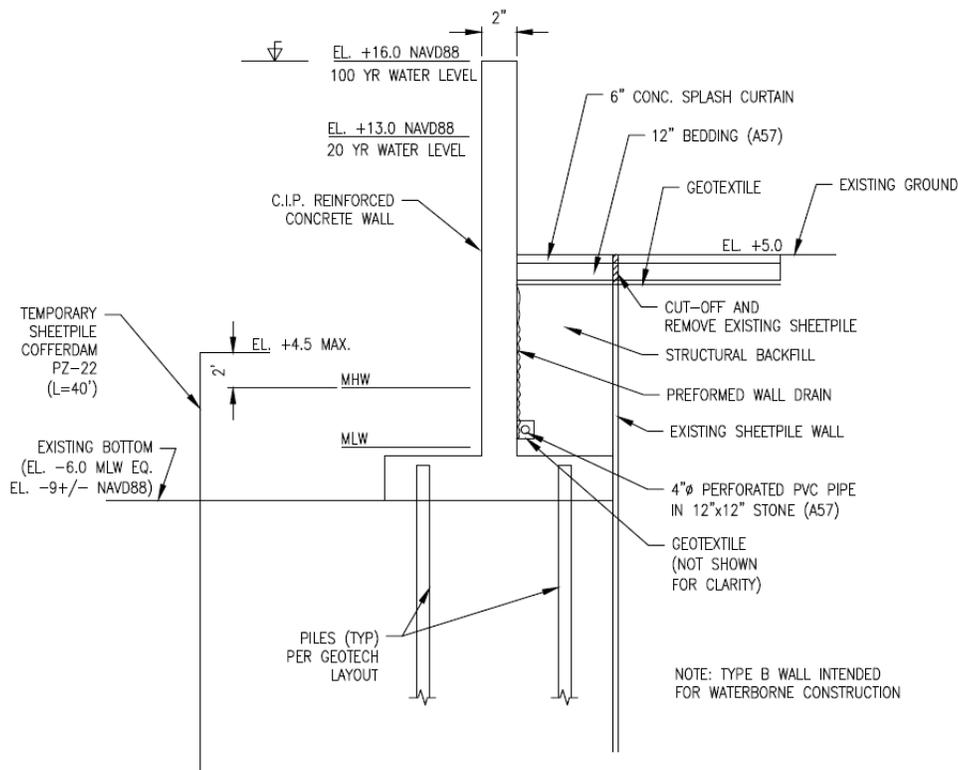


Figure 6 - Typical Section – Concrete Cantilever Wall on Piles – Type B

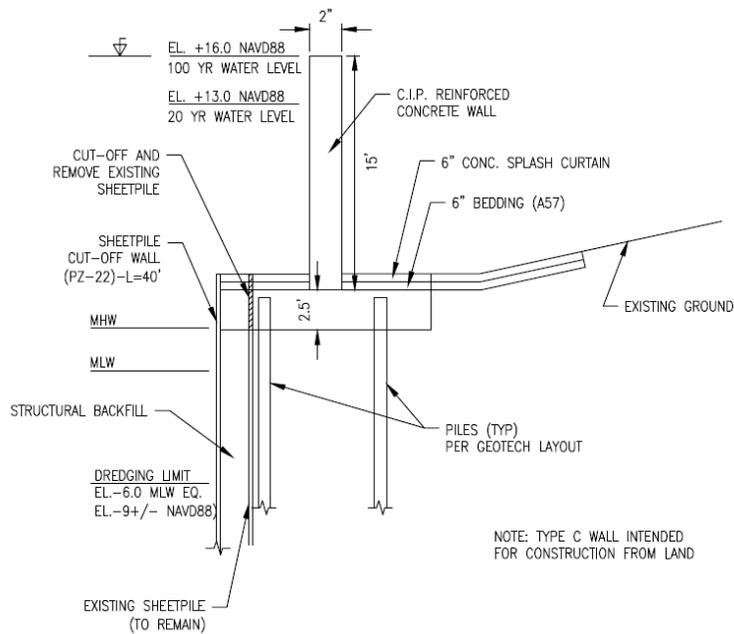


Figure 7 - Typical Section - Concrete Cantilever Wall on Piles - Type C

- 5 miter gates at elevation +16 feet NAVD88
- 4 road & 1 rail closure gate at elevation +16 feet NAVD88
- Elevation of 14,183 residential structures to the modeled 1% AEP non-structural design water surface elevation (which includes intermediate sea level change projected to 2080).
- Dry flood proofing of 2,667 industrial/commercial (non-residential) structures from the ground surface up to 3 feet above ground.

This alternative was screened out due to economics and is not carried forward in this evaluation.

*Pre-construction*-- Prior to construction, investigations may include wetland delineation, a subsurface geotechnical investigation, and hazardous, toxic, and radioactive waste (HTRW) sampling. These investigations are being developed.

*Construction*-- In-water construction activities for the construction of floodwalls, miter and sluice gates, and railroad and road closures include:

- Type B: installation and removal of sheetpile (likely vibratory driving)
- Type C: temporary excavations, fill and rock placement, concrete work.

Type B floodwalls would be constructed in temporary cofferdams constructed from sheet pile. Type C floodwalls would be constructed from shore. All pile driving would occur on land or in a dewatered coffer dam. On land construction activities include clearing, grading, excavations, backfilling, movement of construction equipment, concrete work, pile driving, and soil stockpiles.

*Operations and Maintenance*-- Miter gates would be installed and operated across smaller channels that require navigable access. Sluice gates would be installed and operated across smaller channels that do not require navigable access. These gates would remain open during normal conditions and would be closed during significant storm events. Regular maintenance is performed on the gates to keep the system running as designed.

#### 4. Localized Structural Critical Infrastructure (CI) & NS Plan

The non-structural portion of the CI & NS plan includes elevating and floodproofing structures as described above in the TSP. The structural portion of the CI & NS plan includes localized floodwalls around large-scale critical infrastructure, sluice gates, railroad closure gates, and road closure gates. Specific structural measures and locations are described in the following sections.

##### a. Far Rockaway

Structural measures that are being considered in order to protect critical infrastructure in the vicinity of Far Rockaway (Figure 8) include the following to protect Evacuation Route No. 1:

- 7,000 linear feet of floodwall construction at elevation +16 feet North Atlantic Vertical Datum of 1988 (NAVD88) of a Floodwall Type C
- 4 road closure gates at elevation +16 feet NAVD88
- 1 sluice gate at elevation +16 feet NAVD88

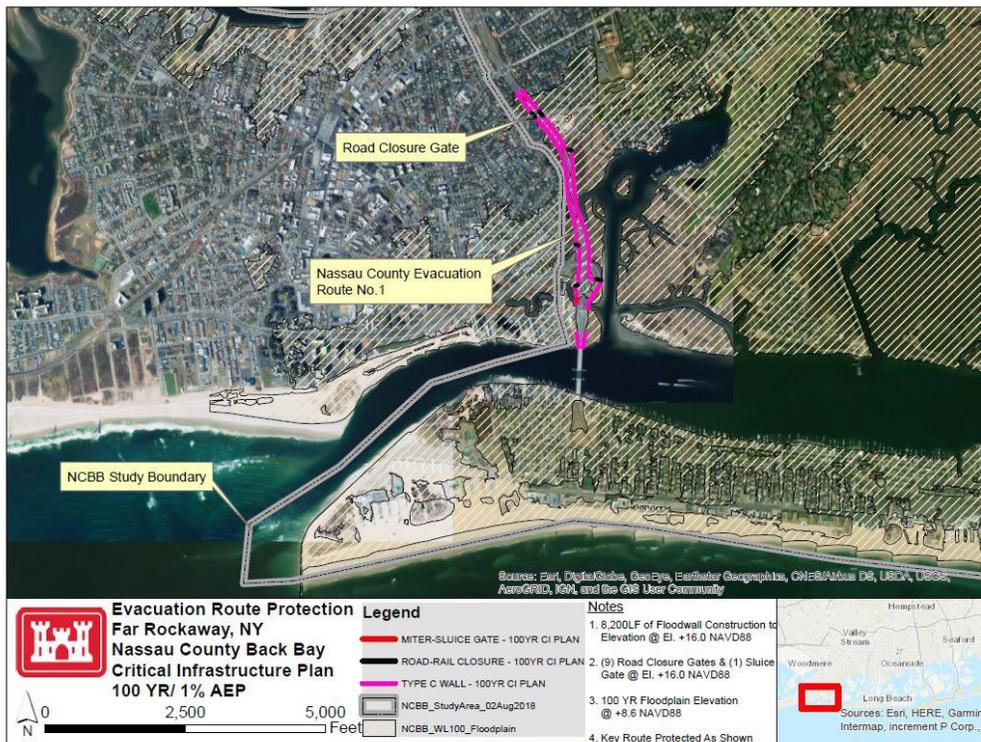


Figure 8 - Evacuation Route (1) Protection in Far Rockaway

b. Village of Freeport

Structural measures that are being considered in order to protect critical infrastructure in the vicinity of Freeport (Figure 9) include the following:

- 12,250 linear feet of floodwall construction at elevation +16 feet NAVD88
- 2 road closure gates at elevation +16 feet NAVD88

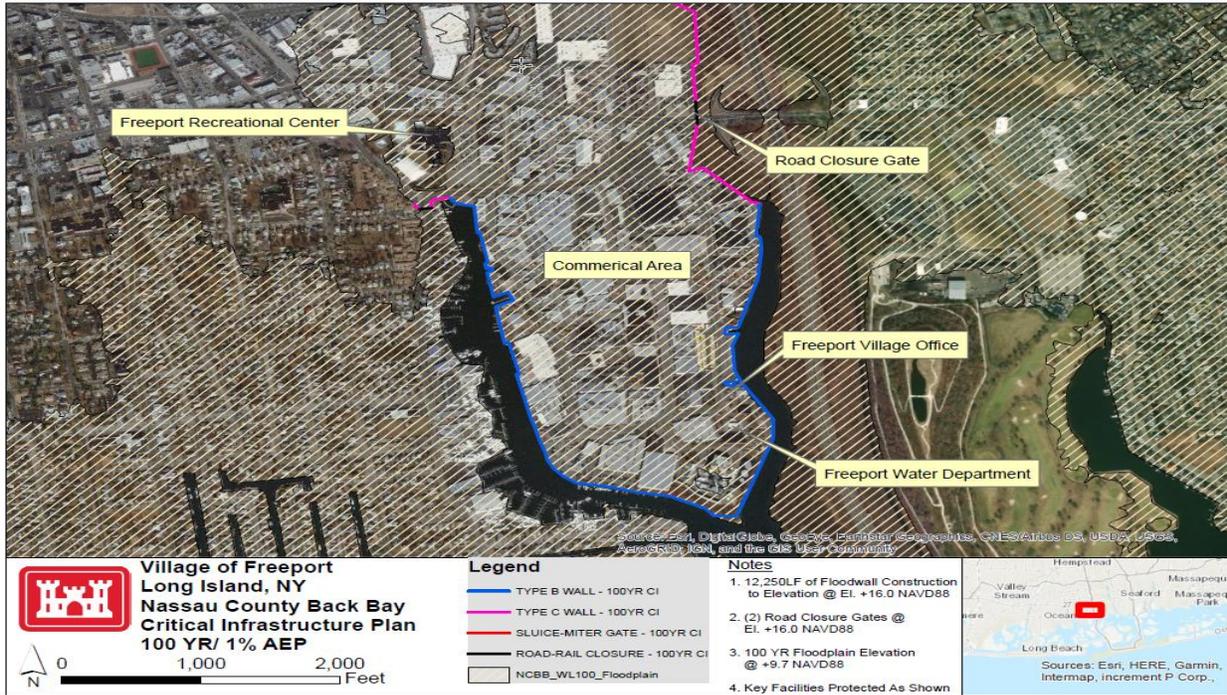


Figure 9 - Local Floodwall in Village of Freeport

c. Island Park

Structural measures that are being considered in order to protect critical infrastructure in the vicinity of Island Park (Figure 10) include the following:

- 6,950 linear feet of floodwall construction at elevation +16 feet NAVD88
- 2 sluice gates at elevation +16 feet NAVD88
- 2 road closure gates at elevation +16 feet NAVD88

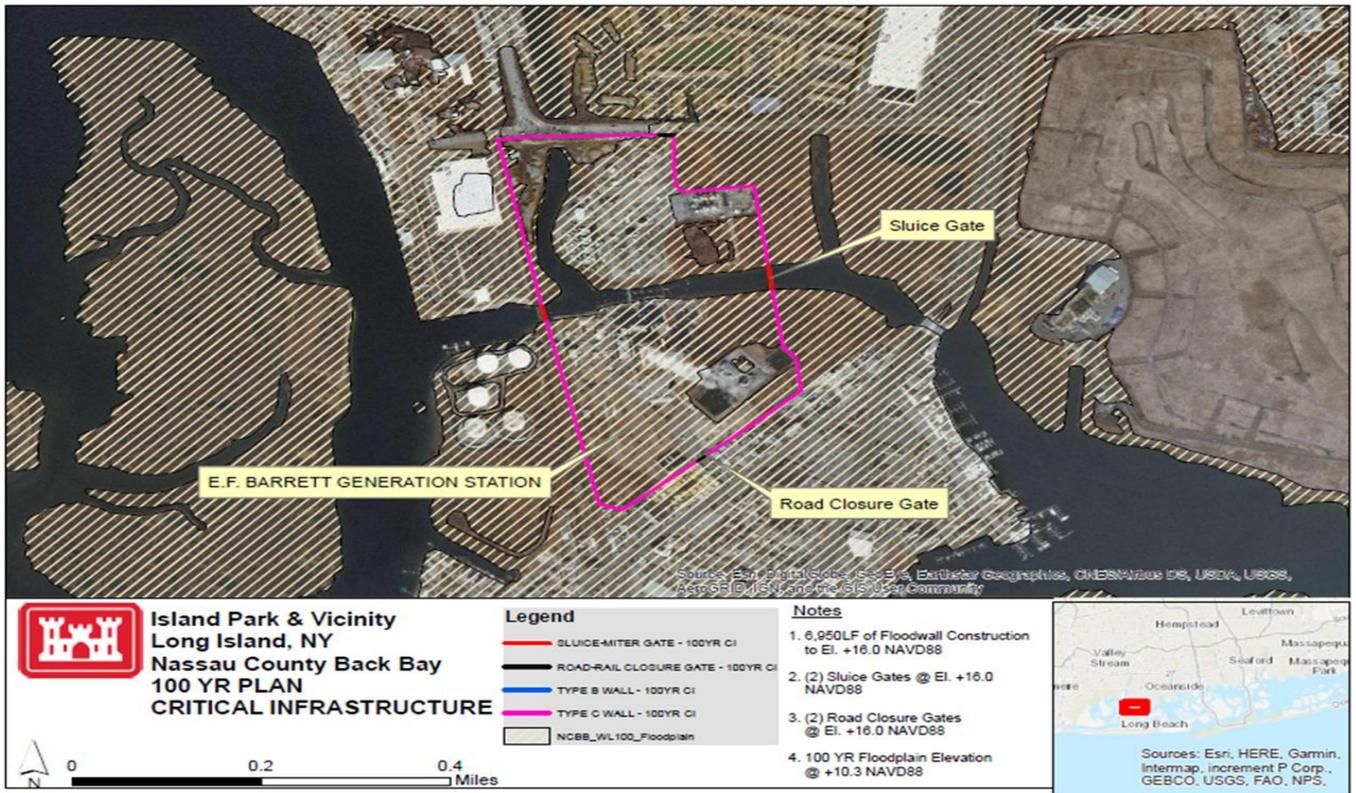


Figure 10 - Local Floodwall in Island Park & Vicinity

d. City of Long Beach

Structural measures that are being considered in order to protect critical infrastructure in the vicinity of Long Beach (Figure 11) include the following:

- 10, 260 linear feet of floodwall construction at +16 feet NAVD88
- 3 road and 1 railroad closure gates at +16 feet NAVD88



Figure 11 - Local Floodwall in the City of Long Beach

e. Hamlet of Wantagh

Structural measures that are being considered in order to protect critical infrastructure in the vicinity of Wantagh (Figure 12 and Figure 13) include the following:

- Protection of Cedar Creek Wastewater Treatment Plant (WWTP) -
  - 6,000 linear feet of floodwall construction at elevation +16 feet NAVD88
  - 1 road closure gate at elevation +16 feet NAVD88
- Protection of Evacuation Route No. 4 -
  - 800 linear feet of floodwall construction at elevation +16 feet NAVD88
  - Floodwall Type – Type C

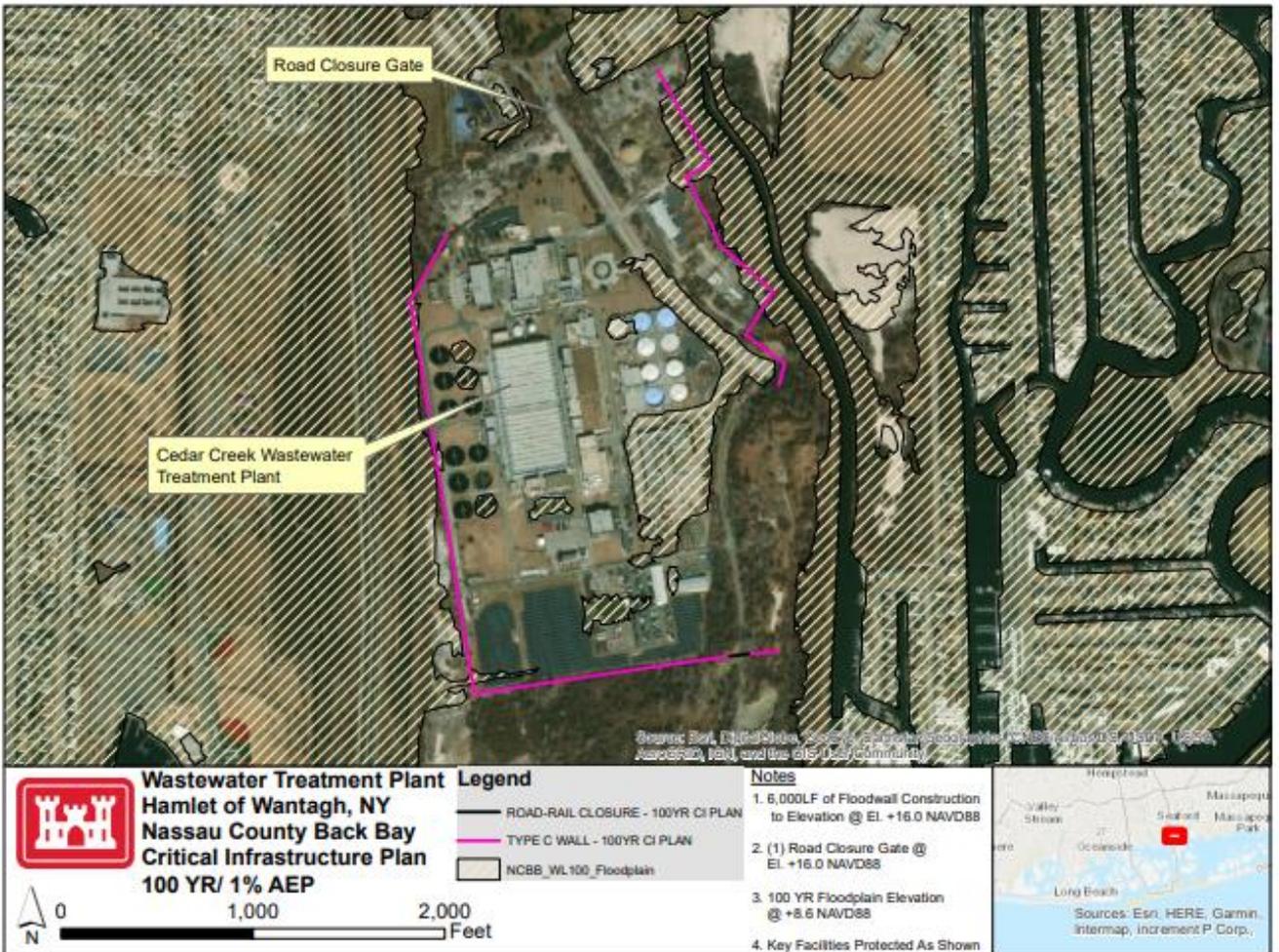


Figure 12 - Local Floodwall in the Hamlet of Wantagh



Figure 13 - Evacuation Route (4) Protection in Wantagh

This alternative is still being considered.

*Pre-construction*-- Prior to construction, investigations may include wetland delineation, a subsurface geotechnical investigation, and HTRW sampling. These investigations are being developed.

*Construction*-- In-water construction activities for the construction of floodwalls, miter and sluice gates, and railroad and road closures include:

- Type B (Freeport only): installation and removal of sheetpile (likely vibratory driving)
- Type C (all other locations): temporary excavations, fill and rock placement, concrete work.

Type B floodwalls would be constructed in temporary cofferdams constructed from sheet pile. Type C floodwalls would be constructed from shore. All pile driving would occur on land or in a dewatered coffer dam. On land construction activities include clearing, grading, excavations, backfilling, movement of construction equipment, concrete work, pile driving, and soil stockpiles.

*Operations and Maintenance*-- Sluice gates would be installed and operated across smaller channels that do not require navigable access. These gates would remain open during normal conditions and would be

closed during significant storm events. Regular maintenance is performed on the gates to keep the system running as designed.

## 5. Natural and Nature-Based Features

Natural and Nature Based Features (NNBF) are intended to be complementary measures to attenuate surge and waves by increasing both elevation and roughness, per lessons learned from the New Jersey Back Bays (NJBB) CSRM Study's modeling efforts. NNBF will be evaluated in greater detail during feasibility-level design and plan optimization. Thus far, opportunities for wetland restoration and conservation have been considered through an identification of at-risk wetlands. Specific NNBFs include living shorelines, reefs, and wetland and SAV restoration.

*Preconstruction*-- Prior to construction, investigations may include, wetland delineation, a subsurface geotechnical investigation, and HTRW sampling. These investigations are being developed.

*Construction*-- In-water construction activities for the construction of NNBF could include installation and removal of temporary cofferdams, temporary excavations, dredging and filling and rock placement, and wetland/upland vegetation planting. On land construction activities could include clearing, grading, excavations, backfilling, movement of construction equipment, and temporary roads.

*Operation and Maintenance*-- It is assumed that NNBF would require period maintenance or repair and that maintenance would be similar to construction, but on a much smaller scale.

## 2.0 Discharges

### 2.1 General Description of Discharge Material

*Non-Structural Measures*-- Non-structural measures associated with the TSP would be built in the uplands in the footprints of existing structures; therefore, no discharges are expected.

*Critical Infrastructure Measures*-- The discharge material for the CI measures associated with the CI&NS plan would include the necessary materials to construct Type B and C floodwalls, road closures, rail closures, and sluice gates:

- Sheetpile
- Geotextile
- 6" Bedding stone (AASHTO No. 57)
- Clean imported backfill
- Structural steel H-Pile (HP 14 x 73)
- Concrete
- Pre-formed wall drain
- 4" diameter perforated PVC pipe
- 24" reinforced concrete pipe
- Flap gate
- Concrete splash curtain

In total, implementation of the Localized CI & NS Plan would require 43,411 linear feet (LF) of 16' high floodwall (8,221 LF of Type B and 35,190 LF of Type C), 3 sluice gates, 13 road closures, and 1 rail closure.

Material quantities are not yet determined for construction of sluice gates, road closures, or rail closures; or NNBF measures.

*NNBF*-- Although NNBF measures are still being formulated, the discharge material for the NNBF could be expected to include clean substrate for habitat development; rock, straw bales, and other clean materials to contain the substrate; and vegetation.

## 2.2 Description of the Proposed Discharge Sites

*Critical Infrastructure Measures*-- The CI measures are in Nassau County, NY along the shoreline of the South Shore Estuary. The sites are within highly urbanized and developed areas surrounding infrastructure that has been identified as critical to the communities within Nassau County and at high risk to future coastal storm damage. Most of the localized floodwalls proposed are located within the footprint of existing bulkhead. To date, no jurisdictional wetland delineations or submerged aquatic vegetation surveys have been conducted along any of the preliminary alignments for the CI measures. Therefore, impact estimates may be modified and refined based on a higher level of design detail that include surveyed wetland jurisdictional lines, and mitigation measures that first employ avoidance and minimization. However, it is assumed that for unavoidable wetland and aquatic habitats, compensatory mitigation would be required based on habitat modeling.

1. Far Rockaway – The CI measures would be constructed to the east and west in a parallel configuration to the Nassau Expressway. The floodwall would begin south of the small channel that runs under the northern edge of the Atlantic Beach Bridge at the toll facility. The northern end of the floodwall is situated slightly north of the intersection of the expressway with Rock Hall Road. There are heavily developed areas surrounding the plan, but natural landscapes lie adjacent to the central portion of the eastern alignment. The footprint of the plan intersects:
  - 0.03 acres of shallow subtidal habitat (the channel),
  - 0.01 acres of shoal, bar, and mudflat, and
  - 0.06 acres of intertidal wetlands.
2. Village of Freeport – The CI measures would be constructed adjacent to the Village of Freeport Industrial/Commercial Area on the peninsula that lies below Mill Road. The area west of Meadowbrook State Parkway would be confined by a 16-foot Type B floodwall (8,221 ft). Additionally, a Type C floodwall would extend from the eastern terminal of the Type B floodwall adjacent to the Meadowbrook State Parkway (4,024 ft). Although largely commercial, there are some undeveloped tree-lined portions of the shoreline in this area that are currently only rip-rap. There are also docks and water access throughout the peninsula. The footprint of the plan intersects:
  - 2.64 acres of shallow, subtidal habitat and
  - 0.04 acres of intertidal wetlands.
3. Island Park – The CI measures would be constructed around the E.F. Barrett Generation Plant. The plan includes two sluice gates that would be situated in the channel that bisects the plant facility. The plant is located in a commercial area. The footprint of the plan intersects:
  - 0.19 acres of shallow subtidal habitat,
  - 0.04 acres of shoal, bar, and mudflat, and
  - 0.07 acres of intertidal wetlands.

4. City of Long Beach – The CI measures are located in an industrial/commercial area to the east and west side of the Long Beach Bridge on Long Beach bisected by Long Beach Boulevard. The footprint of the plan intersects the shoreline along Wreck Lead Channel:
  - 0.09 acres of shallow subtidal habitat and
  - 0.41 acres of shoal, bar, and mudflat.
5. Hamlet of Wantagh – The CI measures are located on the boundaries of the Cedar Creek Wastewater Treatment Plant as well as just south of the on-ramp for the Seaford-Oyster Bay Expressway. The Wantagh CI measures do not intersect any aquatic habitats.

*NNBF*-- Specific project areas have not been identified for *NNBF* measures. However, any measures would be located along shoreline, within shallow estuarine waters, or on existing eroding marsh islands within the back bay ecosystem.

### 2.3 Description of Discharge Method

*Critical Infrastructure Measures*-- Type B floodwalls would be constructed in temporary cofferdams constructed from sheet pile. Type C floodwalls would be constructed from shore. All pile driving would occur on land or in a dewatered coffer dam. On land construction activities include clearing, grading, excavations, backfilling, movement of construction equipment, concrete work, pile driving, and soil stockpiles.

*NNBF*-- In-water construction activities for the construction of *NNBF* could include installation and removal of temporary cofferdams, temporary excavations, dredging and filling and rock placement, and wetland/upland vegetation planting.

## 3.0 Factual Determinations

### 3.1 Physical Substrate Determinations

- (1) Substrate Elevation and Slope – The study area comprises generally low lying, morainal shorelines and barrier beach. Topography is low-lying, flat terrain with elevations less than 100 feet above MSL, but primarily less than 20 ft above MSL.
- (2) Sediment Type – Soils within the study area are categorized as Upidsamments-beaches-urban land, ipswick-udipsamments, urban land-upidsamments-sudbury, urban land, and urban land-riverhead.
- (3) Material Movement – Because most of the localized floodwalls will be built within the footprint of existing bulkhead, no changes such as scour are expected. Negligible to minimal movement of the placed material outside of the project area is anticipated. For *NNBF* measures, containment structures such as straw bales would be utilized in wetland restoration efforts to minimize movement of material.
- (4) Physical Effects on Benthos – Construction of CI measures would disturb and result in the loss of the benthic environment in the areas impacted. Approximately, 3.6 acres of habitat would be permanently converted to protective structures (See Section X for details). Within the footprint of the floodwalls and sluice gates, non-mobile benthic species would be buried by place material and destroyed. Mobile benthic species would be expected to leave the area

during construction. An additional, approximately 3.95 acres of habitat would be temporarily disturbed during construction. It is anticipated that these areas would be repopulated by comparable benthic organisms via migration from adjacent areas within about 2 years.

NNBF measures for wetland restoration, living shorelines, or reefs would permanently convert shallow water habitat to the targeted habitat, thereby resulting in a loss of the benthic habitat in impacted areas. It is anticipated that the restored habitat would provide for recolonization of benthic organisms within about 2 years.

- (5) Other Effects – N/A
- (6) Actions Taken to Minimize Impacts –

To minimize impacts, construction of critical infrastructure plan components would be conducted from land (Type C floodwall) or within a dewatered cofferdam (Type B floodwall). Also, impact pile driving would be conducted from land or a dewatered cofferdam. It is assumed that the contractor would work within the estimated approximate easement limits. Type C floodwall locations were chosen for certain areas because it was determined that there was enough upland area and access to construct from land at those locations. Finally, a sediment and erosion control plan would be developed, and construction specifications would state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement. Best management practices (BMPs) would be employed during construction of the CI and NNBF measures.

### 3.2 Water Circulation, Fluctuation, and Salinity Determinations

Given the distance between and the impact size of each individual plan, neither the CI nor NNBF measures are expected to affect water circulation, fluctuation, or salinity within the back bays ecosystem. Proposed projects would be situated along shorelines.

#### (1) Water

- (a) Salinity – No impacts to salinity in the back bays ecosystem are expected from the CI or NNBF measures. Sluice gates would remain open during normal conditions and would be closed during significant storm events. Where sluice gates are implemented, there may be a minor, short-term impact to local salinity when gates are closed during flood conditions. Any alternations would dissipate once the gate is opened. These impacts would only be associated with the Far Rockaway and Island Park components.
- (b) Chemistry – No change is expected.
- (c) Clarity – Local, minor, and temporary water clarity impairments could occur in relation to implementation of the CI and NNBF measures due to increased turbidity associated with construction. Increases in turbidity would be localized and temporary and would be expected to dissipate within a tidal cycle.
- (d) Color – Local, minor, and temporary water impacts could occur in relation to implementation of the CI and NNBF measures due to increased turbidity associated with construction. Any affects would be expected to dissipate within a tidal cycle.
- (e) Odor – No change is expected.

- (f) Taste – N/A
  - (g) Dissolved Gas Levels – Activities such as excavation, fill, and construction and dewatering of temporary cofferdams could result in localized increases in turbidity and decreases in dissolved oxygen. Decreases in dissolved oxygen would be localized and temporary and would be expected to dissipate within a tidal cycle.
  - (h) Nutrients – Minor, temporary elevations in nutrients are expected as a result of newly exposed sediments. All are expected to be within state guidelines.
  - (i) Eutrophication – Not expected to occur.
  - (j) Others as Appropriate – None.
- (2) Current Patterns and Circulation
- (a) Current Patterns and Flow – The CI and NNBF measures are not expected to have long-term or large-scale effects on physical oceanography. There may be some localized, intermittent negligible effects on localized hydrodynamics. Sluice gates would remain open during normal conditions and would be closed during significant storm events. Some temporary, localized, but minor changes in currents and flows might occur while the gate is closed. These would dissipate once it is open again.
  - (b) Velocity – No impacts are expected from floodwall construction. Sluice gates would remain open during normal conditions and would be closed during significant storm events. Some temporary, localized, but minor changes in velocity may occur while the gate is closed. These would dissipate once it is open again. Wetland restoration and conservation (NNBF measures) could provide beneficial reductions in storm-driven velocities.
  - (c) Stratification – No change expected.
  - (d) Hydrologic Regime – No change expected
- (3) Normal Water Level Fluctuations – No change expected
- (4) Salinity Gradients – No change
- (5) Actions to Minimize Impacts – To minimize impacts, construction of critical infrastructure plan components would be conducted from land (Type C floodwall) or within a dewatered cofferdam (Type B floodwall). Also, impact pile driving would be conducted from land or a dewatered cofferdam. These measures presented previously also would assist in minimizing impacts to water quality impacts such as water clarity, color, dissolved gas, and nutrients. Finally, a sediment and erosion control plan would be developed, and construction specifications would state that compliance is mandatory for all applicable environmental protection regulations for pollution control and abatement.

### 3.3 Suspended Particulate/Turbidity Determinations

- (1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Project Site – Minor and short-term impacts are expected to occur in the immediate vicinity of the CI and NNBF sites during construction. Turbidity is anticipated to subside to normal levels within a tidal cycle and upon construction completion.
- (2) Effects on Chemical and Physical Properties of the Water Column

- (a) Light Penetration – A minor, temporary decrease may occur during construction from turbidity.
- (b) Dissolved Oxygen – A minor, localized and temporary depression of dissolved oxygen may occur during construction.
- (c)
- (d) Toxic Metals and Organics – No evidence exists to suggest the presence of toxic metals or organics in the proposed project area.
- (e) Pathogens – N/A
- (f) Aesthetics – The aesthetics of the water column may be temporarily impacted due to the presence of equipment and materials, as well as increased turbidity. The impact is projected to be minor, localized, and temporary.
- (g) Others as Appropriate – N/A

### 3.4 Contaminant Determinations

All the materials to be used to construct the projects would be free of contaminants. There is no knowledge of HTRW at any of the proposed project sites. If HTRW is encountered during construction, the non-Federal sponsor will be responsible for all HTRW response costs and solely responsible for ensuring that required HTRW response actions are accomplished in accordance with applicable requirements of Federal, state and local regulations.

### 3.5 Aquatic Ecosystem and Organism Determinations

- (1) Effects on Plankton – Some plankton may be destroyed during placement of materials during construction. No long-term effect expected.
- (2) Effects on Benthos – Non-mobile and poorly mobile benthic organisms would be destroyed in the structure footprints (cumulatively 3.6 acres) and in areas selected for NNBF measures that are located in wetlands and shallow subtidal waters. Mobile benthic species would be expected to leave the area during construction. An additional, approximate 3.95 acres of habitat would be temporarily disturbed during construction. It is anticipated that these areas would be repopulated by comparable benthic organisms via migration from adjacent areas within about 2 years.
- (3) Effects on Nekton – Nekton in the project area would be disturbed during construction and may choose to temporarily relocate elsewhere. The project would result in the permanent loss of approximately 3.6 acres of wetland and shallow subtidal habitat and the temporary disruption to an additional 3.95 acres plus areas disturbed by any selected NNBF measures. When sluice gates are closed due to flood events, the channels at Far Rockaway and Island Park would not be accessible to nekton. Some individuals could become temporarily trapped inside the closure areas. Impacts to nekton would subside once sluice gates are re-opened.
- (4) Effects on Food Web – A temporary, minor reduction in benthic food sources may occur from the destruction of benthos within the project footprints, as well as disturbance of adjacent benthic habitat. These impacts would subside once construction has concluded.
- (5) Effects on Special Aquatic Sites

- (a) Sanctuaries and Refuges – While the study area overlaps with the Lido Beach Wildlife Management Area of the Long Island National Wildlife Refuge (NWR) Complex, no structural or non-structural measures are proposed for the wildlife management area.
- (b) Wetlands – Projected impacts to wetlands are provided in Table 1 and Table 2. To determine aquatic impacts, the New York State Department of Environmental Conservation (NYSDEC) Tidal Wetlands spatial layer used for Regulatory determinations was utilized to determine overlap between the proposed plan footprints and shallow water habitats and wetlands. The “Wetland Habitats” categories evaluated include fresh marsh, high marsh, intertidal (low) marsh, dredged spoil sites, formerly connected wetlands, littoral zone (shallow subtidal), and shoals, bars, and mudflats. The location of the CI measures relative to tidal wetland resources are shown in Figure 14.

CI measures would result in the permanent loss of approximately 3.6 acres of wetland and shallow subtidal habitat and the temporary disruption to an additional 3.95 acres plus areas disturbed by any selected NNBF measures. Most impacts would occur in subtidal habitat (2.97 acres of permanent impacts and 2.94 acres of temporary impacts), and the majority is associated with the Freeport CI measures (2.64 acres for permanent and temporary impacts).

It should be noted that, to date, no jurisdictional wetland delineations have been conducted along any of the preliminary CI measure alignments. Therefore, these impact estimates may be modified and refined based on a higher level of design detail that include surveyed wetland jurisdictional lines, and mitigation measures that first employ avoidance and minimization. However, it is assumed that for unavoidable wetland and aquatic habitats, compensatory mitigation would be required based on habitat modeling.

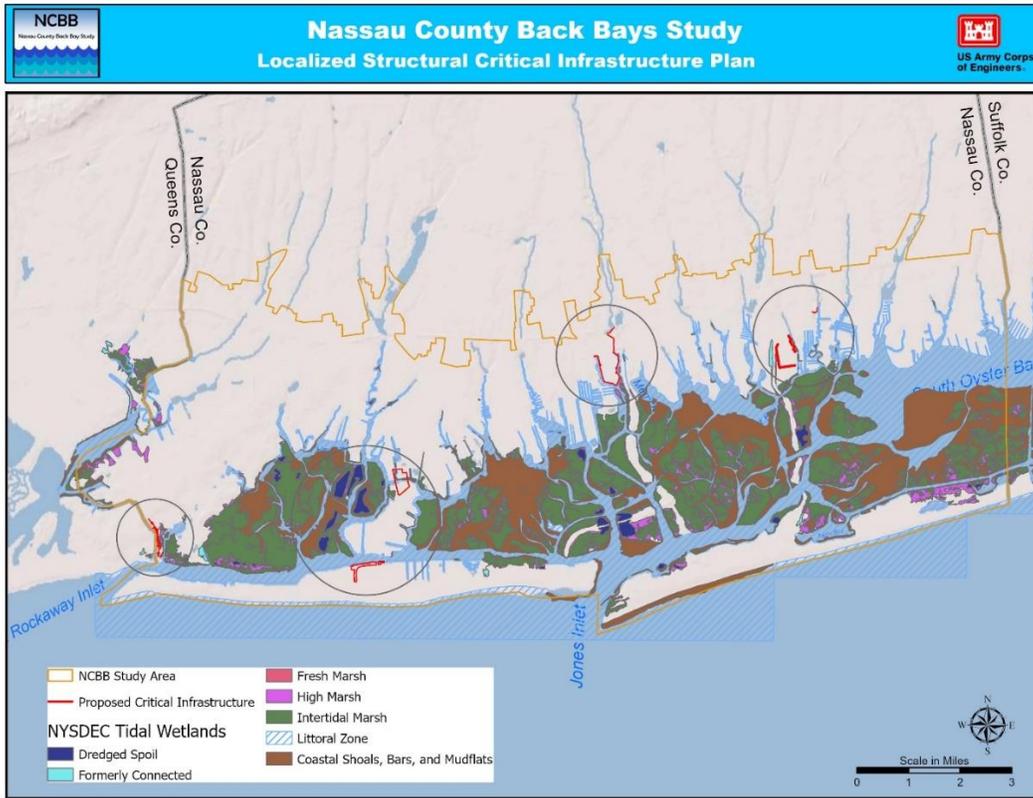


Figure 14 - Locations of Critical Infrastructure Protection Measures and NYSDEC Tidal Wetlands

Table 1 - Permanent Impacts to Habitats as a Result of the CI & NS Plan

Location	Shallow Subtidal (LZ)	Shoals, Bars, and Mudflats (SM)	Intertidal Marsh (IM, E2EM1P, FC)	Palustrine Forested (PFO1Ad)
Far Rockaway	0.03	0.01	0.06	0.00
Freeport	2.64	0.00	0.04	0.00
Island Park	0.19	0.04	0.07	0.00
Long Beach	0.09	0.41	0.00	0.00
Wantagh	0.00	0.00	0.00	0.00
<b>Total Impacts</b>	<b>2.97</b>	<b>0.46</b>	<b>0.17</b>	<b>0.00</b>

Table 2 - Temporary Impacts to Habitats as a Result of the CI & NS Plan

Location	Shallow Subtidal (LZ)	Shoals, Bars, and Mudflats (SM)	Intertidal Marsh (IM, E2EM1P, FC)	Palustrine Forested (PFO1Ad)
Far Rockaway	0.02	0.01	0.11	0.00
Freeport	2.64	0.00	0.08	0.01
Island Park	0.11	0.04	0.06	0.00
Long Beach	0.17	0.70	0.00	0.00
Wantagh	0.00	0.00	0.00	0.00
Total Impacts	2.94	0.75	0.25	0.01

Conserving and restoring marsh as an NNBf measure would be expected to improve and enhance wetland resources in the area. Undertaking these measures would provide additional potential CSRm benefits by leveraging back bay marsh ecosystem services, while improving habitat for many marsh-associated and aquatic species that make use of marsh and marsh-linked aquatic habitat.

(c) Tidal flats – Approximately 0.46 acres of shoals, bars, and mudflats habitat would be permanently lost due to implementation of the CI measures. Another approximate 0.75 acres would temporarily be impacted by construction.

(d) Vegetated Shallows – Although no surveys of the CI measure alignments or potential NNBf measures have been completed at this study phase, there is no information to suggest that vegetation exists in the shallow waters of the project area. The NYSDEC Statewide Seagrass Map (2018) does not identify SAV in or near any of the potential CI work areas.

(e) Coral Reefs – N/A

(f) Riffle and Pool Complexes - N/A

(6) Threatened and Endangered Species – Informal consultation was initiated on 6 October 2017, when USACE, New York District sent letters inviting U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to be cooperating agencies for the study. The USFWS Information for Planning and Conservation and NMFS Endangered Species Act (ESA) mapper databases were queried May 2021 to determine which species protected under the ESA have the potential to occur in the NCBB Study Area. Based on a drafted Biological Assessment, USACE has determined that the CI & NS Plan would have no effect on the following listed species:

- Shortnose sturgeon
- Northeastern Beach Tiger Beetle

- Piping plover
- Seabeach amaranth
- Eastern black rail
- Atlantic Sturgeon

Additionally, through the drafted Biological Assessment, USACE has determined that the CI & NS Plan is not likely to adversely affect the following listed species:

- Northern long-eared bat
- Roseate tern
- Red knot
- Atlantic loggerhead
- Kemp's ridley
- Atlantic green sea turtle
- Leatherback sea turtle

Based on the analysis of the drafted Biological Assessment, USACE has determined that the complementary NNBF features would have no effect on the following listed species:

- Shortnose sturgeon
- Northeastern Beach Tiger Beetle
- Piping plover
- Seabeach amaranth
- Atlantic Sturgeon
- Northern longeared bat

Based on the analysis of the drafted Biological Assessment, USACE has determined that complementary NNBF features may affect, but are not likely to adversely affect the following listed species:

- Eastern black rail
- Roseate tern
- Red knot
- Atlantic loggerhead
- Kemp's ridley
- Atlantic green sea turtle
- Leatherback sea turtle

Additionally, NNBFs may have beneficial effects on black rail and saltmarsh sparrows.

- (7) Other Wildlife – An Essential Fish Habitat (EFH) Assessment was prepared. Construction of the complementary critical infrastructure components would result in minor and temporary (disruptions during construction), as well as permanent effects on EFH (loss of habitat). Within the project area EFH is designated for a broad variety of species. Impacts from

construction would result in minor disturbance and loss of tidal, intertidal, and wetland habitats. Those species utilizing intertidal and shallow subtidal benthic habitats (flounders, ocean pout, scup, pollock, and skates) have the most potential to be affected by the proposed CI measures. However, those impacts would be expected to be low to moderate due to their mobility, the extent of construction, and the current quality of the habitat.

Birds present in the proposed action area would be temporarily disturbed during construction and relocate to adjacent areas but would be expected to return when construction is complete.

It is possible that any restoration work that may occur as a part of the complementary NNBF measures may generate temporary turbidity in open estuarine waters and adjacent tidal streams. These impacts would also be minimized through use of sediment control BMPs. Overall, NNBF measures are expected to result in beneficial effects on EFH.

Future refinement of the TSP and subsequent surveys (such as wetlands and SAV) is needed before a final EFH assessment can be completed.

- (8) Actions to Minimize Impacts – To minimize impacts to habitats, shallow water, and wildlife, construction of critical infrastructure plan components would be conducted from land (Type C floodwall) or within a dewatered cofferdam (Type B floodwall). Also, impact pile driving would be conducted from land or a dewatered cofferdam. Coordination with resource agencies is ongoing and may result in the application of time of year restrictions for construction to protect targeted species.

### 3.6 Proposed Disposal Site Determinations

- (1) Mixing Zone Determinations – N/A
- (2) Determination of Compliance with Applicable Water Quality Standards – Work would be performed in accordance with all applicable State water quality standards. A Water Quality Certification (WQC) would be requested from the NYSDEC during the Planning, Engineering, and Design Study Phase.
- (3) Potential Effects on Human Use Characteristics
  - (g) Municipal and Private Water Supply – No negative impacts expected. Completion of the Long Beach CI measures would reduce the risk from coastal storms to the Long Beach Water Treatment Plant.
  - (h) Recreational and Commercial Fisheries – Temporary effects are expected as fishing and boating would be restricted in the project area during the construction.
  - (i) Water Related Recreation – Temporary disturbance to recreational boating and fishing during construction activities.
  - (j) Aesthetics – At the construction site, equipment, materials, and vehicles would be present during the construction process and would adversely impact the appearance of the proposed project sites. The sites are currently commercial and industrial. The viewsheds at the project sites would be permanently changed, but given that the current landscapes are commercial and industrial uses and/or highways, the impact would be expected to be minor at the Island Park and Far Rockaway sites.

(k)

(l) Although the Freeport site is largely commercial, there are some undeveloped tree-lined portions of the shoreline in this area that are currently only rip-rip. There are also docks and water access throughout the peninsula. Given the current mix of commercial and recreation in this area, the construction of a 16 foot floodwall would have a major impact on the existing viewshed around the peninsula in Freeport of the Narrows and Stadium Park Canal. The implementation of the Type C floodwall to the north adjacent to the Meadowbrook State Parkway would be expected to be minor as the floodwall would hug the developed land and limit the view of the parkway.

(m)

(n) The impact to aesthetics from the Long Beach component would be expected to be moderate because the area is industrial in nature but neighbored by residential communities and includes hardening the shoreline.

(o) Parks, National and Historical Monuments, National Seashore, Wilderness Areas, Research Sites and Similar Preserves – No impacts expected.

### 3.7 Determination of Cumulative Effects on the Aquatic Ecosystem

Implementation of the CI measures are not expected to contribute towards cumulative impacts to the aquatic ecosystem. The four CI measure alignments with aquatic impacts would cumulatively result in the loss of 3.64 acres of wetlands and shallow habitat. An additional, approximate 3.95 acres would be temporarily impacted by construction activities. These habitats, given their proximity to commercial, industrial, and residential development are thought to be currently of marginal quality. The impact would constitute a small impact relative to the similar available habitat in the study area. The areas that would be affected do not support SAV. In concert with other Federal coastal storm risk management projects along the Atlantic Coast of Long Island, the project would add resiliency to the developed landscape within the study area. The CI & NS Plan is designed to prevent ecosystem impacts associated with damage to unprotected wastewater treatment plants during future storm events.

### 3.8 Determination of Secondary Effects on the Aquatic Ecosystem

The proposed project would not affect the continued use of the area for fishing, boating and other water-based commerce and recreation.

## 4.0 Finding of Compliance

- a. No adaptations of the Section 404(b)(1) Guidelines were made relative to this evaluation.
- b. The proposed project will comply with State water quality standards.
- c. The proposed placement of material will not violate the Toxic Effluent Standard of Section 307 of the Clean Water Act.
- d. The proposed project will not negatively affect any rare, threatened or endangered species.
- e. No Marine Sanctuaries, as designated in the Marine Protection, Research and Sanctuaries Act of 1972, are in the project area.

- f. The proposed project will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, wildlife and special aquatic sites. The life stages of aquatic life and other wildlife will not be adversely affected.
- g. Appropriate steps to minimize potential impacts to the aquatic ecosystem associated with construction of the CI & NS Plan will be followed.
- h. On the basis of the guidelines, the Proposed Action is specified as complying with the inclusion of appropriate and practical conditions to minimize contamination or adverse effects to the aquatic ecosystem.