

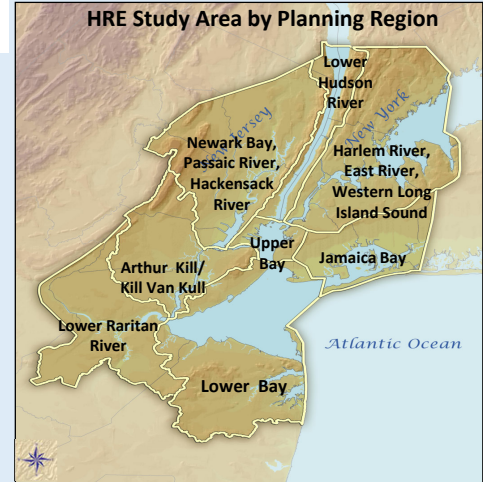
Hudson Raritan Estuary (HRE) Ecosystem Restoration Project, New York and New Jersey

Integration of six feasibility studies (four authorizations) with ten sponsors/partners:

- HRE (8 Planning Regions)
- HRE - Lower Passaic River
- HRE – Hackensack Meadowlands
- Flushing Creek and Bay
- Bronx River Basin
- Jamaica Bay Marine Park, and Plumb Beach



1



Purpose: The purpose of the study was to **restore significant ecological function, structure, and dynamic process** that have been degraded throughout the Hudson Raritan Estuary. Restoration is needed due to the long-term historic habitat degradation and loss via urbanization and industrialization.

Nationally Significant Estuary

2

Institutional Significance:

- Estuary of National Importance- National Estuary Program
- Ecosystems of National Significance
- One of the largest estuaries in the U.S
- Second largest Port in the U.S.
- HRE Comprehensive Restoration Plan (Regional Goals)
- Regionally Significant Coastal Habitat
- Migratory Bird Treaty Act
- Urban Waters Federal Partnership (Passaic & Bronx Rivers)
- National Estuarine Research Reserve System

Technical Significance:

- Wetland habitat is extremely scarce and actively declining nationally (99% freshwater >85% of estuarine wetlands)
- Provides habitat for 27 Federally-listed species of special status, 2 candidate species, 400 plant and animal species of special emphasis
- Atlantic Flyway - stop-over point for >500 avian species



Public Significance:

- Home to over 13 million people
- Collaboration with over 120 federal and state agencies, academic institutions, nonprofit and community organizations to restore the HRE

Key Problems

3



Lost/Degraded Wetlands



Disappearing Marsh Islands



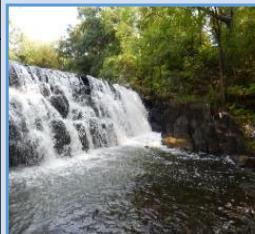
Hardened Shorelines

- Significant habitat loss within study area:
>85% estuarine wetlands lost
> 99% freshwater wetlands lost
~2,000 acres of marsh islands in Jamaica Bay lost
- Filled, eroded, and hardened shorelines
- Loss of ~100% of oyster reefs
- Barriers to fish passage impede spawning and access to habitat
- Scarce habitat and lack of connectivity
- Bed and bank erosion
- Decrease in habitat diversity
- Increase in invasive species
- Poor benthic habitat
- Altered hydrology degrades habitat
- Straightened and deepened channels degrade habitat
- Loss of >95% of eelgrass beds
- Poor sediment and water quality

Objectives

4

1. Restore the structure, function, and connectivity, and increase the extent of **estuarine habitat**.
2. Restore the structure and function, and increase the extent of **freshwater riverine habitat**.
3. Restore the structure and function, and increase the extent of **marsh island habitat** in Jamaica Bay.
4. Increase the extent of **oyster reefs**.



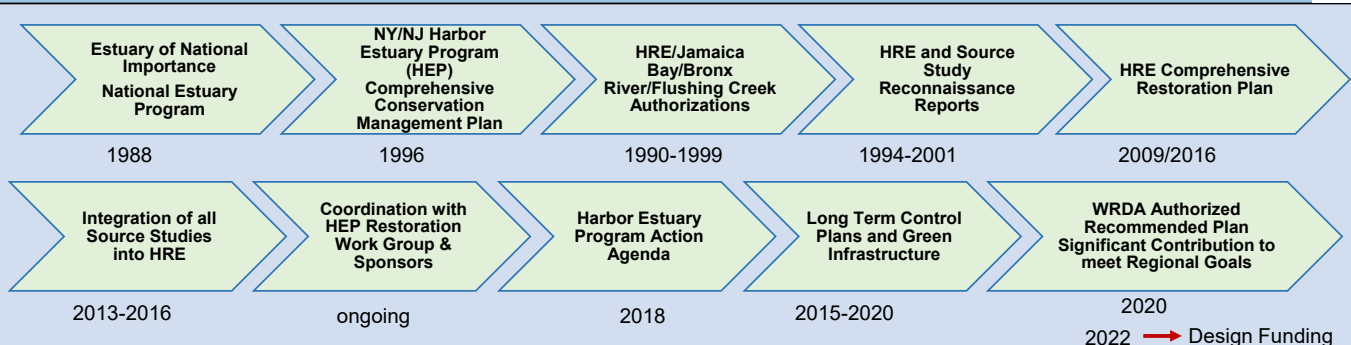
Fish Passage Barriers



Degraded/Eroding Shorelines

Comprehensive Restoration Strategy

5

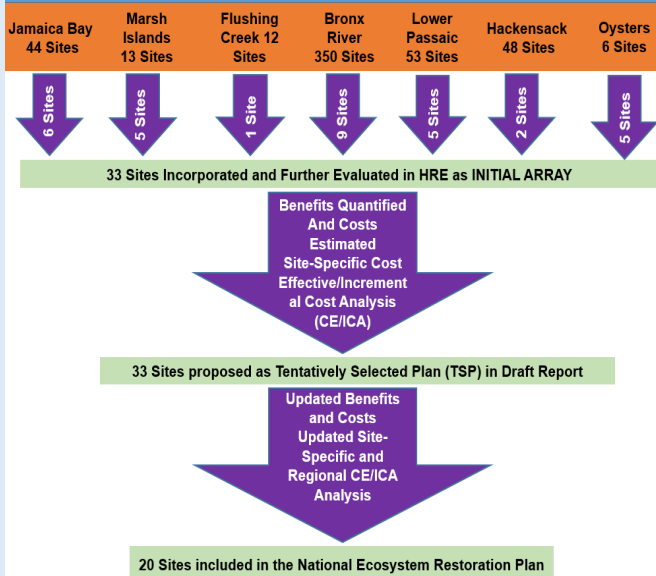


U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT



Hudson-Raritan Estuary Ecosystem Restoration Study

500+ Restoration sites originating from the Comprehensive Restoration Plan (CRP), USACE "source" studies, and the New York-New Jersey Harbor & Estuary Program Restoration Work Group



- Site Screening of 500+ Sites among the 6 "source" studies
- Criteria (including physical constraints, known upland contamination, real estate, sponsor readiness, habitat value, etc.)
- 99 Alternatives were developed at 33 sites
- Management Measures considered: excavation, invasives removal, regrading, native plantings, stream bed restoration, in-stream structures (j-hooks, cross vanes), streambank reestablishment, channel dredging, oyster reefs, fish ladders
- Cost estimated/benefits quantified with approved models including Evaluation of Planned Wetlands, Oyster Habitat Suitability Model and Watershed Scale Connectivity Toolkit
- Plan Evaluation and Comparison: Site and Regional (1,256 plans) Cost Effectiveness/Incremental Cost Analysis, planning objectives, secondary decision factors
- 20 Sites Recommended for construction

Environmental Compliance- 2020

- ✓ Environmental Assessment completed
- ✓ All coordination completed (Endangered Species Act, Fish and Wildlife Coordination Act Report, Essential Fish Habitat)
- ✓ Section 106, Programmatic Agreement
- ✓ Preliminary Water Quality Certificates and Coastal Zone Consistency
- ✓ Supported by State and Federal Resource Agencies

7

The Recommended Plan

- The **National Ecosystem Restoration (NER) Plan** is the restoration of **20 restoration sites** within the HRE that address long-term and large-scale degradation of aquatic habitat.
- Restoration supports Comprehensive Restoration Plan's regional goal, "to develop a mosaic of habitats that provides society with renewed and increased benefits from the estuary environment".
- **NER Plan** provides restoration of approximately:
 - ✓ 381 acres of **estuarine wetlands** including 16 acres/30,650 linear feet of tidal channels;
 - ✓ 50 acres of **freshwater riverine wetlands**;
 - ✓ 27 acres of **maritime forest/uplands**;
 - ✓ 39 acres of **shallow water habitat**;
 - ✓ 52 acres of **oyster habitat**;
 - ✓ 1.6 miles of **streambank restoration**;
 - ✓ 72 acres of **bed and channel restoration**; and
 - ✓ **Two fishways** would be installed and three weirs would be modified to re-introduce or **expand fish passage (24 miles)** along the Bronx River.
- **Future spin-off feasibility studies** to be carried out under the existing HRE authority.



Cost Summary (FY27 Price Levels)

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Project Total First Cost	\$564,137,000	Project Total Fully Funded Cost	\$792,774,000
Project Total Fully Funded Federal Cost (65%)	\$515,302,810	Project Total Non-Federal Share (35%)	\$277,470,740

Costs for each HRE Site in Following Table

Significance of Recommended Plan

9

621 Total Acres of Nationally Significant Habitat Restored

- Restoration of 431 acres of wetland habitat that is extremely scarce and actively declining nationally
- Habitat supports 27 Federally-listed species
- Key stop-over points for migratory birds (>500 species) along the Atlantic Flyway
- Estuarine marshes/wetlands serve as nursery, feeding, spawning sites and refuge to predators
- Reconnecting scarce and fragmented habitat
- Connectivity for migratory fish (anadromous and catadromous)
- Marsh island restoration of 175 acres of habitat in Jamaica Bay to counteract the loss of >2,000 acres providing ecosystem benefits and secondary coastal storm risk management benefits to coastal communities

Recommended Sites and Measures/Habitat Type at Each Site



Restoration Measures/Habitat Types

- | | | |
|------------------------------|--------------------------|---------------------------|
| 1. Estuarine Wetlands | 4. Oyster Reefs | 7. Streambank Restoration |
| 2. Tidal Channel Restoration | 5. Shallow Water Habitat | 8. Bed Restoration |
| 3. Maritime Forest | 6. Freshwater Wetland | 9. Fish Passage |
| | | 10. Sediment Forebay |

Engineering and Design Phase: 2022- Stony Creek Marsh Island, Flushing Creek, Oysters at Naval Station Earle and Bronx Zoo & Dam/Stone Mill Dam Projects; **2024-** Fresh Creek Project and Duck Point Marsh Island

Feasibility Study Spin-Off: 2025- HRE-Harlem River Ecosystem Restoration Feasibility Study (pending Feasibility Cost Share Agreement)

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2027 Price Levels) [as of 10 April 2025]							
Site	Project Description: Current Habitat Types and Actions (Acres/Linear Feet/Miles)	Local Sponsor	Phase Cost	Total (\$)	Federal (65%)(%)	Non-Federal (35%)(%)	Status
Jamaica Bay Planning Region – Perimeter Sites							
Dead Horse Bay	Low Marsh (19 acres); High Marsh (5.4 acres); Scrub/Shrub (6.2 acres); Upland (8 acres) Tidal Channels (2.31 acres) [Total Habitat: 40.91 acres]	NYCDEP NYSDEC NPS*	Total Project	\$86,732,000	\$56,375,800	\$30,356,200	To be coordinated with NPS Remedial Action.
			Engineering & Design	\$7,161,000	\$4,654,650	\$2,506,350	
			Construction	\$79,571,000	\$51,721,150	\$27,849,850	
Fresh Creek	Low Marsh (16.1 acres); High Marsh (4.4 acres); Scrub/Shrub (3.6 acres); Maritime Forest (10.7 acres); Bed/Channel Restoration (45.08 acres) [Total Habitat: 79.88 acres]	NYCDEP NYC Parks*	Total Project	\$55,927,000	\$36,352,550	\$19,574,450	*\$500,000 provided in FY23 Appropriations Bill *\$2,275,000 provided in FY24 Appropriations Bill *DA executed 5/29/24 *Preparing SOW for completion of P&S
			Engineering & Design (FY24)	\$5,000,000	\$3,250,000	\$1,750,000	
			Construction	\$50,927,000	\$33,102,550	\$17,824,450	
Total Cost:				\$142,659,000	\$92,728,350	\$49,930,650	
Jamaica Bay Planning Region – Marsh Islands							
Stony Creek	Low Marsh (24.7 acres); Transition Zone (6 acres), High Marsh (8.9 acres); Scrub/Shrub (3.3 acres); Tidal Channels (1.1 acres); Shallows (3.6 acres) [Total Habitat ~48 acres using ~375,000 CYD of dredge material] (60% designs)	NYCDEP NPS*	Total Project	\$35,920,000	\$23,348,000	\$12,572,000	* Funding provided in FY22 Appropriations Bill (\$300,000) and Infrastructure and Investment and Jobs Act (IIJA) (\$19,461,500) *DA executed 7/28/22 *Completed 60% designs 3/25
			Engineering & Design (FY22)	\$3,182,300	\$2,068,495	\$1,113,805	
			Construction	\$32,737,700	\$21,279,505	\$11,458,195	
Duck Point	Low Marsh (24.9 acres); High Marsh (5.6 acres); Scrub/Shrub (8.1 acres); Tidal Channels (1.03 acres); Shallows (7.57 acres) [Total Habitat: 47.2 acres using ~400,000 CYD of dredge material]	NYCDEP NPS*	Total Project	\$34,293,000	\$22,290,450	\$12,002,550	*Funding provided (\$2,750,000) from the IIJA FY23 Summer Spend Plan *DA executed 5/29/24 * Field Work Completed * 30% designs initiated 7/25
			Engineering & Design (FY24)	\$3,500,000	\$2,275,000	\$1,225,000	
			Construction	\$30,793,000	\$20,015,450	\$10,777,550	
Pumpkin Patch West	Low Marsh (13.7 acres); High Marsh (8.61 acres); Scrub/Shrub (.9 acres); Tidal Channels (0.74 acres); Shallows (3.88 acres) [Total Habitat: 27.83 acres using 327,686 CYD of dredge material]	NYCDEP NPS*	Total Project	\$37,501,000	\$24,375,650	\$13,125,350	
			Engineering & Design	\$3,706,000	\$2,408,900	\$1,297,100	
			Construction	\$33,795,000	\$21,966,750	\$11,828,250	
Pumpkin Patch East	Low Marsh (15.6 acres); High Marsh (10.1 acres); Scrub/Shrub (3.1 acres); Tidal Channels (0.58 acres); Shallows (5.22 acres) [Total Habitat: 34.6 acres using 351,952 CYD of dredge material]	NYCDEP NPS*	Total Project	\$45,302,000	\$29,446,300	\$15,855,700	
			Engineering & Design	\$4,187,000	\$2,721,550	\$1,465,450	
			Construction	\$41,115,000	\$26,724,750	\$14,390,250	
Elders Center	Low Marsh (15.2 acres); High Marsh (10.9 acres); Scrub/Shrub (1.4 acres); Tidal Channels (0.95 acres); Shallows (5.49 acres) [Total Habitat: 33.94 acres using 284,891 CY of dredge material]	NYCDEP NPS*	Total Project	\$34,261,000	\$22,269,650	\$11,991,350	
			Engineering & Design	\$3,139,000	\$2,040,350	\$1,098,650	
			Construction	\$31,122,000	\$20,229,300	\$10,892,700	
Total Cost:				\$187,277,000	\$121,730,050	\$65,546,950	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2027 Price Levels) [as of 10 April 2025]							
Site	Project Description: Current Habitat Types and Actions (Acres/Linear Feet/Miles)	Local Sponsor	Phase Cost	Total (\$)	Federal (65%)(%)	Non-Federal (35%)(%)	Status
East River, Harlem River and Western Long Island Sound Planning Region							
Flushing Creek	Low Marsh (9.76 acres); High Marsh (2.47 acres); Scrub/Shrub (1.8 acres); Maritime Forest (3.89 acres); Shallows (1.37 acres)[Total Habitat = 19.29 acres]	NYCDEP MTA*	Total Project	\$23,647,000	\$15,370,550	\$8,276,450	* Funding provided in FY22 Appropriations Bill (\$300,000) and IJA (\$2,428,700) *DA executed 7/28/22 *30% Designs in Progress
			Engineering & Design (FY22)	\$4,198,000	\$2,728,700	\$1,469,300	
			Construction	\$19,449,000	\$12,641,850	\$6,807,150	
Bronx Zoo & Dam/Stone Mill Dam	Bronx Zoo & Dam: Shrub Swamp (1.8 acres); Forested Scrub/Shrub Wetland (0.5 acres); Bed and Channel (1.3 acres); Fish Passage Opening [partial dam removal](0.8 river miles opened) [Total Habitat: 3.6 acres] (EDR, 2024)	NYC Parks	Total Project	\$20,732,000	\$14,357,850	\$7,731,150	* Projects Combined *Funding provided in FY22 Appropriations Bill (\$300,000) and IJA (\$2,912,300) *DA executed 7/29/22 *Engineering Documentation Report approved 5/1/24 * 30% Designs in Progress
	Engineering & Design (FY22)		\$4,942,000	\$3,212,300	\$1,729,700		
	Stone Mill Dam: Emergent Wetland (.1 acre); Bed Restoration (0.4 acres); Fish Passage Opening [dam removal] (~7 river miles opened +16 miles following upstream weir modifications) [Total Habitat: 0.5] (EDR, 2024)		Construction	\$15,790,000	\$10,263,500	\$5,526,500	
Shoelace Park	Emergent Wetland (2.07 acres); Forested Scrub/Shrub Wetland (1.1 acres); Invasives Removal/Native Planting (7.9 acres); Bed Restoration (5.7 acres); Streambank (7,415 linear feet) [Total Habitat: 16.77 acres]	NYC Parks	Total Project	\$40,065,000	\$26,042,250	\$14,022,750	
			Engineering & Design	\$5,827,000	\$3,787,550	\$2,039,450	
			Construction	\$34,238,000	\$22,254,700	\$11,983,300	
Bronxville Lake	Emergent Wetland (0.86 acres); Forested Scrub/Shrub Wetland (2.49 acres); Invasives Removal/Native Planting (1.39 acres); Bed Restoration (0.65 acres); Sediment Forebay (0.3 acres) [Total Habitat: 5.69 acres]	Westchester County	Total Project	\$29,458,000	\$19,147,700	\$10,310,300	
			Engineering & Design	\$5,580,000	\$3,627,000	\$1,953,000	
			Construction	\$23,878,000	\$15,520,700	\$8,357,300	
Garth Woods - Harney Road	Emergent Wetland (0.82 acres); Wet Meadow (1.67 acres); Forested Scrub/Shrub Wetland (0.57 acres); Invasive Removal/ Native Planting (1.63 acres); Bed Restoration (2.19 acres); Streambank (200 linear feet) [Total Habitat: 6.88 acres]	Westchester County	Total Project	\$16,269,000	\$10,574,850	\$5,694,150	*\$500,000 provided in IJA FY23 Summer Spend Plan *DA pending
			Engineering & Design	\$4,000,000	\$2,600,000	\$1,400,000	
			Construction	\$12,269,000	\$7,974,850	\$4,294,150	
Total Cost:				\$130,171,000	\$85,493,200	\$46,034,800	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2027 Price Levels) [as of 10 April 2025]							
Site	Project Description: Current Habitat Types and Actions (Acres/Linear Feet/Miles)	Local Sponsor	Phase Cost	Total (\$)	Federal (65%)(%)	Non-Federal (35%)(%)	Status
Newark Bay, Hackensack River and Passaic River Planning Region							
Oak Island Yards	Low Marsh (5.32 acres); High Marsh (0.85 acres); Scrub/Shrub (0.44 acres); Maritime Forest (2.85 acres); Tidal Channel Restoration (1.36 acres) [Total Habitat: 10.82 acres]	NJDEP	Total Project	\$40,636,000	\$26,413,400	\$14,222,600	
			Engineering & Design	\$5,997,000	\$3,898,050	\$2,098,950	
			Construction	\$34,639,000	\$22,515,350	\$12,123,650	
Essex County Branch Brook Park	Emergent Wetland Creation (10.25 acres); Forested Scrub/Shrub Wetland (8.8 acres); Invasives Removal/Native Planting (8.91 acres); Bed Restoration (18.09 acres) [Total Habitat: 46.05 acres]	NJDEP	Total Project	\$92,280,000	\$59,982,000	\$32,298,000	
			Engineering & Design	\$4,908,000	\$3,190,200	\$1,717,800	
			Construction	\$87,372,000	\$56,791,800	\$30,580,200	
Metromedia Tract	Low Marsh (26.5 acres); High Marsh (11.7 acres); Scrub/Shrub (13.8 acres); Tidal Channel Restoration (2.79 acres); Shallows (6.51 acres) [Total Habitat: 61.3 acres]	NJDEP NJSEA*	Total Project	\$85,891,000	\$55,829,150	\$30,061,850	Restoration of this site would need to be wait for USEPA remedial actions given the Hackensack River is now a Superfund Site.
			Engineering & Design	\$6,772,000	\$4,401,800	\$2,370,200	
			Construction	\$79,119,000	\$51,427,350	\$27,691,650	
Meadowlark Marsh	Low Marsh (56.2 acres); High Marsh (6.5 acres); Scrub/Shrub (5.4 acres); Tidal Channel Restoration (4.6 acres) [Total Habitat: 72.7 acres]	NJDEP NJSEA*	Total Project	\$70,939,000	\$46,110,350	\$24,828,650	Restoration of this site would need to be wait for USEPA remedial actions given the Hackensack River is now a Superfund Site.
			Engineering & Design	\$8,063,000	\$5,240,950	\$2,822,050	
			Construction	\$62,876,000	\$40,869,400	\$22,006,600	
Total Cost:				\$289,746,000	\$188,334,900	\$101,411,100	
Oyster Reef Restoration (Multiple Planning Regions)							
Naval Weapons Station Earle	Oyster restoration (8.75 acres) with a variety of reef structures including oyster castles/pyramids, gabions filled with shells, reef balls, Natrx Lattice and 2-Tier Cubes. (30% Designs)	NJDEP Navy* Monmouth U* Billion Oyster Program (BOP) /Harbor School*	Total Project	\$20,076,000	\$13,049,400	\$7,026,600	* Funding provided in FY22 Appropriations Bill (\$300,000) and BIL (\$1,175,500) *DA executed 9/14/22 * 30% designs in progress
			Engineering & Design (FY22)	\$2,270,000	\$1,475,500	\$794,500	
			Construction	\$17,806,000	\$11,573,900	\$6,232,100	
Bush Terminal	Oyster restoration with spat on shell, oyster castles and gabions (31.9 acres)	NYC Parks NY Harbor School*	Total Project	\$13,798,000	\$8,968,700	\$4,829,300	
			Engineering & Design	\$3,328,000	\$2,163,200	\$1,164,800	
			Construction	\$10,470,000	\$6,805,500	\$3,664,500	
Head of Jamaica Bay	Oyster restoration with spat on shell and gabions (10.1 acres)	NYCDEP NY Harbor School*	Total Project	\$9,047,000	\$5,880,550	\$3,166,450	
			Engineering & Design	\$3,525,000	\$2,291,250	\$1,233,750	
			Construction	\$5,522,000	\$3,589,300	\$1,932,700	
Total Cost:				\$42,921,000	\$27,898,650	\$15,022,350	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2027 Price Levels) [as of 10 April 2025]							
Site	Project Description: Current Habitat Types and Actions (Acres/Linear Feet/Miles)	Local Sponsor	Phase Cost	Total (\$)	Federal (65%)(%)	Non-Federal (35%)(%)	Status
HRE Program Summary (Current Estimate)							
Jamaica Bay Planning Region: Perimeter Sites	Low Marsh (35.1 acres); High Marsh (9.8 acres); Scrub/Shrub (9.8 acres); Maritime Forest/Upland (18.7 acres); Tidal Channels (2.31 acres) and Bed/Channel (45.08 acres)[Total Habitat Restoration: 120.79 acres]	NYSDEC NYCDEP		\$142,659,000	\$92,728,350	\$49,930,650	
Jamaica Bay Planning Region: Marsh Islands	Low Marsh (94.1 acres); Transition Zone (6 acres), High Marsh (44.1 acres); Shrub/Scrub (16.8 acres); Tidal Channel Restoration (4.4 acres); Shallows (25.8 acres) Using 1,739,529 CY of dredged material [Total Habitat Restoration: 191 acres]	NYCDEP		\$187,277,000	\$121,730,050	\$65,546,950	
Harlem River, East River Western Long Island Sound Planning Region	Low Marsh (9.76 acres); High Marsh (2.47 acres); Scrub/Shrub (1.8 acres); Maritime Forest (3.89 acres); Shrub Swamp (1.8 acres); Shallows (1.37 acres); Emergent Wetland (3.91 acres); Wet Meadow (1.67 acres); Forested Scrub/Shrub (4.64 acres); Invasive Removal/Native Planting (10.92 acres); Bed Restoration (10.74 acres); Sediment Forebay (0.30 acres); Fishway Opening (23.70 miles opened); Streambank (8,365 linear feet) [Total Habitat Restoration: 52.70 acres]	NYCDEP NYC Parks Westchester County Planning		\$130,171,000	\$85,493,200	\$46,034,800	
Newark Bay, Hackensack River, and Passaic River Planning Region	Low Marsh (88.02 acres); High Marsh (19.05 acres); Scrub/Shrub (19.64 acres); Maritime Forest (2.85 acres); Tidal Channel Restoration (8.75 acres); Shallows (6.51 acres); Emergent Wetland (10.25 acres); Invasive Removal/Native Planting (8.91 acres); Forested Scrub/Shrub (8.8 acres); Bed Restoration (18.09 acres) [Total Habitat Restoration: 191.57 acres]	NJDEP NJSEA*		\$289,746,000	\$188,334,900	\$101,411,100	
Oyster Reef Restoration	Oyster restoration using oyster castles/pyramids, gabions filled with shell, spat on shell, reef balls and other structures [Total Habitat: 51.0 acres]	NJDEP NYC Parks Monmouth U* NY Harbor School*		\$42,921,000	\$27,898,650	\$15,022,350	
All Sites	Low Marsh (227 acres); Transition Zone (6 acres); High Marsh (75.43 acres); Scrub/Shrub (48 acres); Maritime Forest/Upland (25.44 acres); Emergent Wetland (14.16 acres); Shrub Swamp (1.8 acres); Shallows (33.6 acres); Wet Meadow (1.67 acres); Forested Scrub/Shrub (13.44 acres); Invasive Removal/Native Planting (19.83 acres); Tidal Channels (15.4); Channel/Bed Restoration (73.41 acres); Sediment Forebay (0.3 acres); Bank Stabilization (8,365 linear feet); Fish Passage (23.7 miles opened); Oyster Reef (51 acres) [Total Habitat Restored: ~606.5 acres]	All		\$792,774,000	\$516,185,150	\$12,002,550	

Engineering and Design Phase Initiated

* Design and Construction Partner

DA: Design Agreement

EDR: Engineering Documentation Report

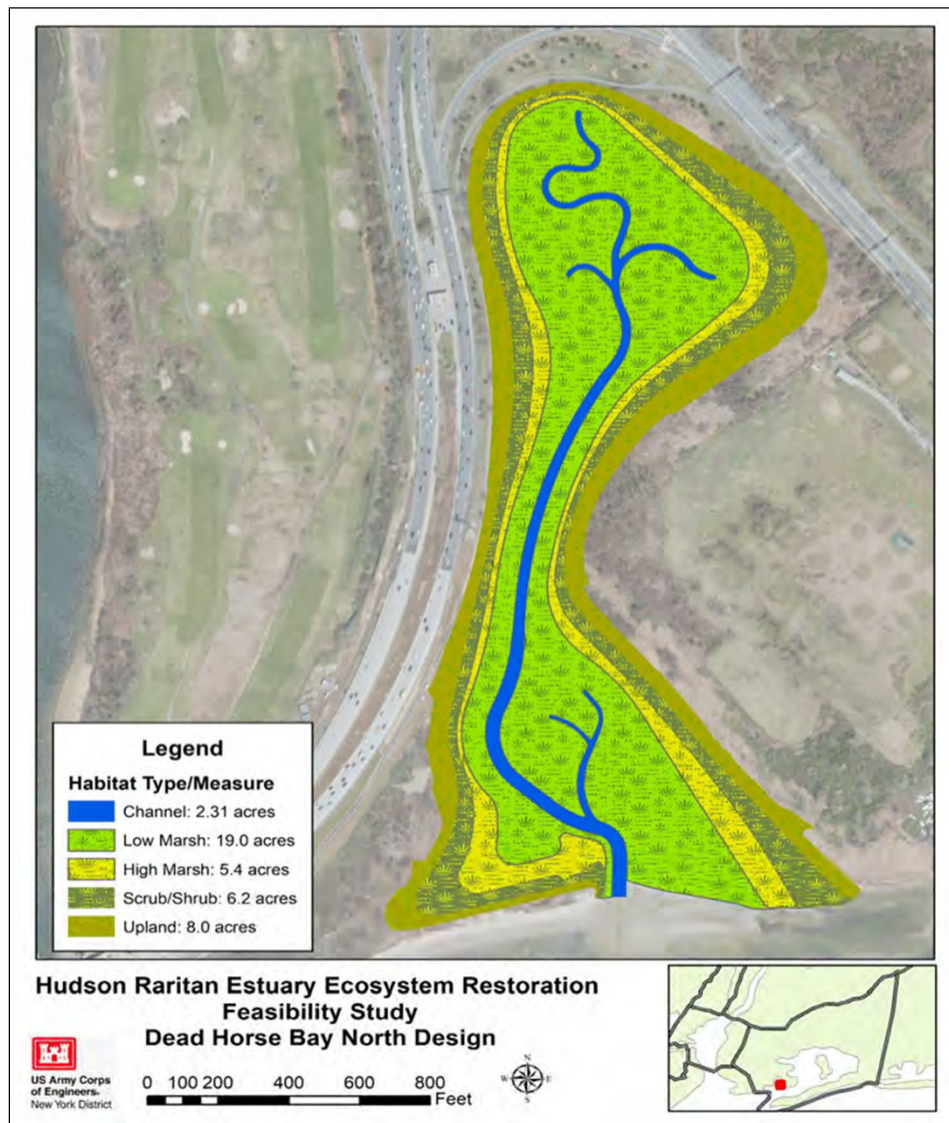
IIJA: Infrastructure Investment and Jobs Act

Note: Total costs are rounded.

BOP: Billion Oyster Program

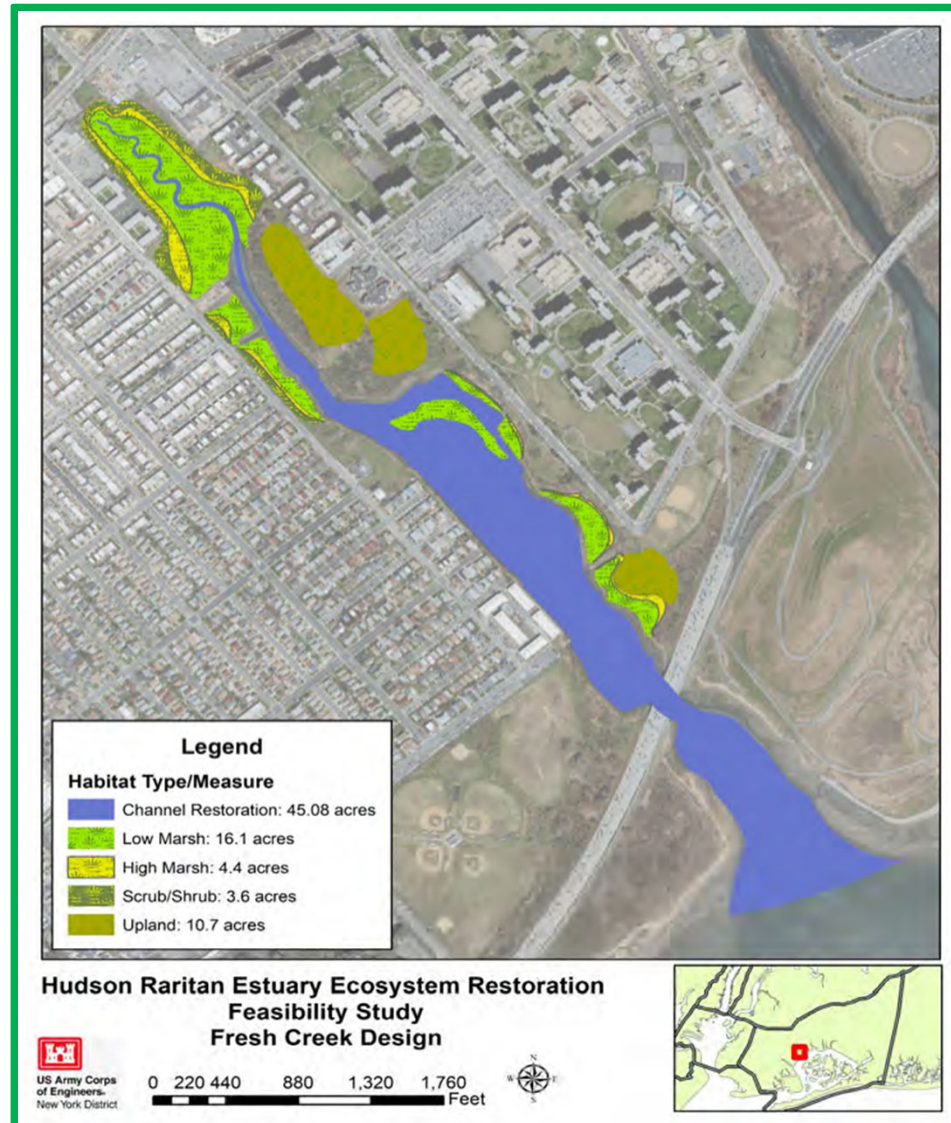
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Jamaica Bay Perimeter Sites

Dead Horse Bay



~40.91 acres of Habitat Restoration

Fresh Creek



~79.88 acres of Habitat Restoration

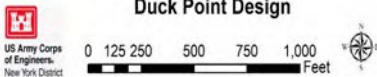
Engineering and Design Initiated 2024

Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Jamaica Bay Marsh Island Sites

Duck Point

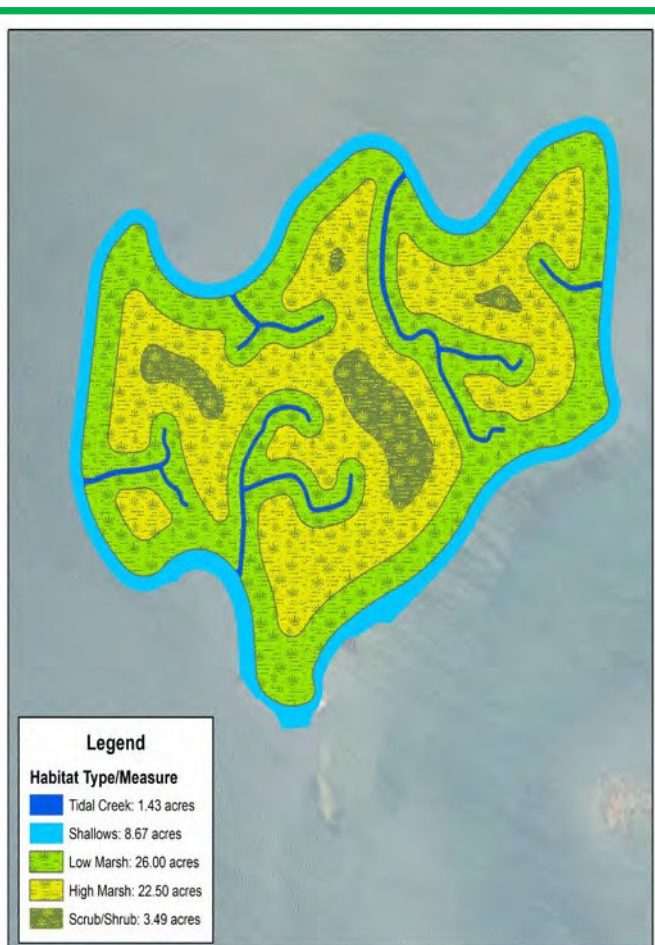


Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Duck Point Design

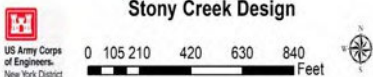


~47 acres of Habitat Restoration
using 400,000 CY of dredged material
Engineering & Design Initiated 2024

Stony Creek



Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Stony Creek Design

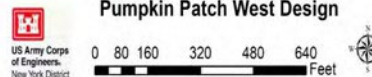


~48 acres of Habitat Restoration using
~375,000 CY of dredged material
Engineering and Design Initiated 2022

Pumpkin Patch West



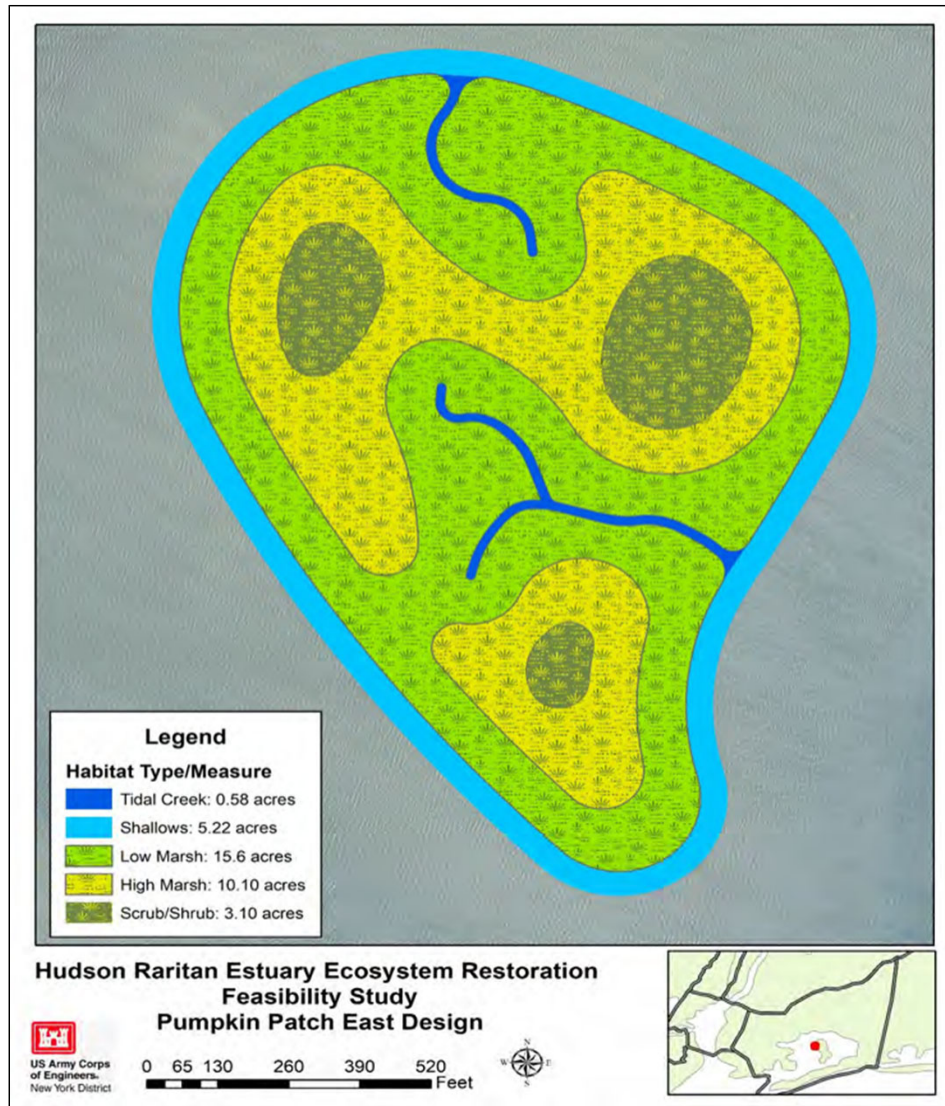
Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Pumpkin Patch West Design



~27.83 acres of Habitat Restoration using
327,686 CY of dredged material

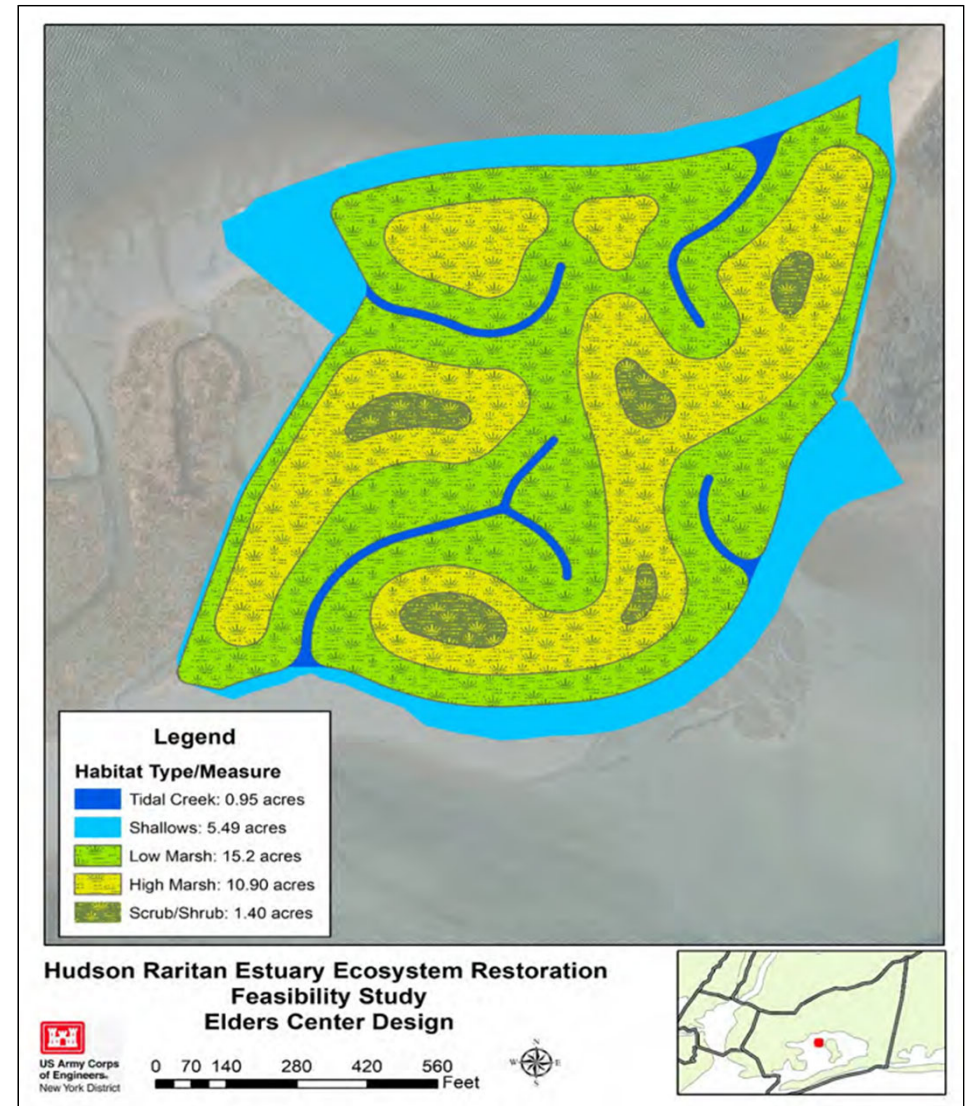
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Jamaica Bay Marsh Island Sites

Pumpkin Patch East



~35 acres of Habitat Restoration using 351,952 CY of dredged material

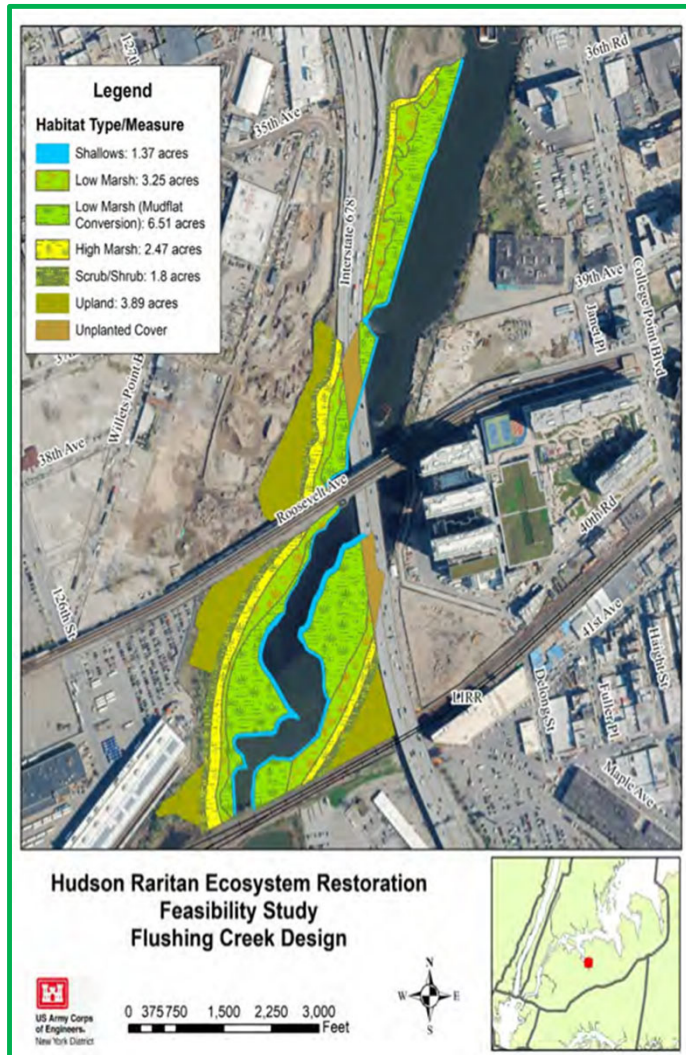
Elders Center



~34 acres of Habitat Restoration using 284,891 CY of dredged material

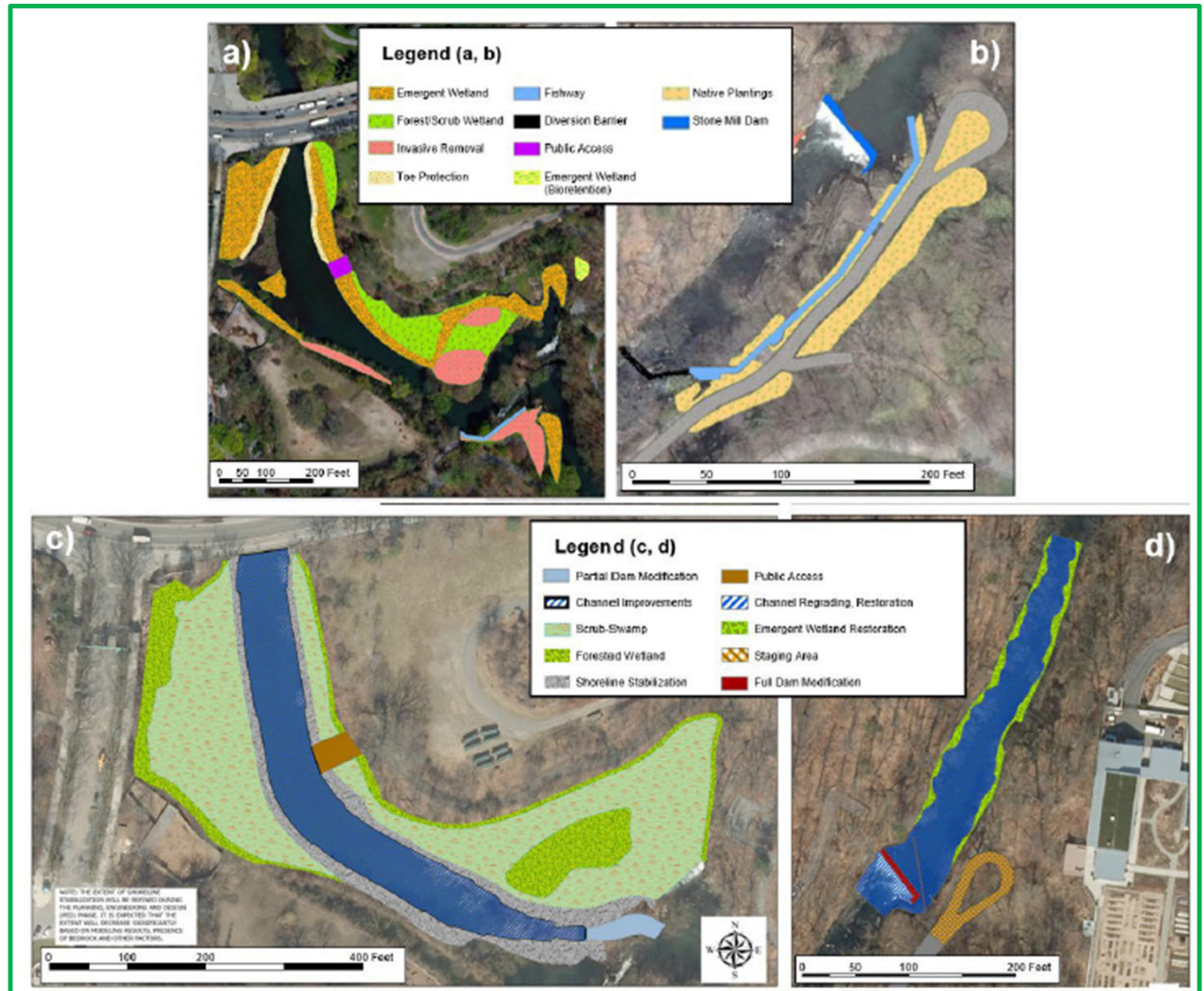
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Flushing Creek and Bronx River Sites

Flushing Creek



~19.29 acres of Habitat Restoration
Engineering and Design Initiated 2022

Bronx Zoo and Dam (a/c)



a and b: Authorized Project (2020)

c and d: Engineering Documentation Report (2024)

c) ~3.6 acres of Habitat Restoration
0.8 River Miles Opened
Engineering and Design Initiated 2022

d) ~0.5 acres of Habitat Restoration
~7 River Miles Opened
Engineering and Design Initiated 2022

Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Flushing Creek and Bronx River Sites

Shoelace Park



Hudson Raritan Ecosystem Restoration Feasibility Study Shoelace Park Design

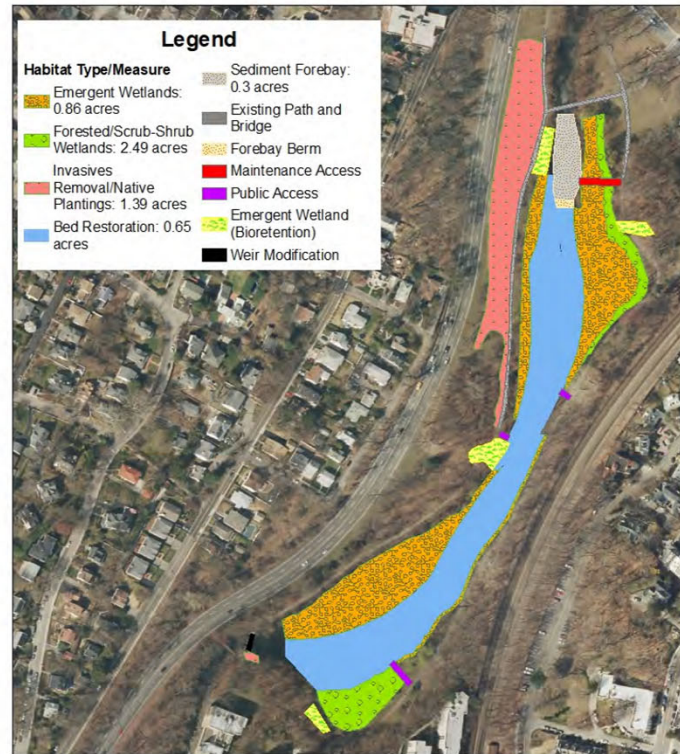


0 100 200 400 600 800 Feet



~16.77 acres of Habitat Restoration

Bronxville Lake



Hudson Raritan Estuary Ecosystem Restoration Feasibility Study Bronxville Lake Design



0 50 100 200 300 400 Feet



~5.69 acres of Habitat Restoration

Garth Woods – Harney Road



Hudson Raritan Estuary Ecosystem Restoration Feasibility Study Garth Harney Design



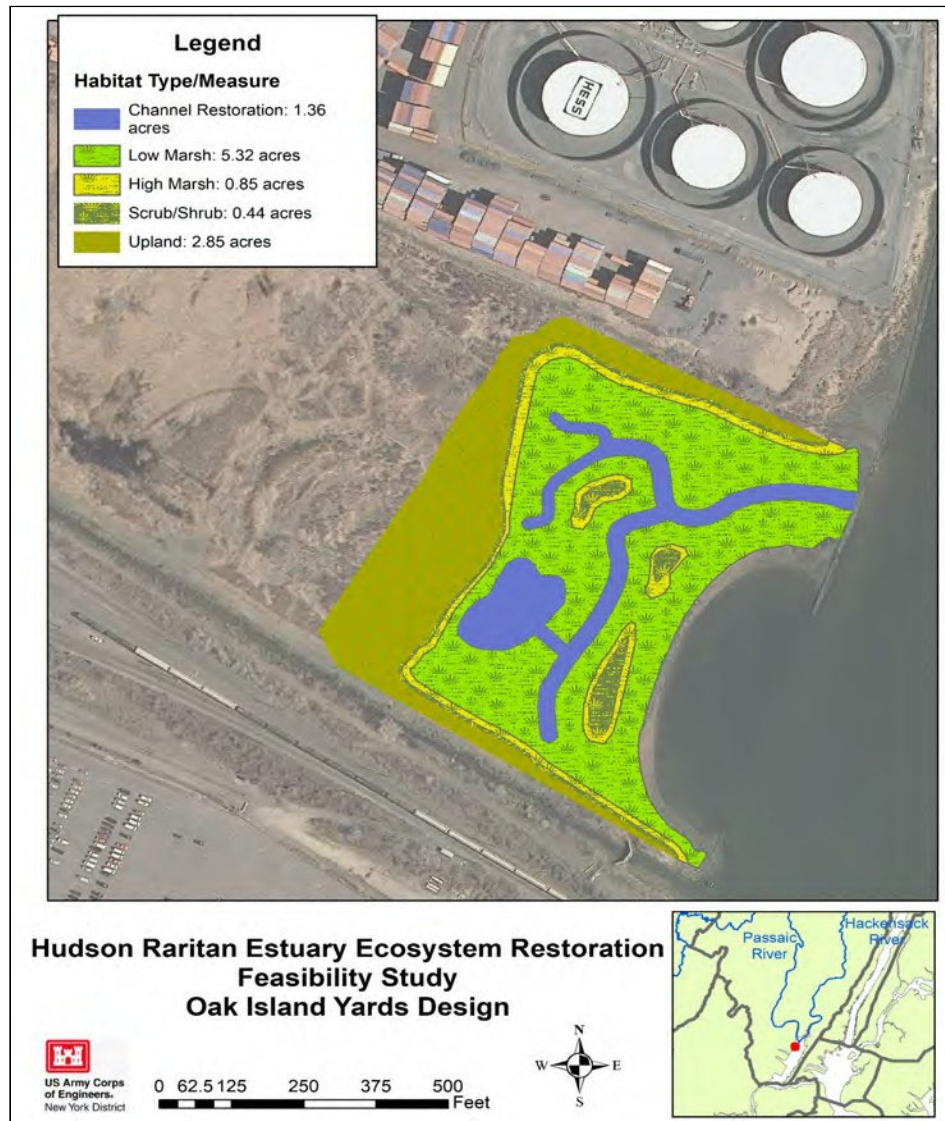
0 62.5 125 250 375 500 Feet



~6.88 acres of Habitat Restoration
Design Agreement Pending

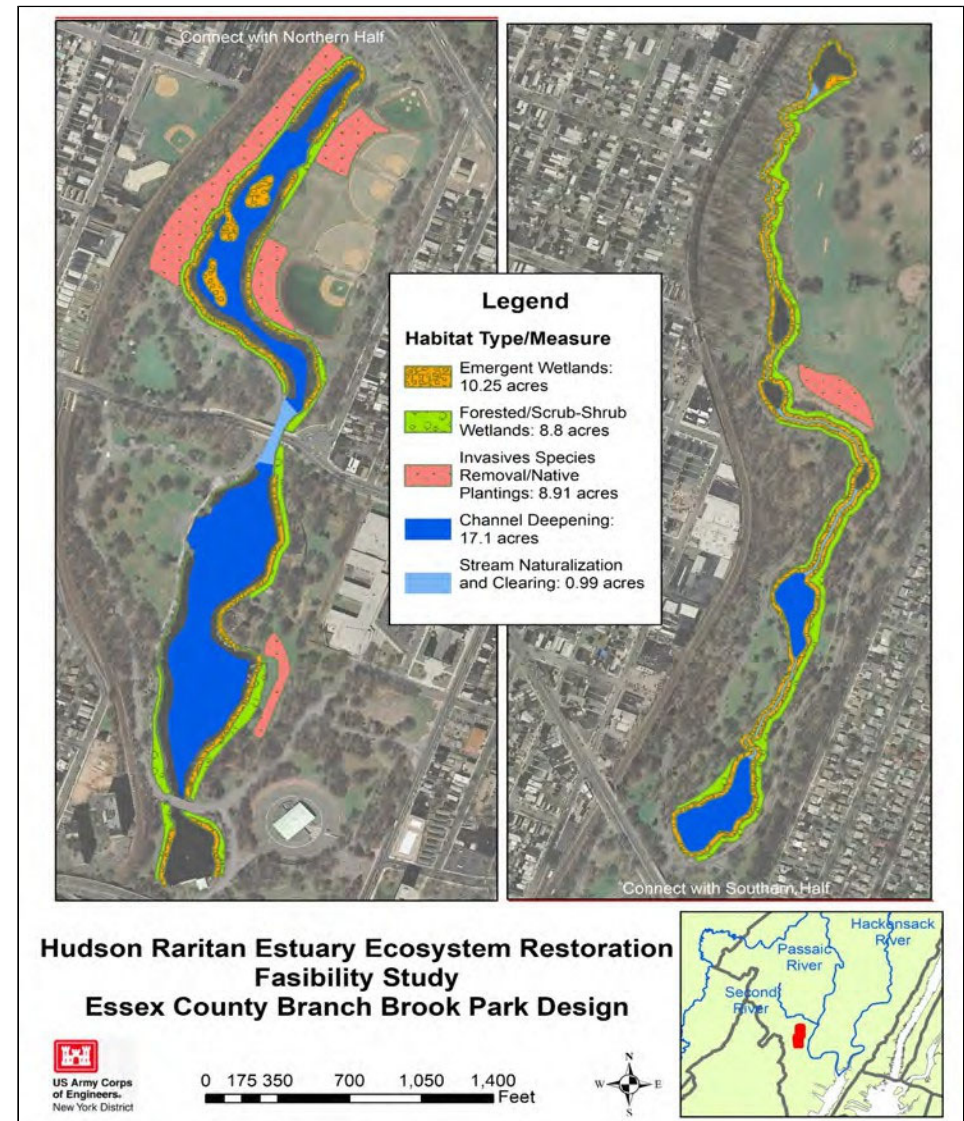
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Lower Passaic Sites

Oak Island Yards



~10.82 acres of Habitat Restoration

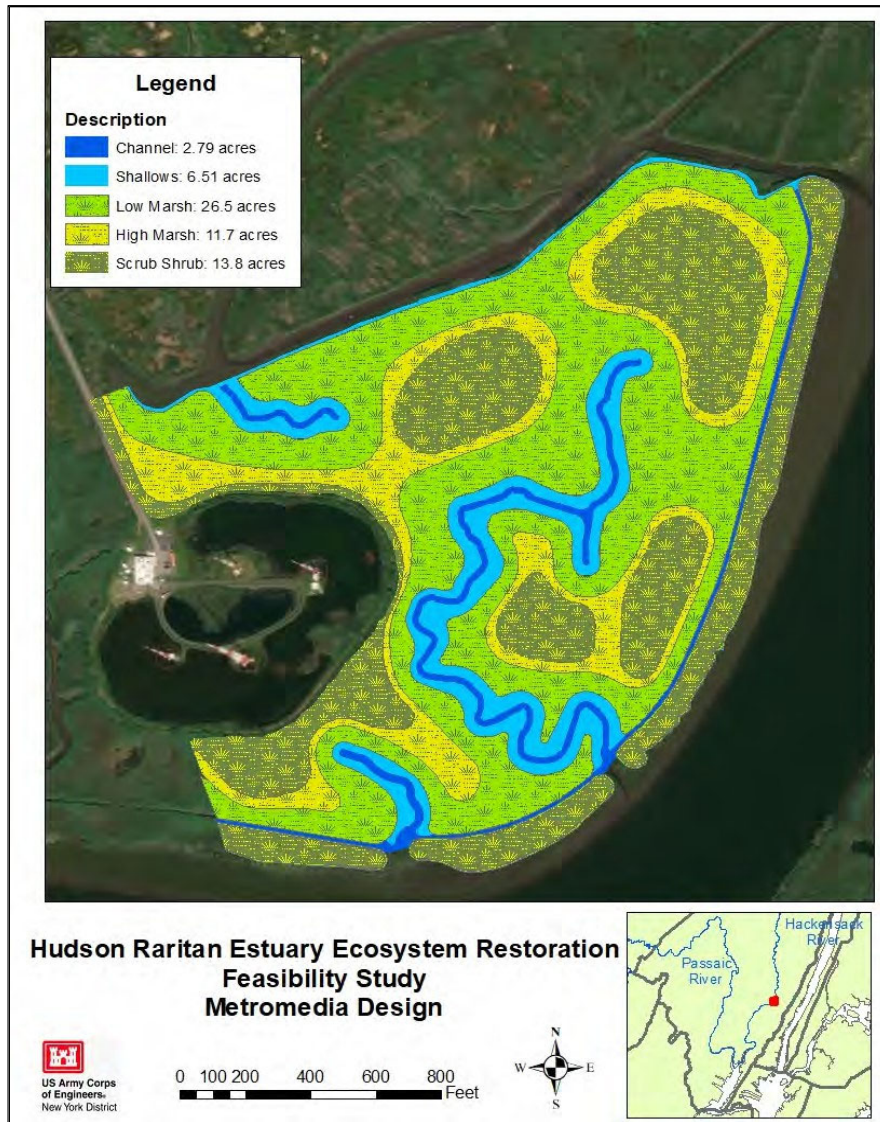
Essex County Branch Brook Park



~46.05 acres of Habitat Restoration

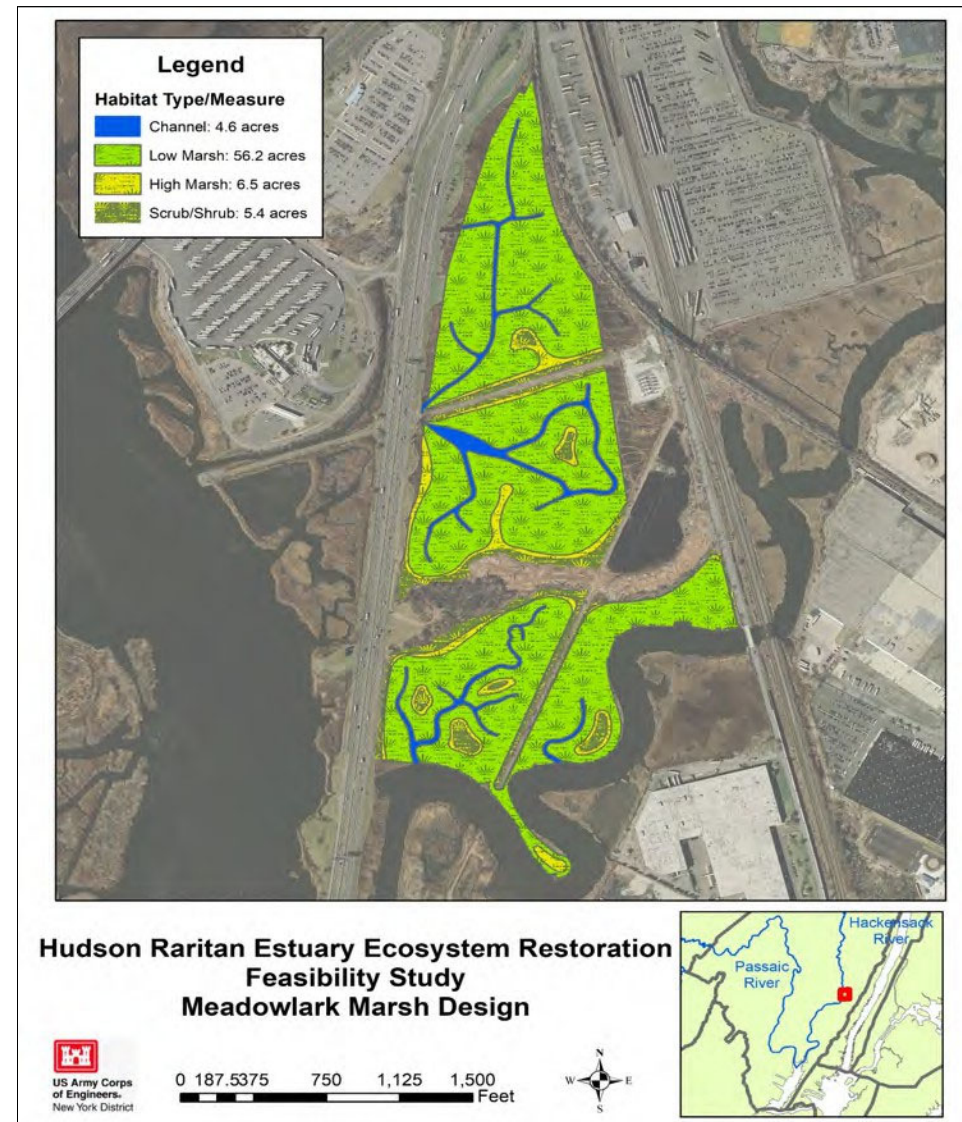
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Hackensack River Sites

Metromedia Tract



~61.3 acres of Habitat Restoration

Meadowlark Marsh



~72.7 acres of Habitat Restoration

Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Oyster Reef Restoration Sites

Naval Weapons Station Earle



Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Naval Weapons Station Earle Oysters Design



0 95 190 380 570 760 Feet



Restoration of ~8.75 acres using Oyster
Pyramids, Reef Balls, Gabions, etc.
Engineering and Design Initiated 2022

Bush Terminal



Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Bush Terminal Oysters Design



0 80 160 320 480 640 Feet



Restoration of ~31.9 acres using Spat on Shell
and Gabions

Head of Bay



Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Head of Jamaica Bay Oysters Design



0 65 130 260 390 520 Feet



Restoration of ~10.1 acres using Gabions,
Hanging Super Trays, Oyster Pyramids and Spat
on Shell