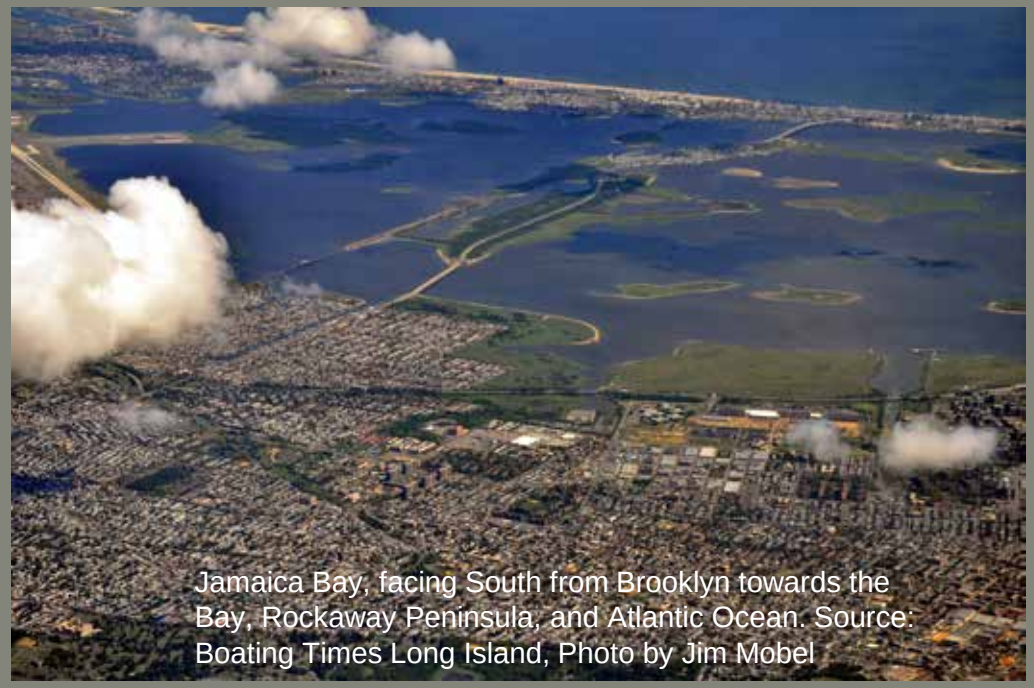
EAST ROCKAWAY INLET TO ROCKAWAY INLET HURRICANE SANDY GENERAL REEVALUATION STUDY FOR COASTAL STORM RISK MANAGEMENT

Public Meeting

In conjunction with the public review of the Revised Draft General Reevaluation Report & Environmental Impact Statement

October 2018



Jamaica Bay, facing South from Brooklyn towards the Bay, Rockaway Peninsula, and Atlantic Ocean. Source: Boating Times Long Island, Photo by Jim Mobel

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."

NYC Mayor's Office of Recovery & Resiliency

NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation

US Army Corps of Engineers
New York District

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AGENDA

Presentation will cover:

1. Background on the Rockaway Reformulation
2. Changes to the Recommended Plan
3. Analysis and recommendation for Jamaica Bay
4. Overview of natural and nature-based features and how they were included
5. Overview of Atlantic Shorefront recommendation
6. How to comment: fill out a card(s)
7. Next steps

Welcome & Poster Session:
6 – 6:30 p.m.
Presentation: 6:30 – 7:00 p.m.
Comments, Questions, and Discussion: 7 – 7:45 p.m.
Second Poster Session & Wrap Up:
7:45 p.m. – 8:15 p.m.

The purpose of this meeting is to present information contained in the Revised Draft Rockaway Report to facilitate public involvement in helping to foster better decision-making. To submit a comment on the changes to the Recommended Plan, fill out a comment card(s) with your questions/comments. Comments will be considered as part of the preparation of the Final Report and, if appropriate, will be incorporated into the design as it is refined.

The public comment period opened August 31st and ends October 22, 2018

Comments received will assist in the agency's evaluation of the project and will be reflected in the project record.

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ATLANTIC COAST AND JAMAICA BAY COASTAL STORM RISK

Problems

Significant risk to life safety, infrastructure and property from coastal flooding in the study area, as evidenced by Hurricane Sandy.

- 10 fatalities during Hurricane Sandy
- >1,000 structures destroyed or substantially damaged to restrict re-entry
- Disproportionate risk compared to other parts of NYC
  - 37% of the unsafe buildings after Sandy were in the Southern Queens portion of the study area
- Storm surge as high as 10 feet above ground in some areas during Sandy
- Frequent flooding from tides or smaller rains is a problem in many parts of the study area
- A line subway with 35,000 daily riders disrupted for over 6 months
- In southeastern Queens, 37 schools closed for up to 2 months
- Important coastal habitats damaged

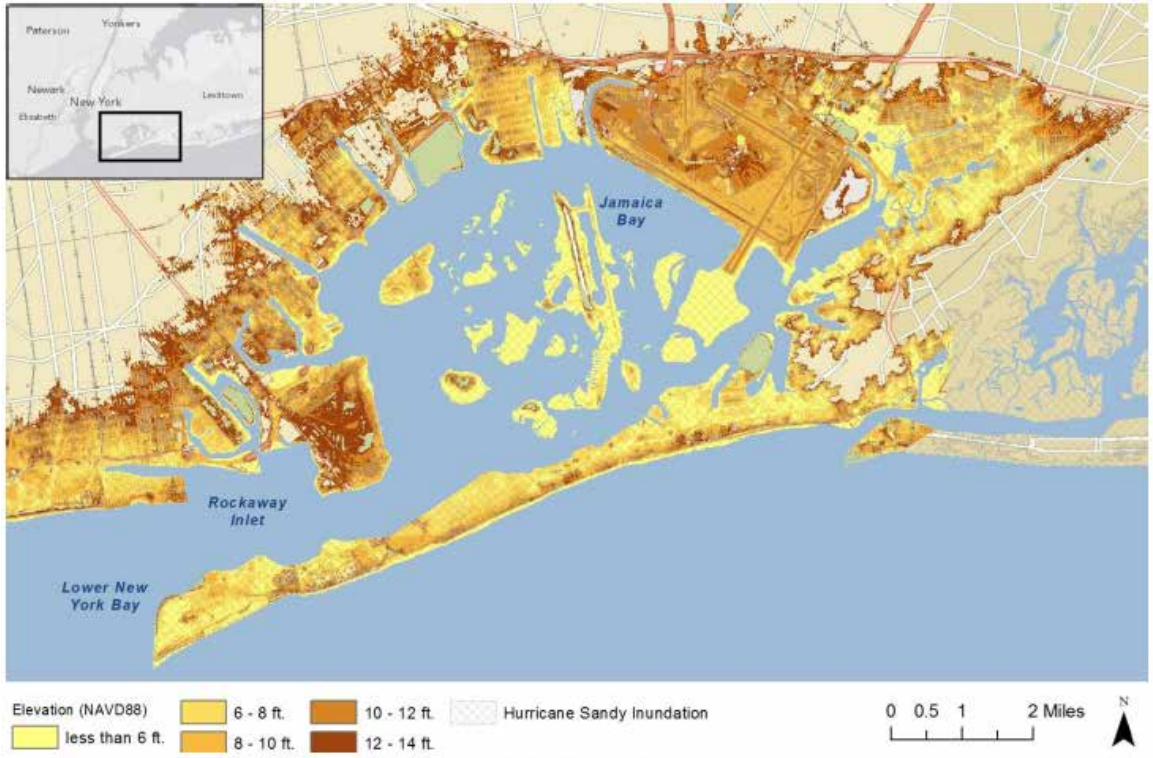

Figure 1-5: Approximate Historical Study Area Inundation at Various Water Elevations

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PURPOSE OF STUDY: MANAGE FLOOD RISK

The *Disaster Relief Appropriations Act of 2013* was passed by Congress and signed into law by the President on January 29, 2013 as Public Law 113-2 (P.L. 113-2). The legislation provides supplemental appropriations to address damages caused by Hurricane Sandy and to reduce future flood risk in ways that will support the long-term sustainability of the coastal ecosystem and communities and reduce the economic costs and risks associated with large-scale flood and storm events.

- 100% federally funded until appropriations run out

As interim fix, directly after Sandy:

- **3.5 million cubic yards of sand placed by USACE**
- More than 6 miles of beach widened and elevated
- City-funded betterment incorporated to elevate berm to provide additional risk reduction
- City's dune grass planting efforts further strengthen project
- City's *Build it Back* program offered buyouts, house raising, relocation through much of the project area
- **More coastal storm risk management than has ever existed in Rockaway**

Study Objectives

1. **Reduce vulnerability** to coastal storm risks;
2. Reduce future coastal storm risks in ways that will **support the long-term sustainability of the coastal ecosystem and communities**;
3. **Reduce the economic costs and risks** associated with large-scale flood and storm events;
4. **Improve community resiliency**, including infrastructure and service recovery from coastal storm events; and
5. **Improve coastal resilience** by reducing erosion and risk caused frequent flooding through the enhancement of natural storm surge buffers, also known as natural and nature-based features (NNBFs).

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BACKGROUND ON ROCKAWAY REFORMULATION

- Draft Report Released August 2016 à wide-ranging public and agency comments were received
- Tentatively Selected Plan in the 2016 Draft Report recommended a comprehensive $3B plan (which has since been revised) but included:
  - Storm surge barrier across Jamaica Bay inlet
  - Atlantic Shorefront seawall dune and beach system with groin enhancement
  - Smaller features in the Back-Bay to manage risk for frequent flooding when the barrier would remain open
  - The $5B “perimeter plan” of floodwalls and tributary gates around Jamaica Bay was screened out in favor of the above
- Public and Agency Input called for further analysis of proposed storm surge barrier across Jamaica Bay
- Numerous comments requested the inclusion of additional natural and nature-based features (NNBFs) in Jamaica Bay
- Equally, there were many comments requesting that the study be expedited to construct the Atlantic Shorefront feature earlier than proposed

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AGENCY DECISION ON STORM SURGE GATE

- Proposed storm barrier needed additional study (and appropriation) for construction à the barrier was moved to New York/New Jersey Harbor and Tributaries Feasibility Study (NYNJHATS)
  - NYNJHATS is looking at coastal storm risk management from a regional perspective, including analyzing a large barrier from Sandy Hook, New Jersey to Breezy Point, which would obviate the need for the proposed Rockaway storm surge barrier
- Remaining elements of the Rockaway TSP to be implemented with Sandy funding at 100% federal expense
  - Atlantic Shorefront composite seawall / dune + beach + erosion control features and renourishment
  - *High Frequency Flooding Risk Reduction Features* (HFFRRFs, formerly 'Residual Risk Features') are designed to complement a potential future storm surge barrier. *Natural and nature-based features* for increased resiliency were included wherever feasible.
- Each element must be justified as stand-alone feature (without the proposed storm surge barrier) and have a positive benefit-to-cost ratio

New York and New Jersey Harbor and Tributaries Study Area—The study team is evaluating a suite of storm surge barriers in the region to evaluate potential for regional storm risk management measures

REMAINING ELEMENTS AND REFINING THE BACK-BAY RECOMMENDATION

- The Atlantic Shorefront reach design
  - The reinforced dune is compatible with potential future implementation of a storm surge barrier and will not induce any flooding
- Refined element undergoing final feasibility design, impact analysis and screening:

  High Frequency Flooding Risk Reduction Features (HFFRRFs)
  - Natural and nature-based features have been added wherever feasible and justified (in up to four areas)
  - These features would complement the implementation of a storm surge barrier by reducing the frequency and duration of the barrier closure in low level storm events
  - Mapped flood extents for a range of high frequency flood events to identify the 'tipping point' for inundation where barrier closure would be most likely and designed HFFRRFs to manage risk for up to that size event
  - Frequency of closure could roughly double over 50 years with sea level rise (storm surge barriers lend themselves to adaptive management for sea level rise in the face of uncertainty, but this underscores the need for HFFRRFs)
  - Extended into parts of Nassau County

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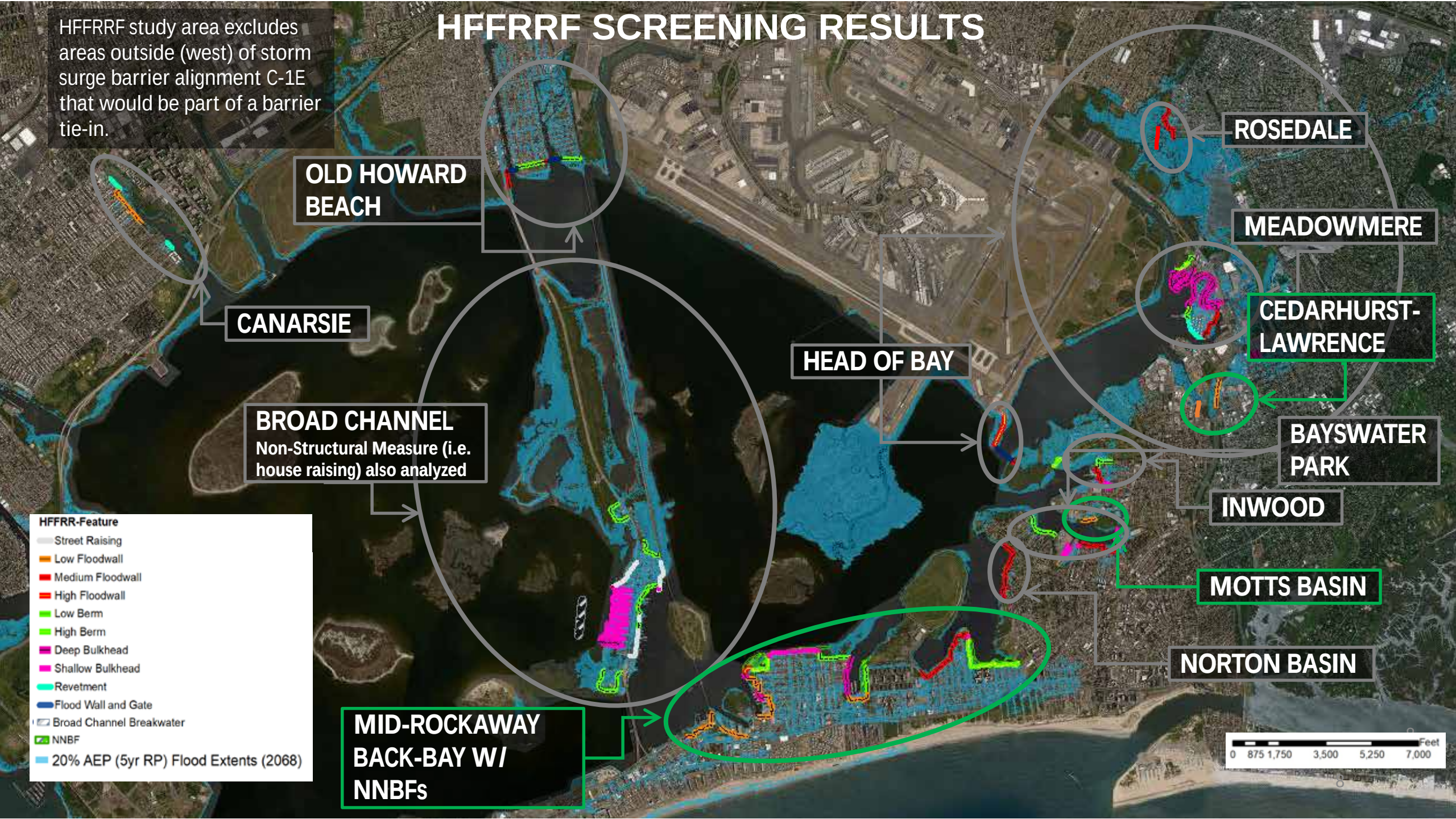
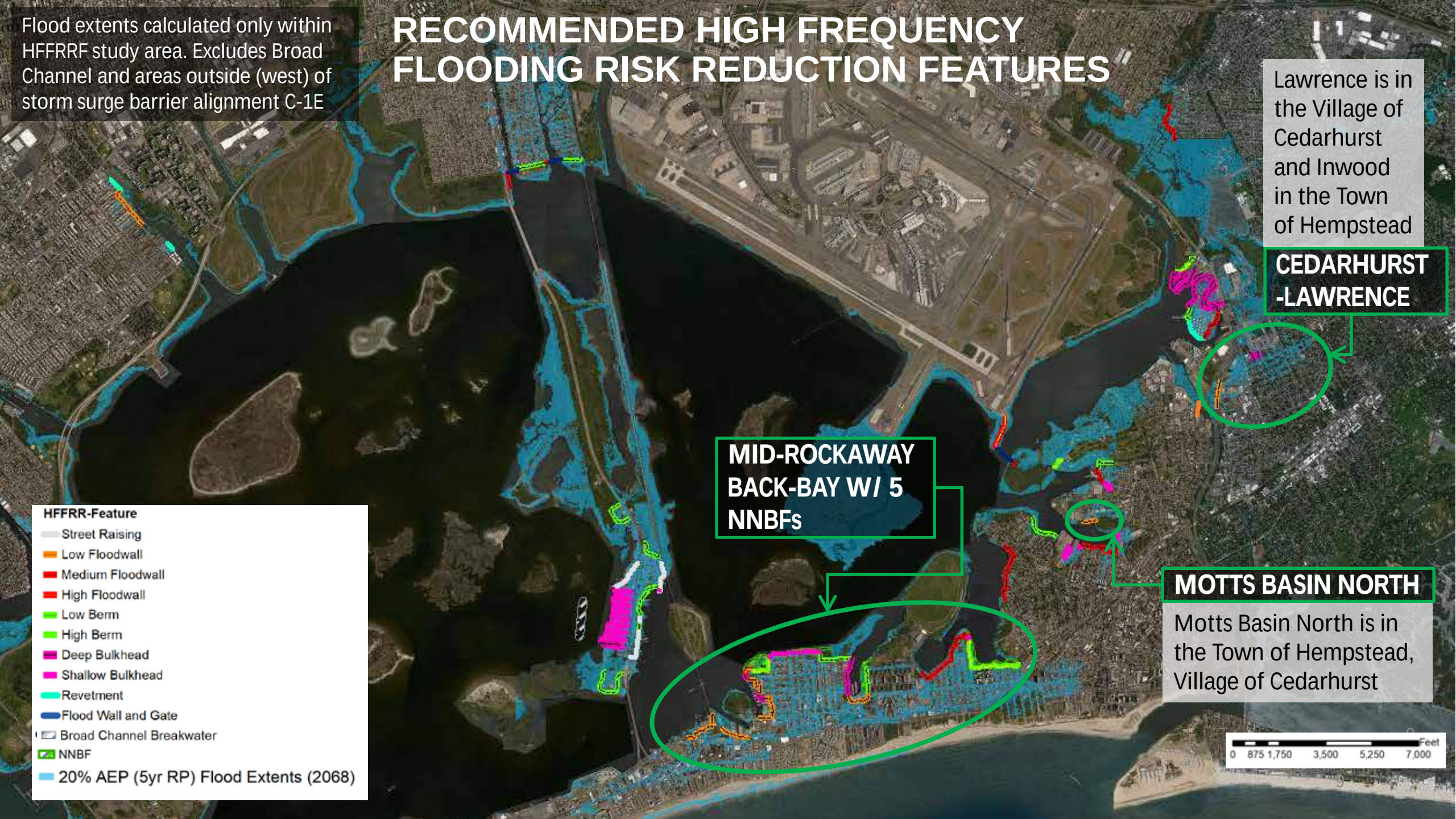
HFFRRF SCREENING RESULTS

HFFRRF study area excludes areas outside (west) of storm surge barrier alignment C-1E that would be part of a barrier tie-in.



RECOMMENDED HIGH FREQUENCY FLOODING RISK REDUCTION FEATURES

Flood extents calculated only within HFFRRF study area. Excludes Broad Channel and areas outside (west) of storm surge barrier alignment C-1E



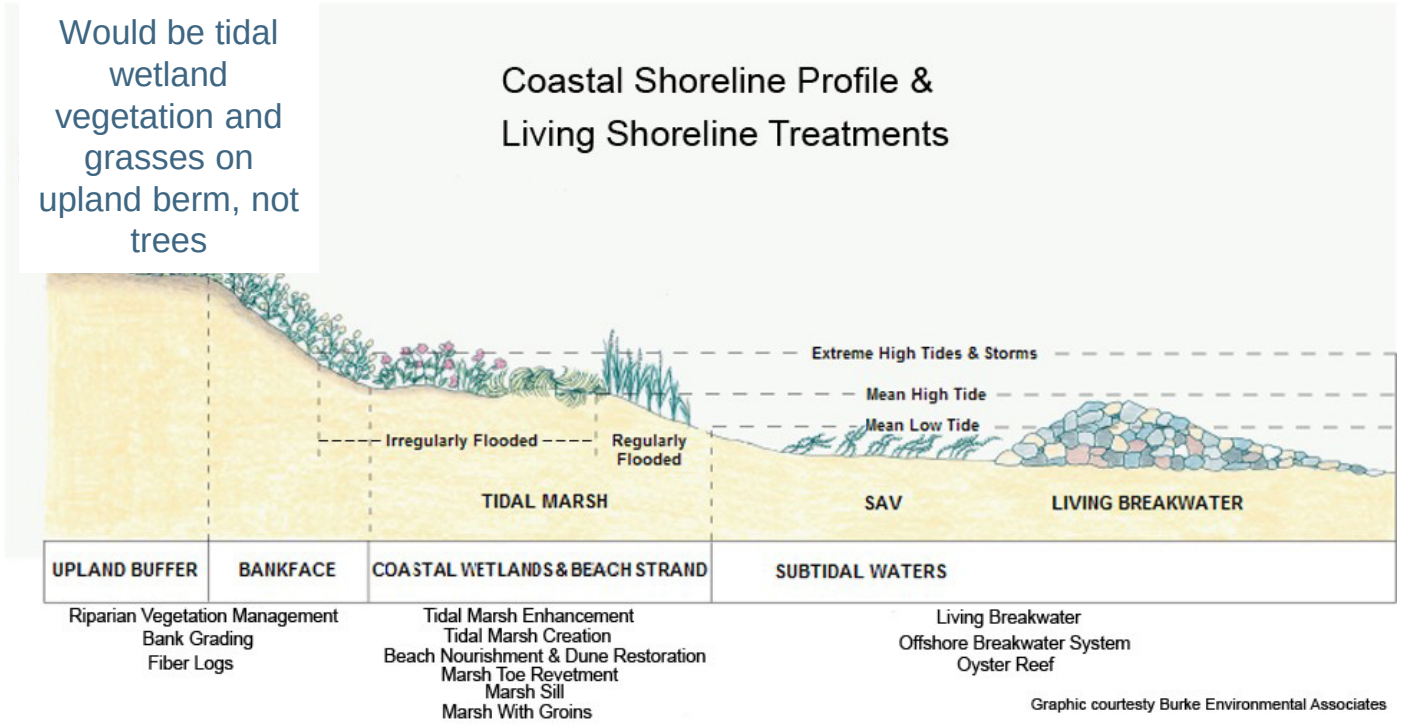
HFFRR FEATURE PLACEMENT CONSIDERATIONS

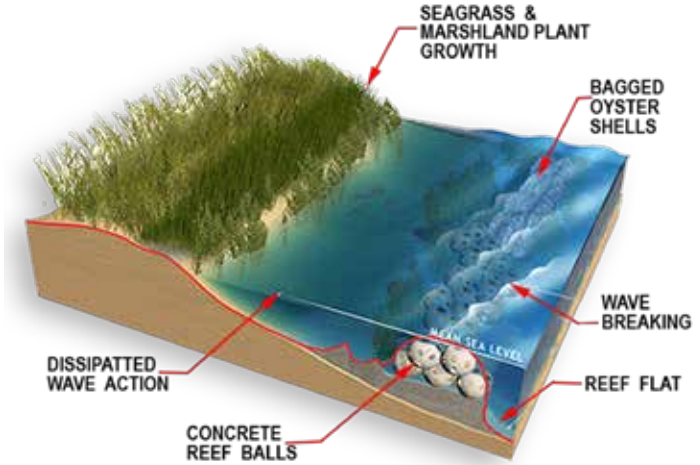
Existing Shoreline and Structural Features	HFFRR-Feature										
	Low Flood Wall	Medium Flood Wall	High Flood Wall	Shallow Bulkhead	Deep Bulkhead	Revetment	Natural and Nature Based Feature (NNBF): Berm & Limited Seaward Marsh Extension (Type A)	NNBF: Berm & Limited Landward Marsh Extension (Type B)	NNBF: Berm & Full Seaward marsh extension (Type A)	NNBF: Berm & Full Landward Marsh Extension (Type B)	Non-Structural (house raisings, buyouts, and/or flood-proofing)
Natural Shoreline	√	√	√				√	√	√	√	
Revetment						√					
Bulkhead				√	√						
Parks or Wetlands	√						√	√	√	√	
Street End	√	√	√	√	√						
Urban Waterfront Development	√	√	√	√	√						
Industrial Waterfront Development	√	√	√	√	√						
Separate Single Family Homes Not Densely Configured											√

CRITERIA USED TO SITE AND SCREEN NNBF LOCATIONS

- Addresses identified clusters of high frequency flooding
- Existing bathymetry and lateral space (would it fit?)
- Site suitability (appropriate NNBF type based on site conditions and ability to persist)
- Opportunity for NNBF to attenuate wave action/reduce erosion on berms designed to be overtopped, as HFFRRFs
- Constraint: Do not increase risk of wildlife hazards to planes; habitat type restrictions near JFK airport

Would be tidal wetland vegetation and grasses on upland berm, not trees





Source: ERDC, 2015, available at: https://ewn.el.erdc.dren.mil/nnbf/other/5_ERDC-NNBF_Brochure.pdf

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LOCAL EXAMPLE OF NATURAL AND NATURE-BASED FEATURE (NNBF)
HUNT'S POINT LANDING, BRONX, NY

BEFORE

Hunt's Point Landing shoreline before installation of nature based features. Photo looking southwest.

Aerial image of project site from June, 2010, before project implementation.

As part of the NYC Economic Development Corporation South Bronx Greenway, this ecological restoration project removed degraded industrial features, restored salt water habitat, improved stormwater treatment, and increased public access to the water. NNBFs used include establishment of high and low tidal marsh protected by in-water stone toe protection and rock sills

Project design diagram

AFTER

Hunt's Point Landing shoreline and park after the installation of nature based features. Photo looking west from new pier.

Source: HRNERR, available at: https://www.hrnerr.org/doc?doc=240203620

Aerial image of project site from October 2014, after project implementation.

NNBF example: Masonville Cove, Maryland

Establishment of Wetland Habitat behind rock sill structures, Post-Construction in 2013

NNBF Example: Masonville Cove, Maryland

Establishment of Wetland Habitat behind rock sill structures, 2015 (2 years after construction)

Proposed Jamaica Bay NNBFs in the Revised Recommended Plan

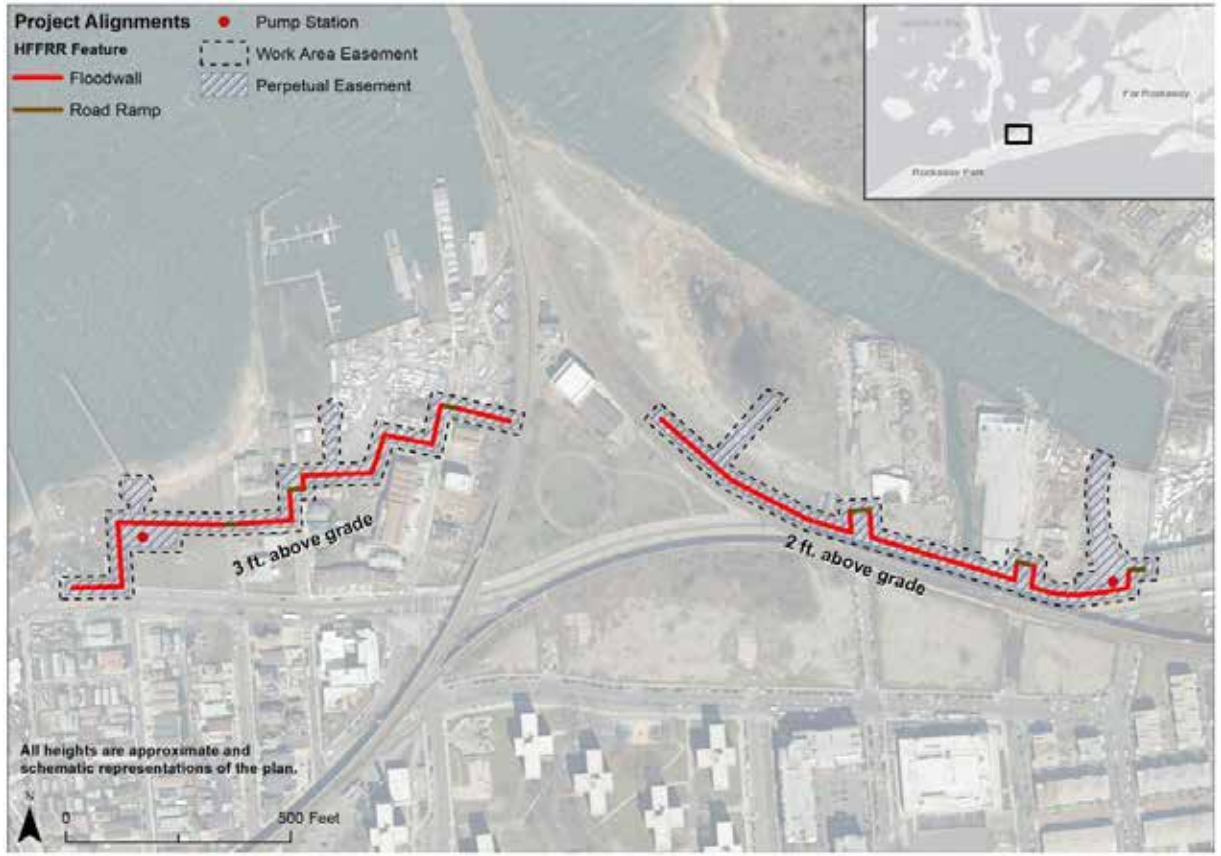
- In-water stone toe protection and rock sill to attenuate waves and allow tidal marsh establishment.
- Restoration and establishment of high and low tidal marsh habitat
- Restoration of maritime forest

Benefits

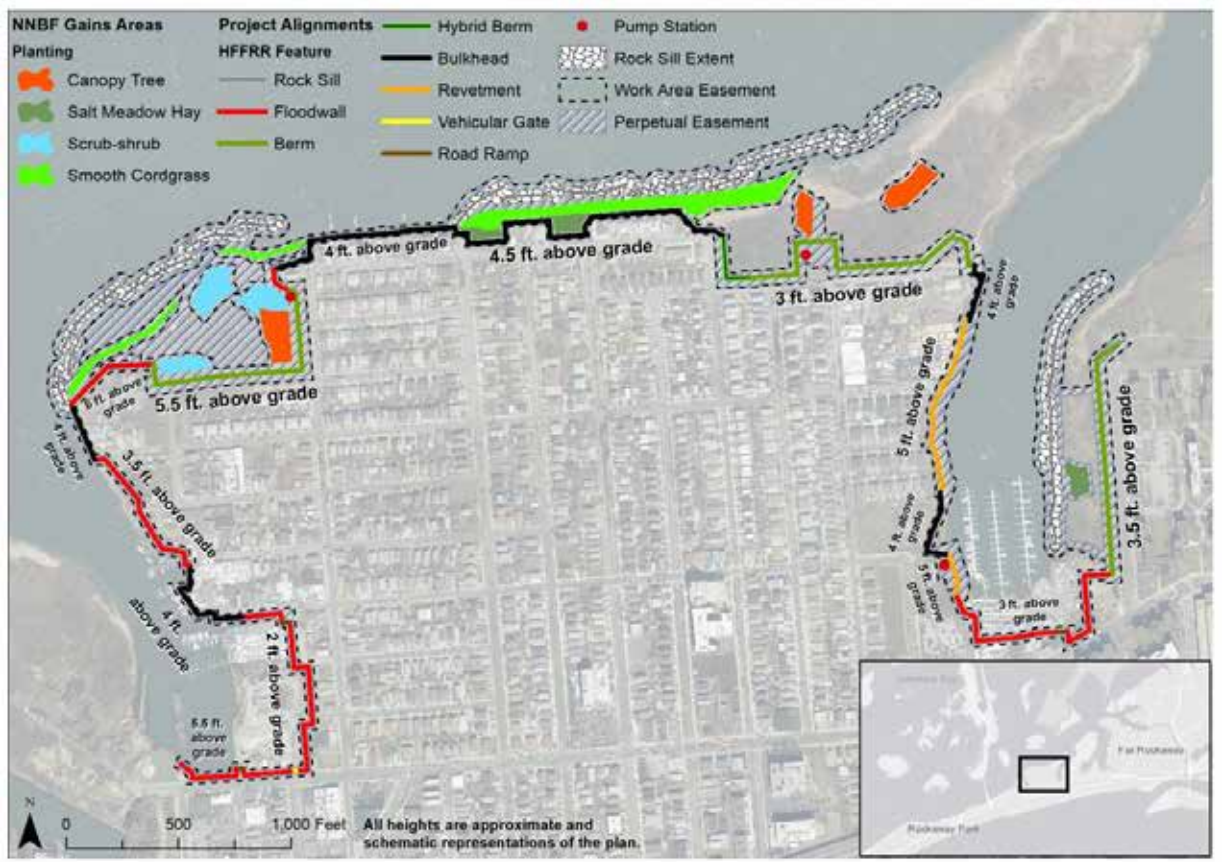
- Resilient to high frequency flooding and coastal storms
- Wave energy attenuation
- Improved coastal habitat
- Erosion control
- Sea level rise adaptability
- Storm water filtration
- Sediment retention
- Enhance aesthetics

RECOMMENDED HIGH FREQUENCY FLOODING RISK REDUCTION FEATURES

Mid-Rockaway – Hammels Area Project Plan



Mid-Rockaway – Arverne Area Project Plan



Total cost of Mid-Rockaway is $222.5 million with a BCR of 1.3. Three NNBF locations at Arverne and two at Edgemere, with a combination of floodwalls, berms, revetments, and bulkheads will serve to manage flood risk for storms up to the current 10% annual chance exceedance. Multiple pump stations and retrofitted plus new stormwater outfalls will help to drain these neighborhoods when the HFFRRF is overtopped during larger storms and will contribute to overall improved resiliency from flooding. The height of the features depends on existing elevation (i.e. lower elevations need higher features to prevent them overtopping first.

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RECOMMENDED HIGH FREQUENCY FLOODING RISK REDUCTION FEATURES

Total cost of Mid-Rockaway is $222.5 million with a BCR of 1.3. Three NNBF locations at Arverne and two at Edgemere, with a combination of floodwalls, berms, revetments, and bulkheads will serve to manage flood risk for storms up to the current 10% annual chance exceedance. Multiple pump stations and retrofitted plus new stormwater outfalls will help to drain these neighborhoods when the HFFRRF is overtopped during larger storms and will contribute to overall improved resiliency from flooding. The height of the features depends on existing elevation (i.e. lower elevations need higher features to prevent them overtopping first.

Mid-Rockaway – Edgemere Area Project Plan

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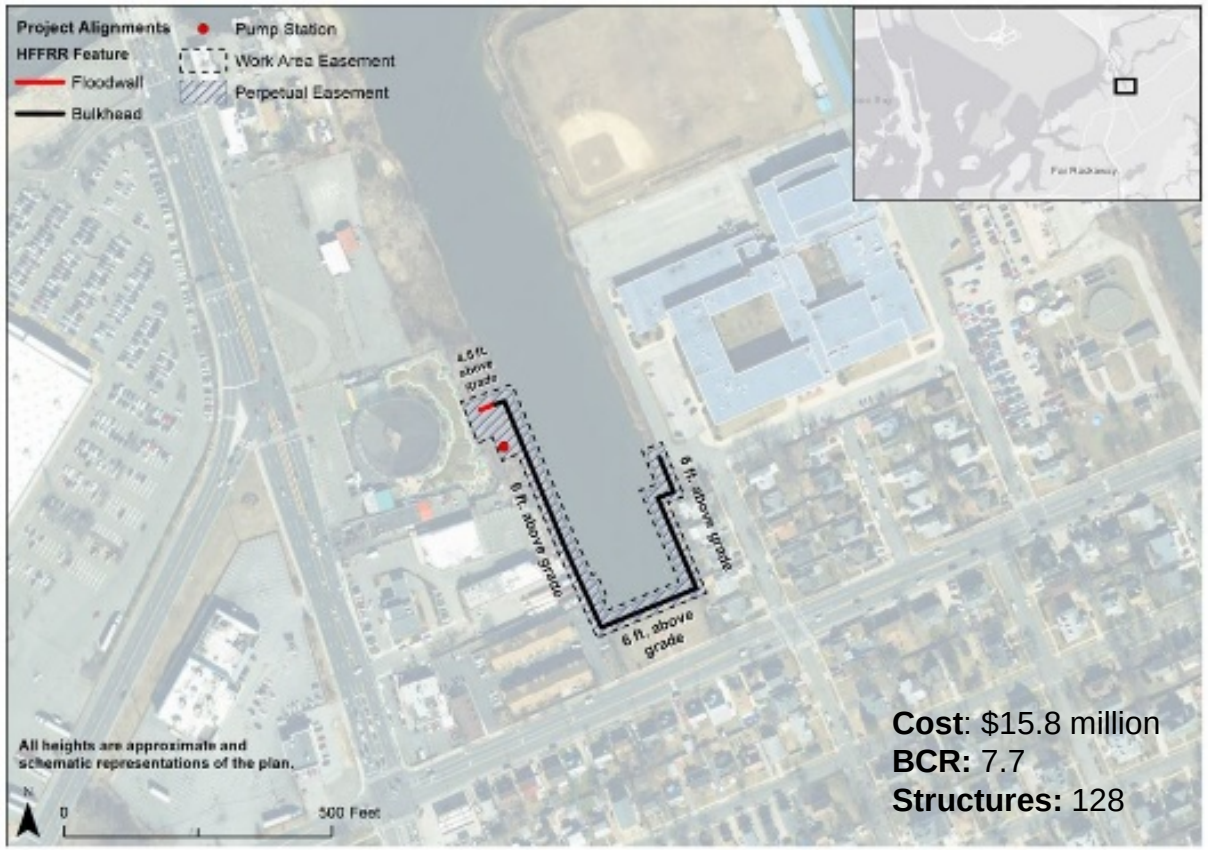
RECOMMENDED HIGH FREQUENCY FLOODING RISK REDUCTION FEATURES

Cedarhurst-Lawrence Project Plan



Cost: $15.8 million
BCR: 7.7
Structures: 128

Cedarhurst-Lawrence would keep water from the canal from entering nearby low-lying neighborhoods during storms up to the current 10% annual chance storm. Retrofitted interior drainage and a pump station would help drain water back into the canal when the bulkheads are overtopped during bigger storms, improving resiliency.

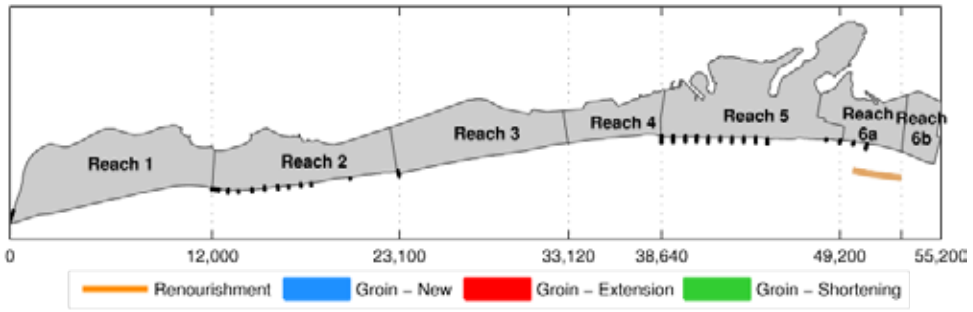
Motts Basin North Project Plan

Cost: $3.16 million
BCR: 1.0
Structures: 18

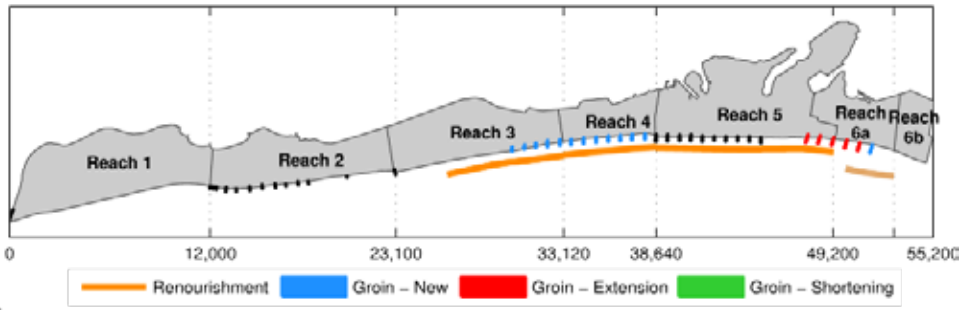
At Motts Basin North a low floodwall and retrofitted outfall is recommended. This is the only HFFRRF that does not require a pump station to drain the interior area of the project once overtopped during storms larger than a current 10% annual chance event.

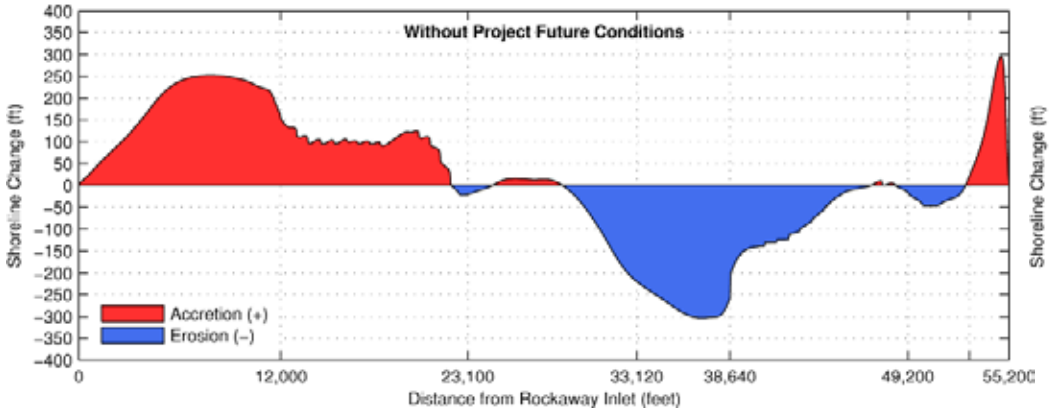
ATLANTIC SHOREFRONT SEDIMENT MODELING RESULTS

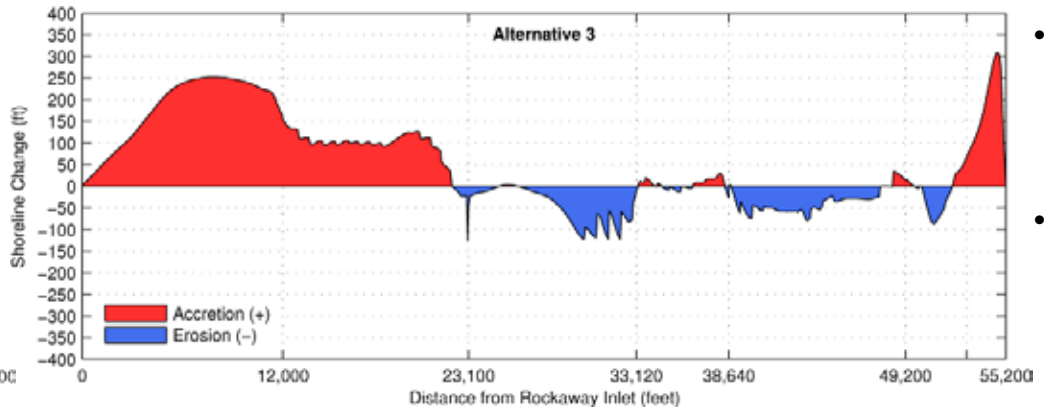
Modeled Shoreline Change: Future Without Project Conditions



Modeled Shoreline Change: Recommended Plan







Reach Number	Boundaries
Reach 1	Rockaway Point to Beach 193rd St. (Breezy Point)
Reach 2	Beach 193rd St. to Beach 149th St. (National Parks Service, Jacob Riis & Fort Tilden)
Reach 3	Beach 149th St.to Beach 109th St.
Reach 4	Beach 109th St. to Beach 86th St.
Reach 5	Beach 86th St. to Beach 42nd St.
Reach 6	Beach 42nd St. to Beach 9th St.

Pre-Construction Engineering & Design Phase

- Incorporate new surveys
- Further refine design
- Phased design/construction enables earlier implementation

Coastal Engineering

- Beaches are inherently dynamic systems where sand erodes and accretes naturally, i.e. beaches left to their own devices move and change
- Storms and offshore topography affect how beaches erode or accrete over time
- Without Project Future Conditions (graph on left) used available historic data to identify long-term trends on where erosion hotspots are

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Recommended Plan Shorefront Features
(Beach Berm and Dune with Groin Construction and Groin Modification)

- Reinforced vegetated dune and beachfill from Beach 9th St. to Beach 149th St. Construction of 12 new groins between Beach 90th to Beach 122nd
- Enhancement of existing groin field from Beach 36th to Beach 49th (extending groins) and new groin at Beach 34th.

Note: Comment received that groins are needed in Belle Harbor and Neponsit. This will be looked at during the Preconstruction Engineering and Design Phase.

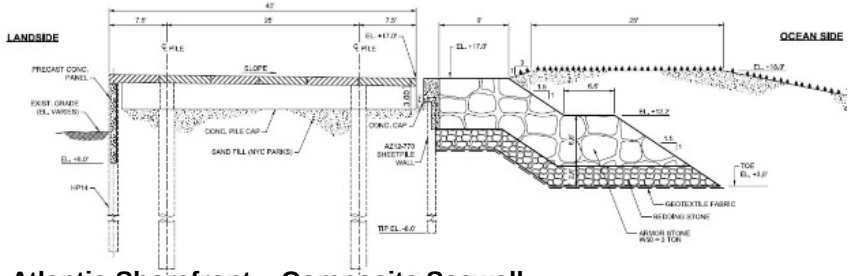
Dune Construction and Beachfill

- Dune crest elevation +18 feet NAVD88
- Estimated total initial beach fill equals 1,596,000 cubic yards
- Renourishment (every 4 years) equals 1,021,000 cubic yards

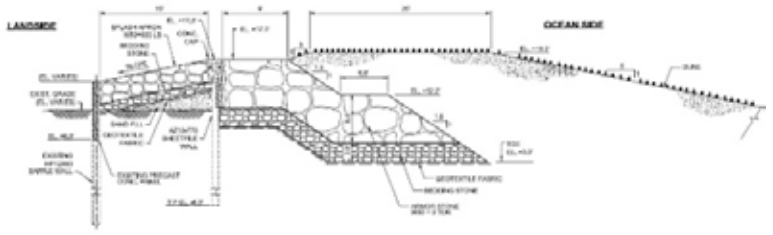
Cost: $285 million
BCR: 3.2
Structures: 898

Composite Seawall Construction

- Seawall crest elevation +17 feet NAVD88
- Armor stone significantly reduces wave breaking pressure, which allows smaller steel sheet pile walls to be used in design
- May be adapted in the future to rising sea levels



Atlantic Shorefront – Composite Seawall
(Beach 126th St to Beach 149th St)

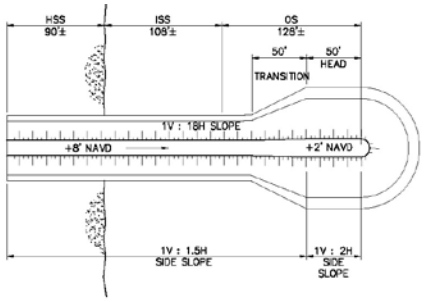


Atlantic Shorefront – Composite Seawall
(Beach 9th St to Beach 126th St)

Groin Construction

34th St new groin - 498 ft
37th St extend groin - 209 ft
40th St extend groin - 307 ft
43rd St extend groin - 114 ft
46th St extend groin - 155 ft
49th St extend groin - 180 ft
92nd St new groin - 302 ft
95th St new groin - 298 ft
98th St new groin - 299 ft
101st St new groin - 298 ft
104th St new groin - 302 ft
106th St new groin - 303 ft
108th St new groin - 302 ft
110th St new groin - 351 ft
113th St new groin - 376 ft
115th St new groin - 376 ft
118th St new groin - 376 ft
121st St new groin - 299 ft
Reach 2 new groin (1) – 369 ft
Reach 2 new groin (2) – 413 ft
Reach 2 new groin (3) – 431 ft

Typical groin section



Typical groin layout

HOW TO COMMENT

The documents are available at:

http://www.nan.usace.army.mil/Rockaway

The public comment period opened August 31st and **ends October 22, 2018**

Comments received will assist in the agency's evaluation of the project and will be reflected in the project record.

For information about the project contact:
Mr. Daniel Falt
Project Manager
New York District Corps of Engineers
Attn: CENAN-PP
26 Federal Plaza New York, NY 10278
Email: Daniel.T.Falt@usace.army.mil

Send Comments to:
Ms. Daria Mazey
Project Biologist & Planner
New York District Corps of Engineers
Attn: CENAN-PL-E, Rm 2141
26 Federal Plaza, New York, NY 10278
Email: Daria.S.Mazey@usace.army.mil

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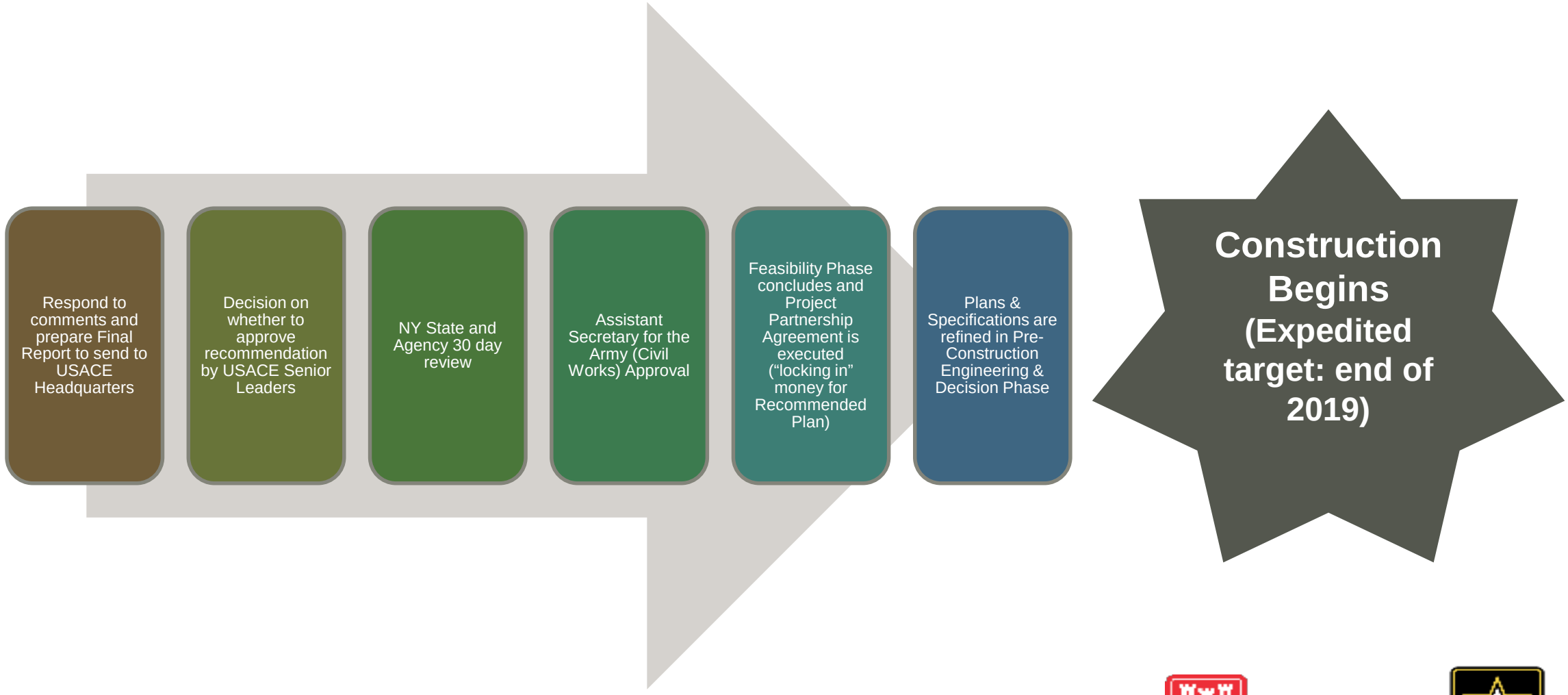
NEXT STEPS & SCHEDULE FOR ROCKAWAY REFORMULATION



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QUESTIONS & COMMENTS

If you would like your comment or question read aloud and answered here, please write it down and pass it the team members collecting them

If you prefer to have a discussion with team members directly, we will be available 7:45-8:15 by the posters for any direct follow-up and discussion

Thank you for coming and participating in this important study.

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BACKUP SLIDES

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New York-New Jersey Harbor and Tributaries Coastal Storm Risk Management Feasibility Study

NEXT STEPS & FURTHER OPPORTUNITY FOR PUBLIC INVOLVEMENT on NYNJHATS

- § Scoping Period through November 5th
- § Release of the Draft Interim Report – Winter 2019
- § Public/ Agency Reviews with Public Meetings
- § Draft Feasibility Report and Tier 1 EIS – Spring 2020
- § Public/ Agency Reviews with Public Meetings
- § Optimization of the Selected Plan
- § Final Feasibility Report and Tier 1 EIS – Spring 2021
- § Chief's Report – Summer 2022
- § Public Involvement during Pre-Construction Engineering and Design Phase –Tier 2 EIS

*The red boxes indicate the best opportunities for the public to provide input to the study.

The scoping period extends until **November 5, 2018.** Comments and input submitted by this deadline will be used to develop the Draft Interim Report. Comments received after the deadline are welcome and will be used to help identify the Tentatively Selected Plan (TSP) in 2020.

Once the Draft Interim Report is released, the public and agencies will have a chance to review and submit comments and public meetings will be held as part of the public review period. The comments are used to inform the agency as it moves to identifying the TSP.

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NYNJHAT STUDY SCHEDULE

Milestones	
Milestones	**Dates***
Draft Interim Report	Winter 2019
Draft Feasibility Report and Tier 1 EIS	Spring 2020
Final Feasibility Report and Tier 1 EIS	Spring 2021
Chief's Report (for Congress)	Summer 2022

* The schedule is contingent upon available funding, non-federal partner support, and concurrence by Corps higher-authority offices.

New York-New Jersey Harbor and Tributaries
Coastal Storm Risk Management Feasibility Study

HOW TO GET INVOLVED

Scoping Comments

Send any questions and/or comments to NYNJHarbor.TribStudy@usace.army.mil

OR

Fill out and submit a comment card at a scoping meeting

Scoping Comment Period open through **November 5, 2018**

Project Webpage

http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/

Stakeholder Mailing List

Email NYNJHarbor.TribStudy@usace.army.mil if you would like to join our mailing list and receive periodic updates.

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CONSIDERATION OF ENVIRONMENTAL IMPACTS

US Army Corps of Engineers
New York District

NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

Impacts Considered: Benthic Communities, Fisheries, Shorebirds, Water Quality, Air Quality and Noise, Cultural Resources, Aesthetics, Surfing, Fishing, Beach Usage

Impacts Avoided or Minimized

Benthic:
Short term, recovery expected within 2 - 6.5 months nearshore and 1.5 to 2.5 years offshore following construction

Intertidal: High Frequency Flooding Risk Reduction Features have been designed to avoid wetlands and mudflats as much as possible. Where wetlands may be impacted, Natural and Nature-Based Features (NNBFs) are incorporated into self-mitigating designs

Fisheries:
No long-term impacts expected, will generally avoid construction area. Integration of NNBFs may increase habitat for fisheries species.

Shorebirds/Endangered Species:
No construction during breeding season
Avoidance and enhancement of existing foraging/nesting habitats
NOAA concurrence received that project *May Affect But Not Likely to Adversely Affect* marine endangered and threatened species

Water Quality:
No significant impacts

Air Quality and Noise:
No significant impacts. Mitigation provided to offset minor air quality impacts

Aesthetics:
New sand similar to the existing beach

Unavoidable, Minimal &Temporary Recreational and Environmental Impacts

Beach Access:
Temporary disruption to beach access via walkovers over the dune

Aesthetics:
Potential impacts to view of beach from north side of the dune

Surfing and Fishing:
Will be temporary and will dissipate as the beach returns to equilibrium

Beach Usage:
Impacts end as construction moves along the beach

Groins/Jetties:
Impact local shoreline sand supply, disrupt benthic habitat, provide vertical and structural habitat for many marine organisms;
Potential adverse effect to buried cultural resources

Seawalls:
Reduce aquatic-terrestrial connectivity. Reducing spawning habitat for forage fish. Potential loss of upper beach and backshore altered sediment transport (loss of beach shoreward of the structure);
Potential adverse effects to buried cultural resources

US Army Corps of Engineers

U.S.ARMY

Rockaways History of Coastal Projects

- State & City Projects constructed 1927 – 1975
  - Over 12 Million CY of sand placed
  - Several hundred groins built, stone and wood
- Joint Corps, State, City Project 1975 - 2012
  - Approximately 19 Million CY of sand placed
  - Terminal groin constructed (1979)

Before and After
Initial Construction 1975

Corps Project (Authorized in 1965)

Beach Erosion Control and Hurricane Protection Project

Beach Erosion Control Features:
- Beach Berm at +10 ft MSL, up to 200 ft wide, length - 6 miles
- 5 M CY of sand placed for initial construction
- Renourished for a period of 10 years, each of 1M CY

Hurricane Protection Features:
- Hurricane Barrier w/ Navigation gate across Rockaway Inlet
- Floodwall at +18 ft MSL, for 7.7 miles along Rockaway

Authorized Project

Corps Construction

1974 Corps authorized separate construction of "beach erosion control" portion plus 10-years of renourishment

Constructed in 1975-1977
Terminal groin added at Beach 149th Street in 1979
Project Renourished through 1987

"Hurricane Protection Features" were de-authorized by Congress

In 1993, approved to extend renourishment
Renourishment undertaken in 1996, 2000, 2004

Constructed Project Cross-Section

US Army Corps of Engineers
New York District

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

NYC Mayor's Office of Recovery & Resiliency

Post-Sandy Projects

The Corps has worked with partners in NYC and New York State to build a robust coastal storm risk management project along the Atlantic Coast of Rockaway

- **3.5 million cubic yards of sand placed**
- More than 6 miles of beach widened and elevated
- City-funded betterment incorporated to elevate berm to provide additional risk reduction
- City's dune grass planting efforts further strengthen project
- **More coastal storm risk management than has ever existed in Rockaway**

New York/New Jersey Harbor & Tributaries Study (NYNJHATS)

- The Rockaways are within the NYNJHATS study area, which is one of the 9 high-risk focus areas identified in the North Atlantic Coast Comprehensive Study (NACCS)
- Study is investigating comprehensive coastal storm risk management alternatives for the region.
- **Further analysis and potential recommendation of the proposed Rockaway storm surge gate will be performed under NYNJHATS**