

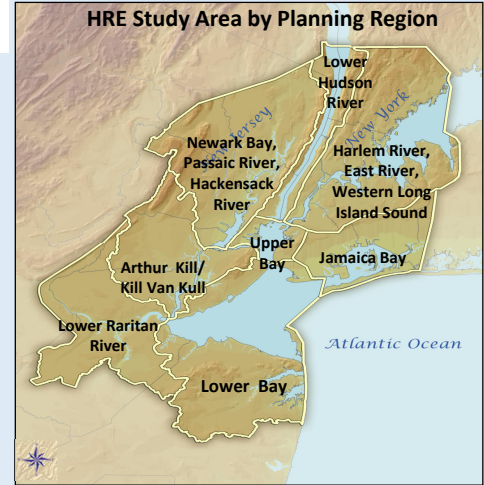
Hudson Raritan Estuary (HRE) Ecosystem Restoration Project, New York and New Jersey

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



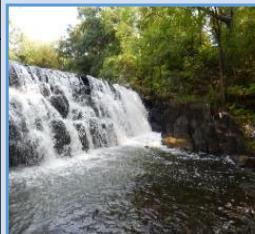
Hardened Shorelines

- 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**.



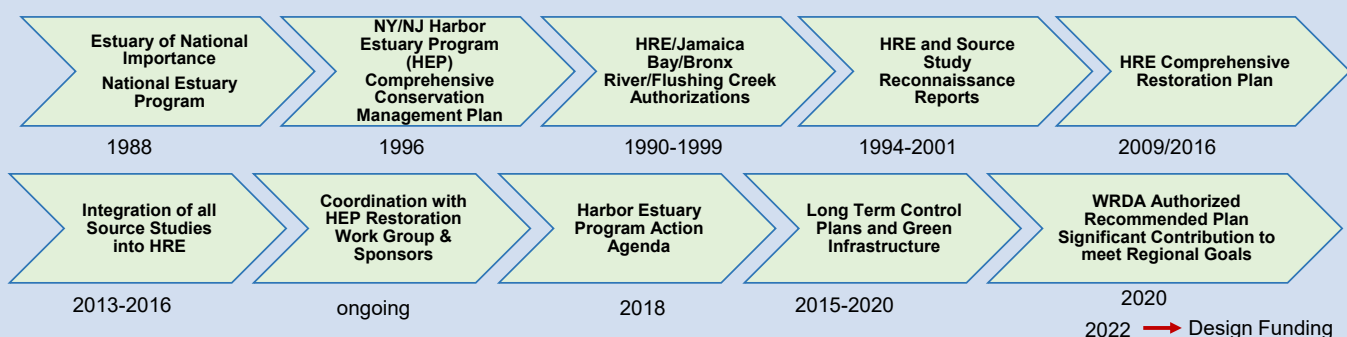
Fish Passage Barriers



Degraded/Eroding Shorelines

Comprehensive Restoration Strategy

5

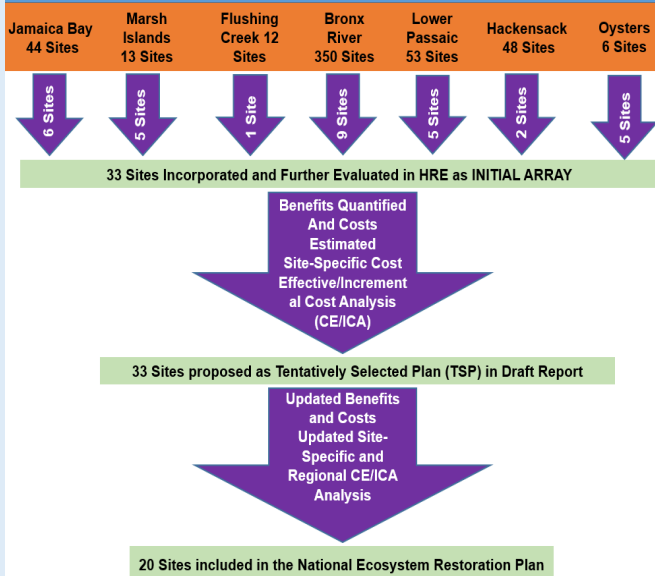


U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT



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 (FY25 Price Levels)

8

Project Total First Cost	\$542,909,000	Project Total Fully Funded Cost	\$720,799,000
Project Total Fully Funded Federal Cost (65%)	\$468,519,350	Project Total Non-Federal Share (35%)	\$252,279,650

Costs for each HRE Site in Following Table

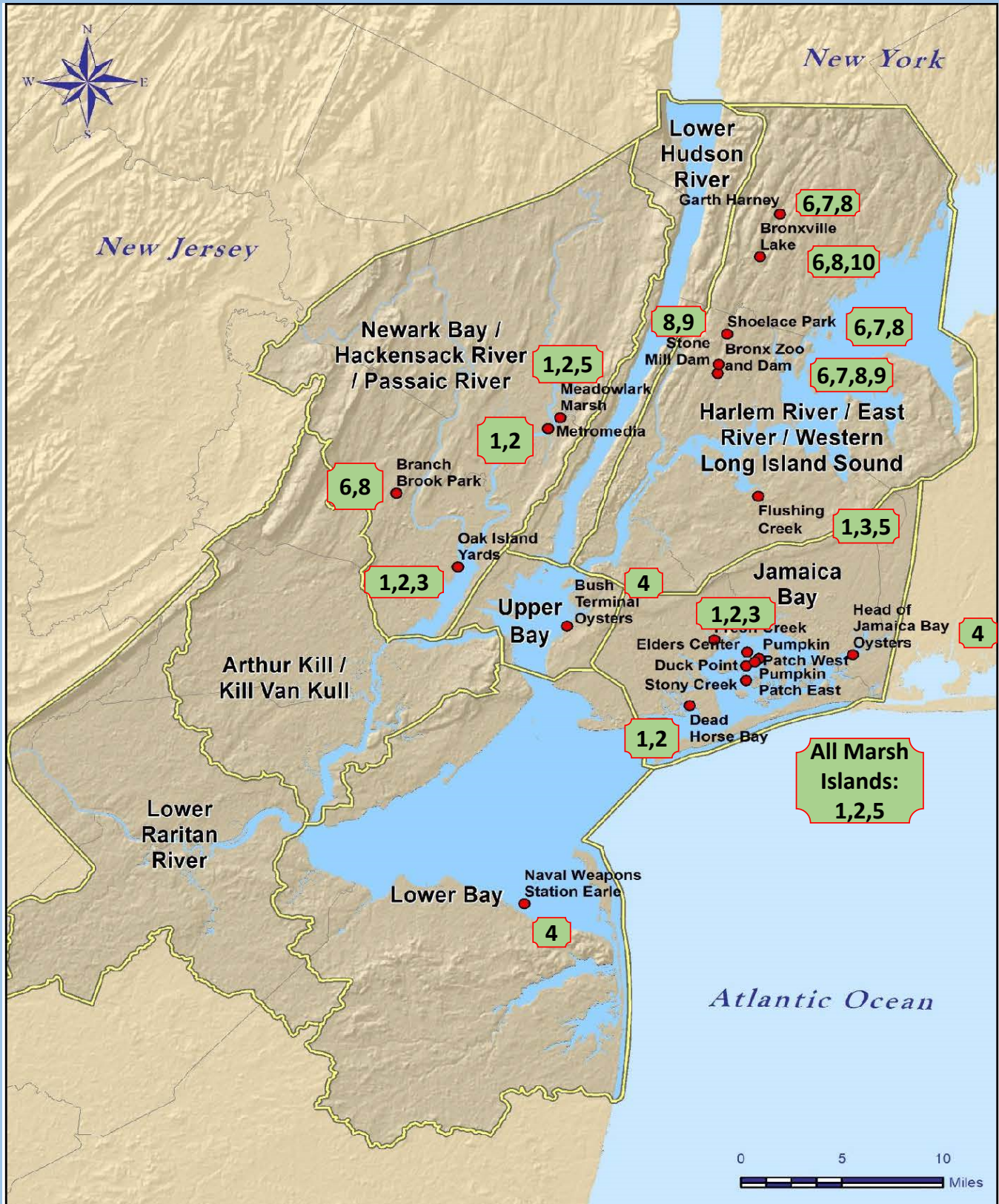
Significance of Recommended Plan

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 (FY2025 Price Levels) [as of 25 November 24]							
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	Total Project	\$73,276,000	\$47,629,400	\$25,646,600	
			Engineering & Design	\$5,594,000	\$3,636,100	\$1,957,900	
			Construction	\$67,682,000	\$43,993,300	\$23,688,700	
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	Total Project	\$52,275,000	\$33,978,750	\$18,296,250	* \$500,000 provided in FY23 Appropriations Bill * \$2,275,000 provided in FY24 Appropriations Bill * DA executed 5/29/24
			Engineering & Design (FY24)	\$5,000,000	\$3,250,000	\$1,750,000	
			Construction	\$47,275,000	\$30,728,750	\$16,546,250	
Total Cost:				\$125,551,000	\$81,608,150	\$43,942,850	
Jamaica Bay Planning Region – Marsh Islands							
Stony Creek	Low Marsh (24 acres); High Marsh (14 acres); Scrub/Shrub (3 acres); Tidal Channels (1 acres); Shallows (7 acres) [Total Habitat ~50 acres using ~450,000 CYD of dredge material] (30% designs)	NYCDEP	Total Project	\$31,257,000	\$20,317,050	\$10,939,950	* Funding provided in FY22 Appropriations Bill (\$300,000) and Bipartisan Infrastructure Law (BIL) (\$19,461,500) * DA executed 7/28/22 * 60% designs in progress
			Engineering & Design (FY22)	\$3,182,300	\$2,068,495	\$1,113,805	
			Construction	\$28,074,700	\$18,248,555	\$9,826,145	
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 213,776 CYD of dredge material]	NYCDEP	Total Project	\$31,772,000	\$20,651,800	\$11,120,200	* Funding provided (\$2,750,000) by the BIL FY23 Summer Spend Plan * DA executed 5/29/24
			Engineering & Design (FY24)	\$3,500,000	\$2,275,000	\$1,225,000	
			Construction	\$28,272,000	\$18,376,800	\$9,895,200	
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	Total Project	\$35,974,000	\$23,383,100	\$12,590,900	
			Engineering & Design	\$3,882,000	\$2,523,300	\$1,358,700	
			Construction	\$32,092,000	\$20,859,800	\$11,232,200	
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	Total Project	\$42,782,000	\$27,808,300	\$14,973,700	
			Engineering & Design	\$4,259,000	\$2,768,350	\$1,490,650	
			Construction	\$38,523,000	\$25,039,950	\$13,483,050	
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	Total Project	\$33,628,000	\$21,858,200	\$11,769,800	
			Engineering & Design	\$3,389,000	\$2,202,850	\$1,186,150	
			Construction	\$30,239,000	\$19,655,350	\$10,583,650	
Total Cost:				\$175,413,000	\$114,018,450	\$61,394,550	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2025 Price Levels) [as of 25 November 24]							
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	Total Project	\$22,002,000	\$14,301,300	\$7,700,700	* Funding provided in FY22 Appropriations Bill (\$300,000) and BIL (\$2,428,700) *DA executed 7/28/22 *Field sampling in Progress
			Engineering & Design (FY22)	\$4,198,000	\$2,728,700	\$1,469,300	
			Construction	\$17,804,000	\$11,572,600	\$6,231,400	
Bronx Zoo & Dam/Stone Mill Dam	Bronx Zoo & Dam: Emergent Wetlands (1.16 acres); Forested Scrub/Shrub Wetland (0.48 acres); Invasives Removal/Native Plantings (0.42 acres); Streambank (750 linear feet); Fish Passage Opening (0.8 river miles opened) [Total Habitat: 2.06 acres]	NYC Parks	Total Project	\$22,631,000	\$14,357,850	\$7,731,150	*Funding provided in FY22 Appropriations Bill (\$300,000) and BIL (\$2,912,300) *DA executed 7/29/22 *Engineering Documentation Report approved 5/1/24
	Stone Mill Dam: nvasive Removal/Native Planting (.03 acres); Bed Restoration (0.5 acres); Fish Passage Opening (~7 river miles opened +16 miles following upstream weir modifications) [Total Habitat: 0.53]		Engineering & Design (FY22)	\$4,942,000	\$3,212,300	\$1,729,700	
		Construction	\$17,689,000	\$11,497,850	\$6,191,150		
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	\$32,104,000	\$20,867,600	\$11,236,400	
			Engineering & Design	\$4,977,000	\$3,235,050	\$1,741,950	
			Construction	\$27,127,000	\$17,632,550	\$9,494,450	
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	\$26,095,000	\$16,961,750	\$9,133,250	
			Engineering & Design	\$4,726,000	\$3,071,900	\$1,654,100	
			Construction	\$21,369,000	\$13,889,850	\$7,479,150	
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	\$15,308,000	\$9,950,200	\$5,357,800	*\$500,000 provided in BIL FY23 Summer Spend Plan *DA pending Sponsor Readiness
			Engineering & Design (FY24)	\$3,620,000	\$2,353,000	\$1,267,000	
			Construction	\$11,688,000	\$7,597,200	\$4,090,800	
Total Cost:				\$118,140,000	\$76,438,700	\$41,159,300	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2025 Price Levels) [as of 25 November 24]							
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	\$28,641,000	\$18,616,650	\$10,024,350	
			Engineering & Design	\$4,239,000	\$2,755,350	\$1,483,650	
			Construction	\$24,402,000	\$15,861,300	\$8,540,700	
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	\$93,543,000	\$60,802,950	\$32,740,050	
			Engineering & Design	\$5,016,000	\$3,260,400	\$1,755,600	
			Construction	\$88,527,000	\$57,542,550	\$30,984,450	
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	\$79,006,000	\$51,353,900	\$27,652,100	
			Engineering & Design	\$5,283,000	\$3,433,950	\$1,849,050	
			Construction	\$73,723,000	\$47,919,950	\$25,803,050	
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	\$66,199,000	\$43,029,350	\$23,169,650	
			Engineering & Design	\$6,298,000	\$4,093,700	\$2,204,300	
			Construction	\$59,901,000	\$38,935,650	\$20,965,350	
Total Cost:				\$267,389,000	\$173,802,850	\$93,586,150	
Oyster Reef Restoration (Multiple Planning Regions)							
Naval Weapons Station Earle	Oyster restoration with oyster castles, shell and gabions (10.0 acres)	NJDEP Monmouth U*	Total Project	\$12,546,000	\$8,154,900	\$4,391,100	* 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	\$10,276,000	\$6,679,400	\$3,596,600	
Bush Terminal	Oyster restoration with spat on shell, oyster castles and gabions (31.9 acres)	NYC Parks NY Harbor School*	Total Project	\$11,192,000	\$7,274,800	\$3,917,200	
			Engineering & Design	\$3,354,000	\$2,180,100	\$1,173,900	
			Construction	\$7,838,000	\$5,094,700	\$2,743,300	
Head of Jamaica Bay	Oyster restoration with spat on shell and gabions (10.1 acres)	NYCDEP	Total Project	\$9,733,000	\$6,326,450	\$3,406,550	
			Engineering & Design	\$3,060,000	\$1,989,000	\$1,071,000	
			Construction	\$6,673,000	\$4,337,450	\$2,335,550	
Total Cost:				\$33,471,000	\$21,756,150	\$11,714,850	

HUDSON RARITAN ESTUARY ECOSYSTEM RESTORATION PROGRAM - AUTHORIZED PROJECTS (FY2025 Price Levels) [as of 25 November 24]							
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		\$125,551,000	\$81,608,150	\$43,942,850	
Jamaica Bay Planning Region: Marsh Islands	Low Marsh (93.4 acres); High Marsh (49.2 acres); Shrub/Scrub (16.5 acres); Tidal Channel Restoration (4.3 acres); Shallows (29.2 acres) Using 1,628,305 CY of dredged material [Total Habitat Restoration: 193 acres]	NYCDEP		\$175,413,000	\$114,018,450	\$61,394,550	
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); Shallows (1.37 acres); Emergent Wetland (4.91 acres); Wet Meadow (1.67 acres); Forested Scrub/Shrub (4.64 acres); Invasive Removal/Native Planting (11.37 acres); Bed Restoration (9.04 acres); Sediment Forebay (0.30 acres); Fishway Opening (23.70 miles opened); Streambank (8,365 linear feet) [Total Habitat Restoration: 51.22 acres]	NYCDEP NYC Parks Westchester County Planning		\$118,140,000	\$76,438,700	\$41,159,300	
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*		\$267,389,000	\$173,802,850	\$93,586,150	
Oyster Reef Restoration	Oyster restoration using spat on shell, gabions, oyster castles or shell [Total Habitat: 52.0 acres]	NJDEP NYC Parks Monmouth U* NY Harbor School*		\$33,471,000	\$21,756,150	\$11,714,850	
All Sites	Low Marsh (226.28 acres); High Marsh (80.53 acres); Scrub/Shrub (47.74 acres); Maritime Forest/Upland (25.44 acres); Emergent Wetland (15.16 acres); Shallows (37.04 acres); Wet Meadow (1.67 acres); Forested Scrub/Shrub (13.44 acres); Invasive Removal/Native Planting (20.28 acres); Tidal Channels (15.3); Channel/Bed Restoration (72.21 acres); Sediment Forebay (0.3 acres); Bank Stabilization (8,365 linear feet); Fish Passage (23.7 miles opened); Oyster Reef (52 acres) [Total Habitat Restored: ~609 acres]	All		\$719,964,000	\$467,624,300	\$11,120,200	

Engineering and Design Phase Initiated

* Construction Partner

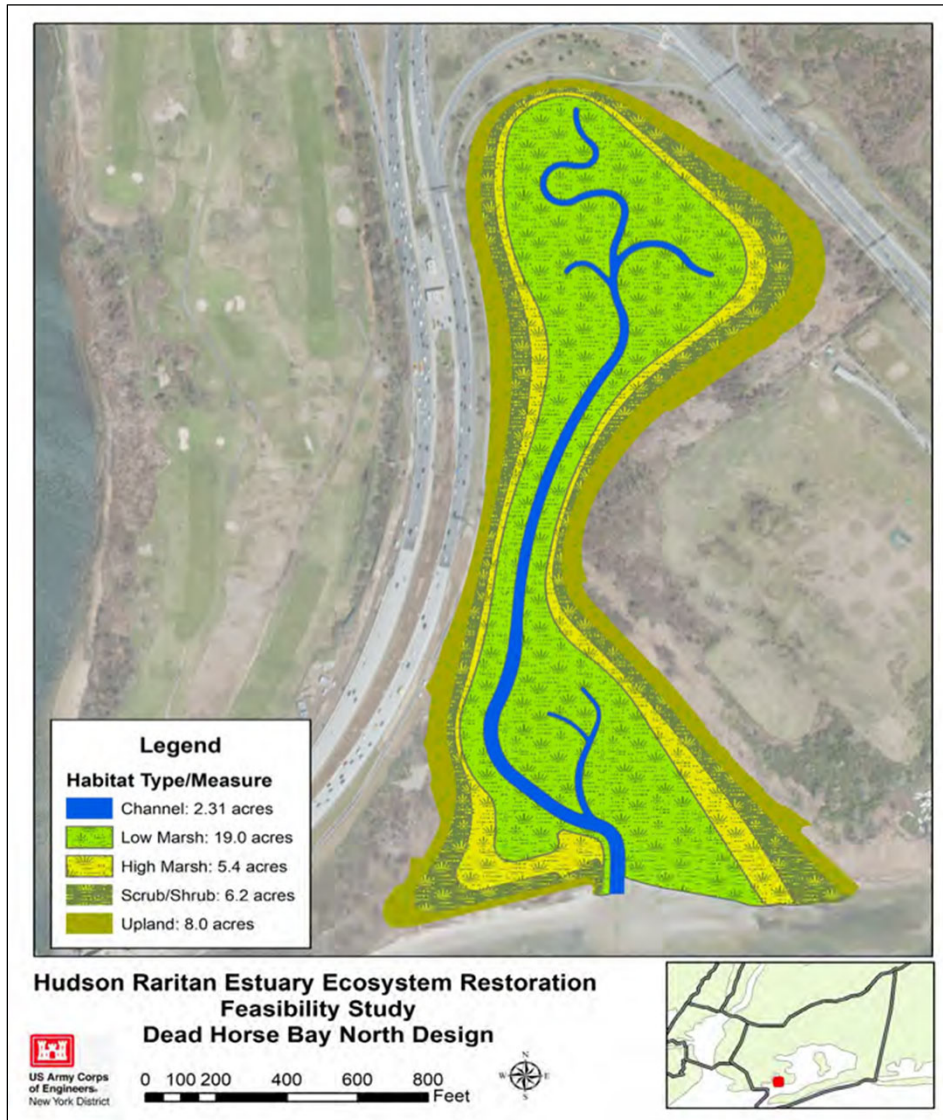
DA: Design Agreement

BIL: Bipartisan Infrastructure Law

Note: Total costs are rounded.

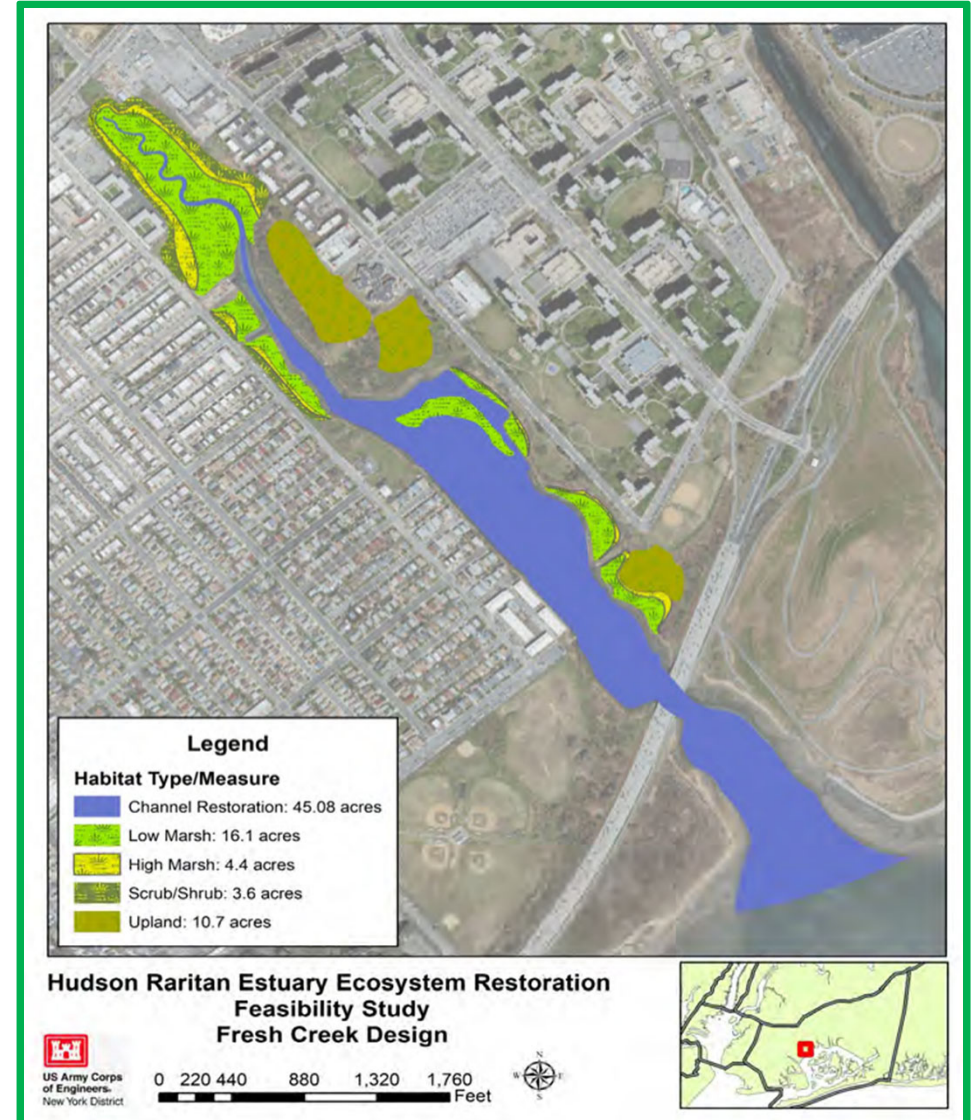
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Jamaica Bay Perimeter Sites

Dead Horse Bay



~40.91 acres of Habitat Restoration

Fresh Creek



~79.88 acres of Habitat Restoration

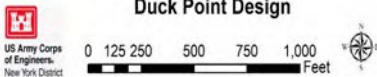
Engineering and Design Initiated 2024

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

Duck Point

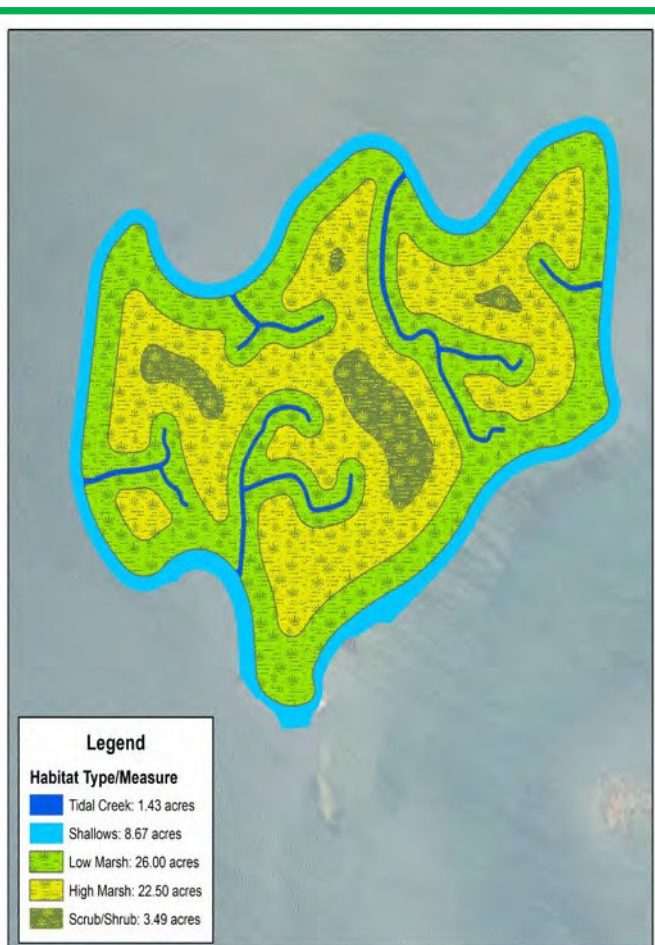


Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Duck Point Design

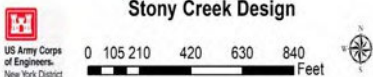


~39.63 acres of Habitat Restoration
using 213,776 CY of dredged material
Engineering & Design Initiated 2024

Stony Creek



Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Stony Creek Design

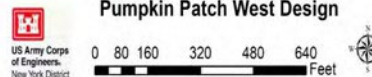


~50 acres of Habitat Restoration using
~450,000 CY of dredged material
Engineering and Design Initiated 2022

Pumpkin Patch West



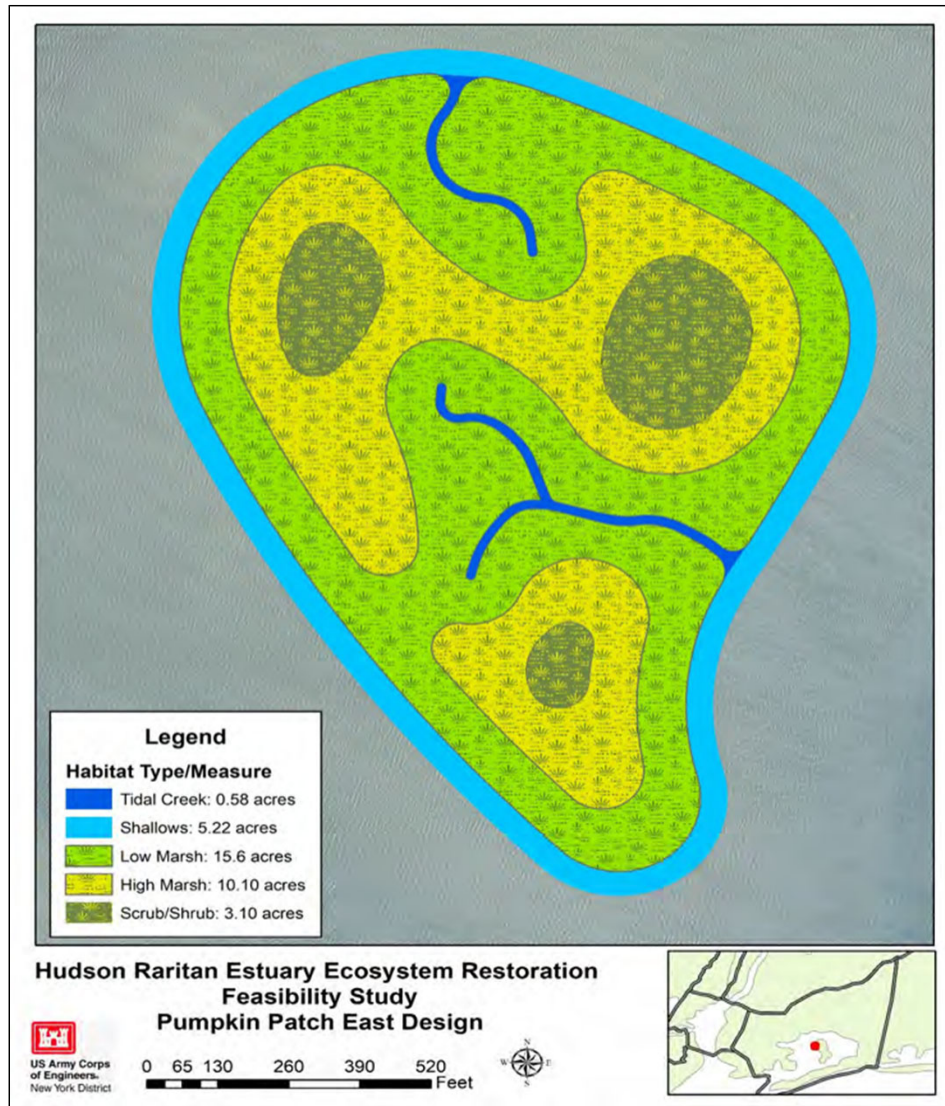
Hudson Raritan Estuary Ecosystem Restoration
Feasibility Study
Pumpkin Patch West Design



~23.95 acres of Habitat Restoration using
327,686 CY of dredged material

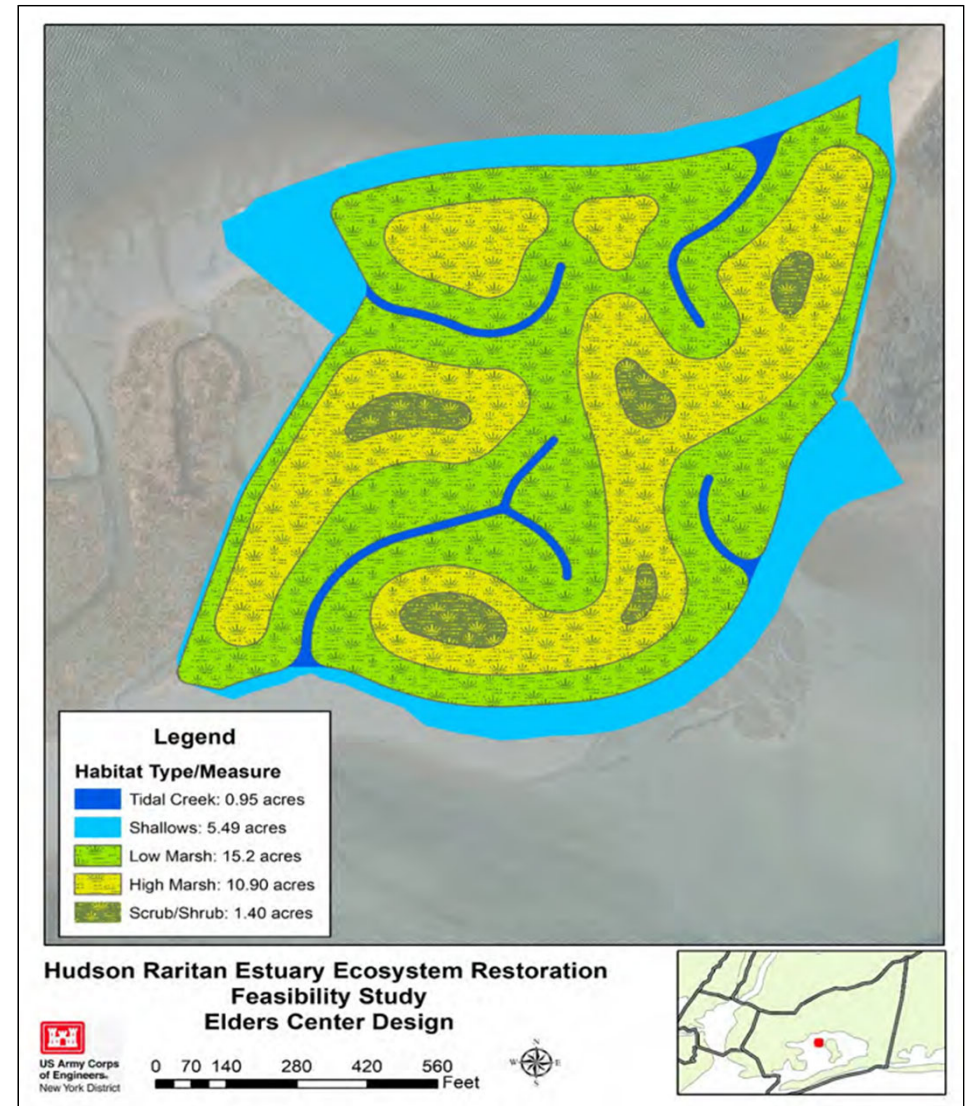
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Jamaica Bay Marsh Island Sites

Pumpkin Patch East



~29.38 acres of Habitat Restoration using 351,952 CY of dredged material

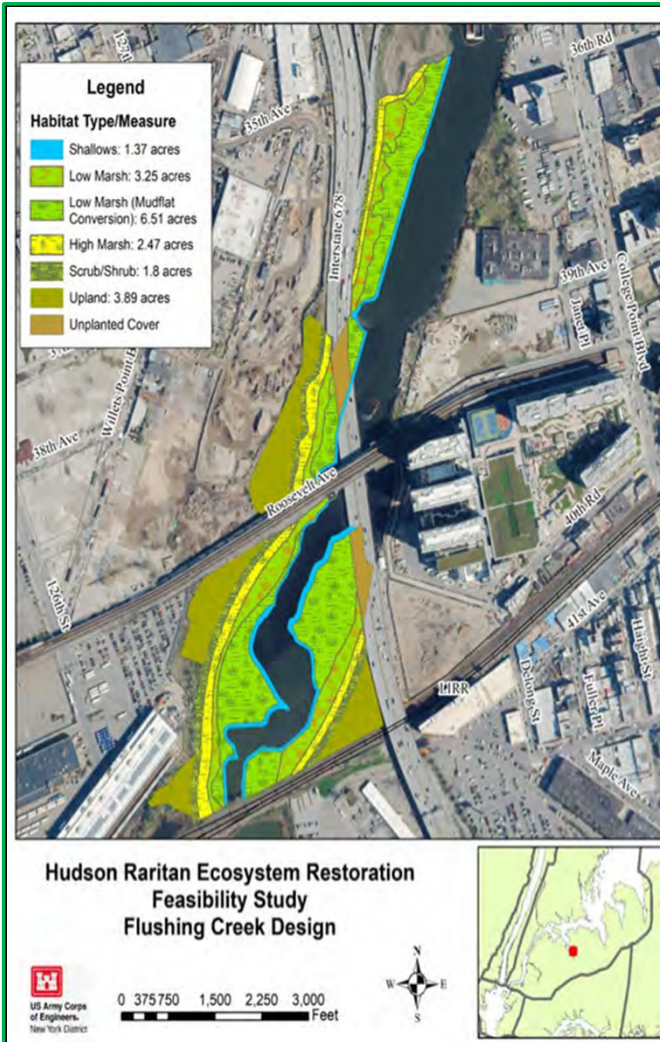
Elders Center



~28.45 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



~2.15 acres of Habitat Restoration
0.8 River Miles Opened
Engineering and Design Initiated 2022

Stone Mill Dam



~0.53 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

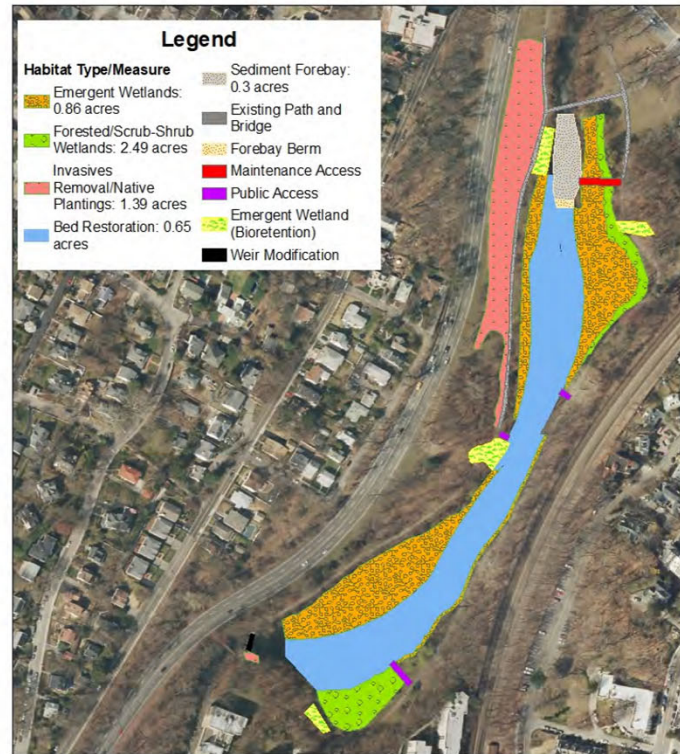


0 100 200 400 600 800 Feet



~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



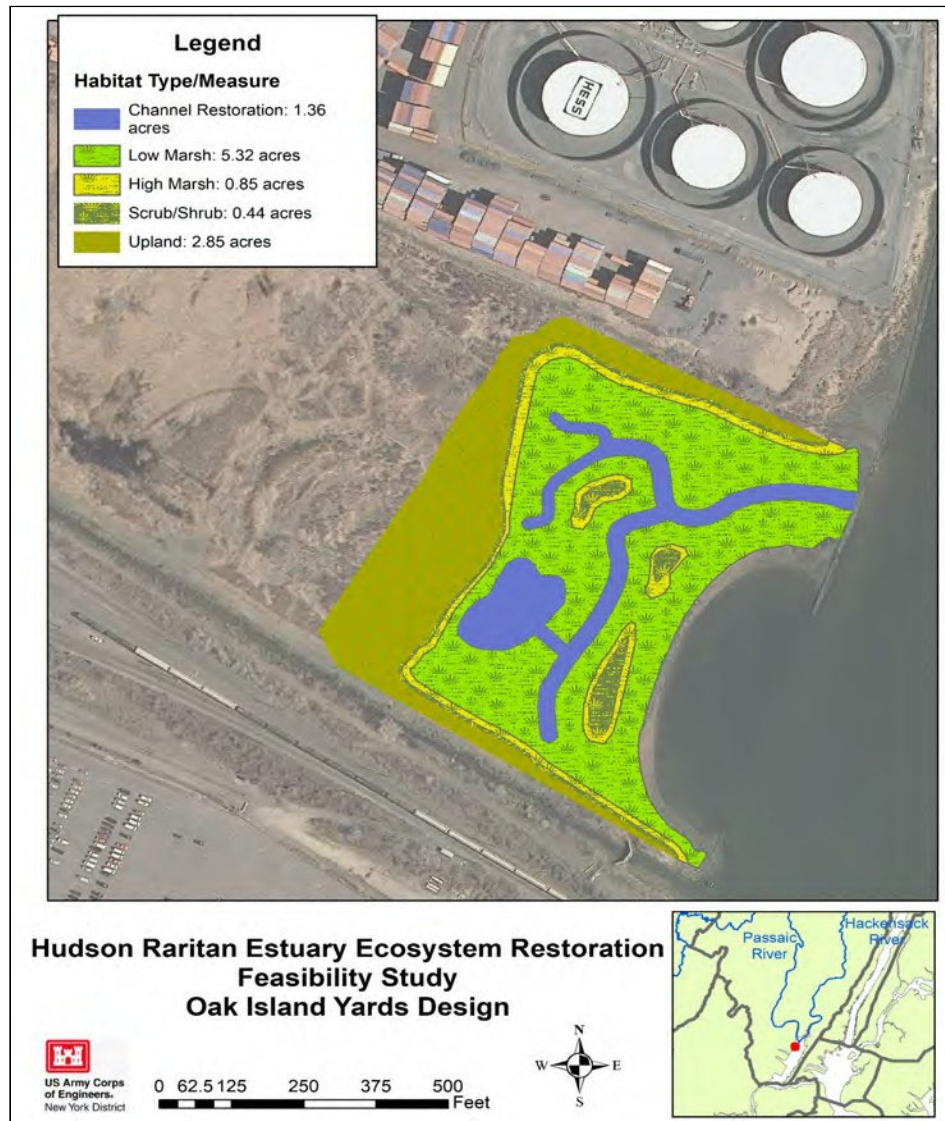
0 62.5 125 250 375 500 Feet



~6.88 acres of Habitat Restoration
Design Agreement Pending

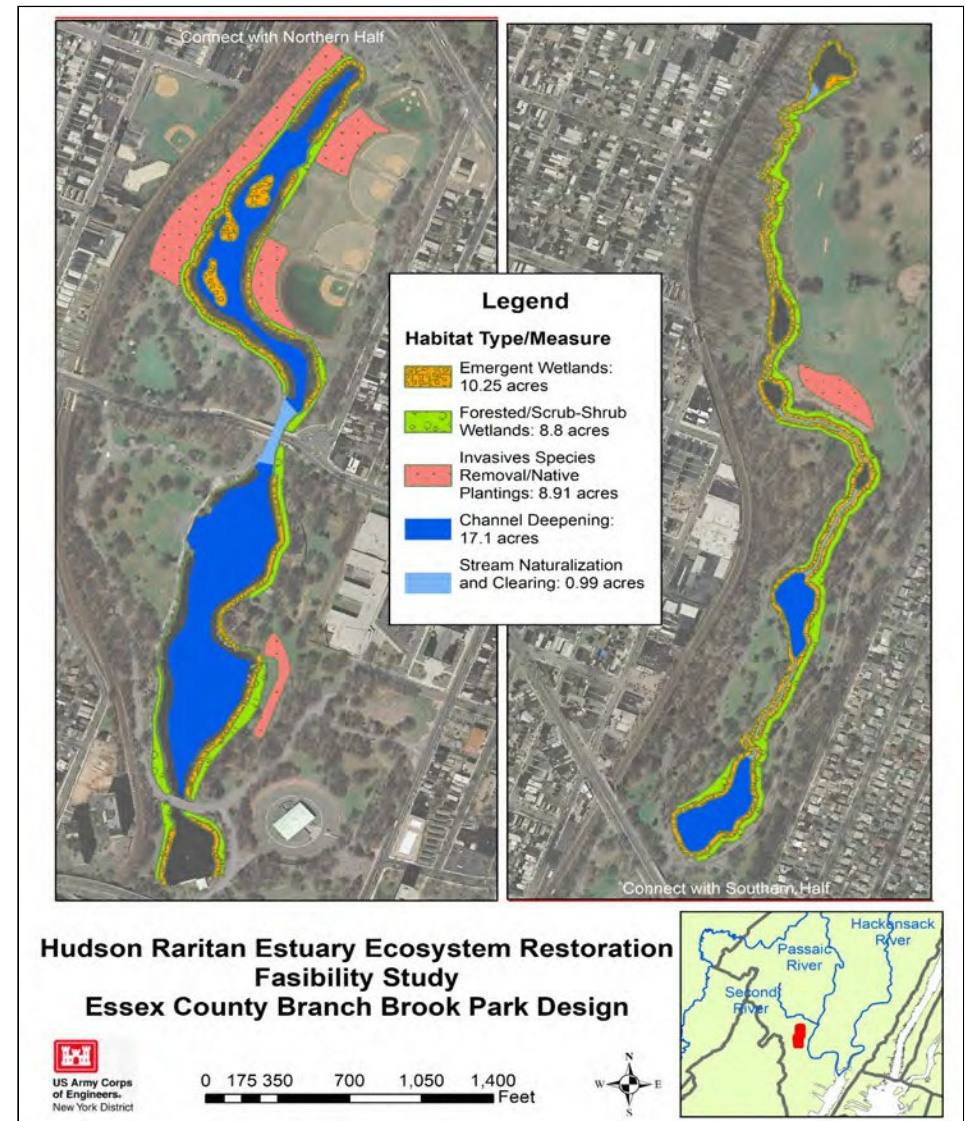
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Lower Passaic Sites

Oak Island Yards



~10.82 acres of Habitat Restoration

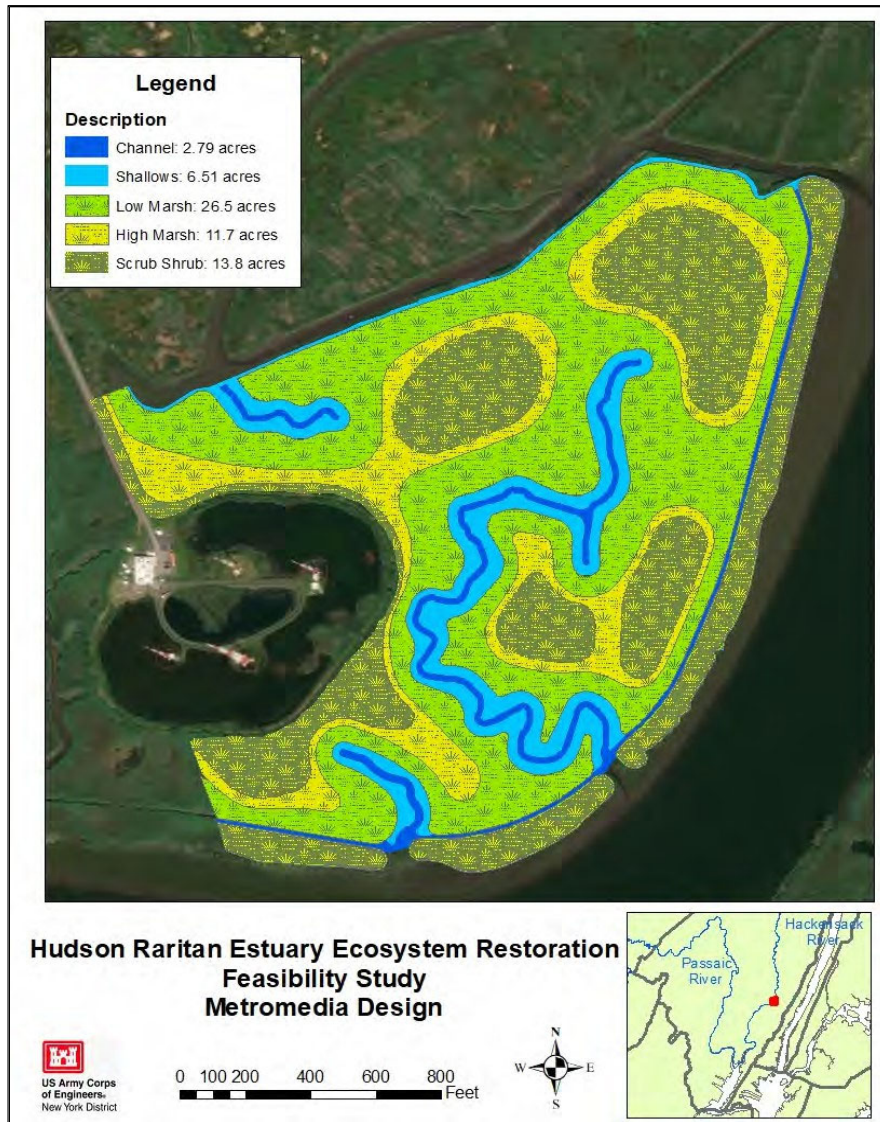
Essex County Branch Brook Park



~46.05 acres of Habitat Restoration

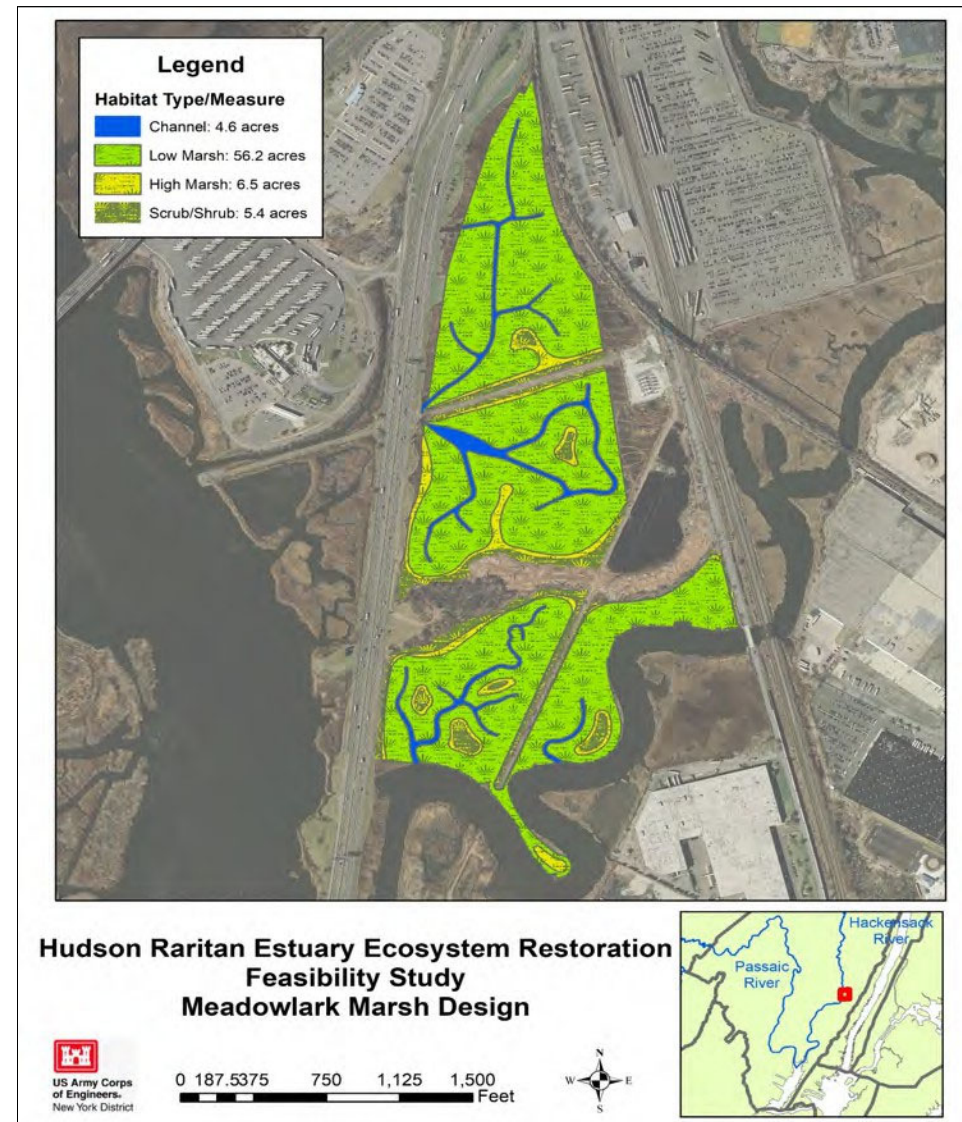
Hudson Raritan Estuary Ecosystem Restoration Recommended Plan – Hackensack River Sites

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 ~10 acres using Gabions
and Oyster Pyramids**
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