

Hudson River Habitat Restoration (HRHR) Feasibility Study, New York

1 Non-Federal Sponsors



2 Study Timeline



*3x3x3 Exemption (16 Sept 2019) states 31 Dec 20 Chief's Report Milestone

3 Purpose

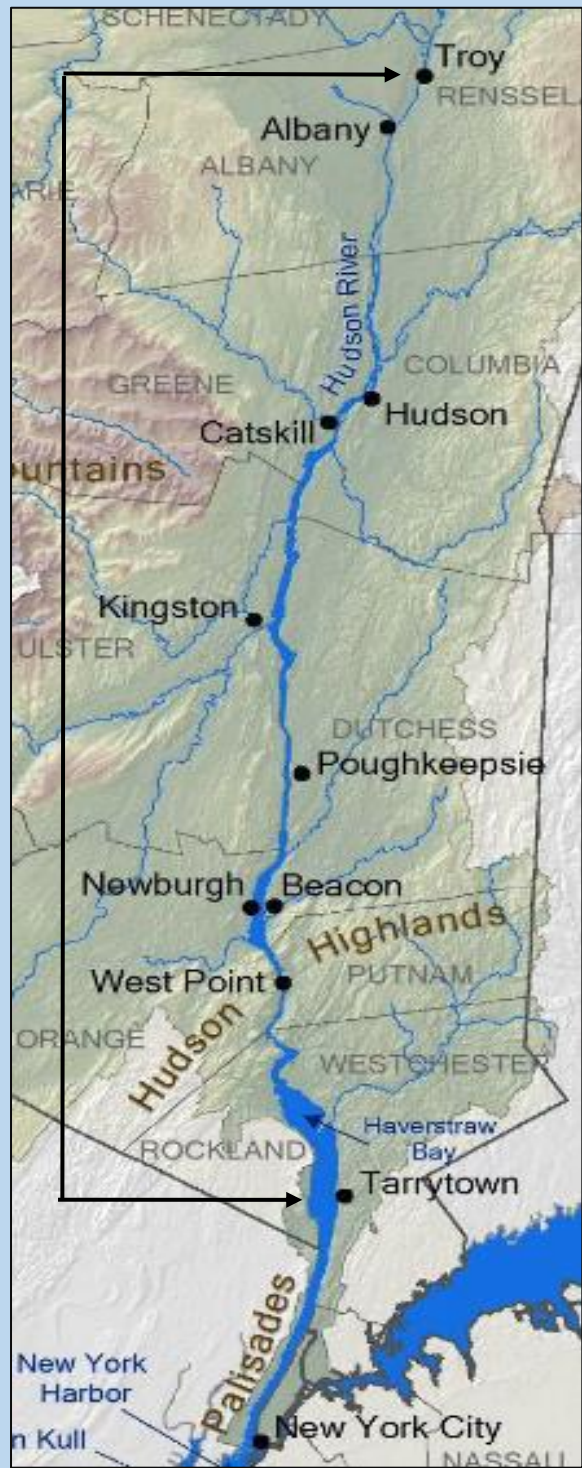
Restore significant ecosystem function, structure, and dynamic processes that have been degraded in the Hudson River. Intent of restoration is to partially or fully reestablish the attributes of a naturalistic, functioning and self-regulating system.

5 Nationally Significant Hudson River

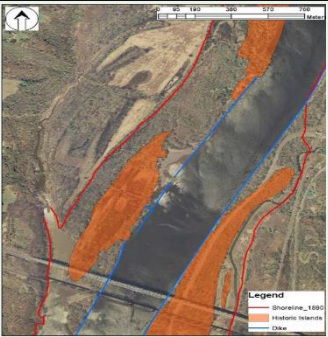
- Institutional Significance: one of 28 Estuaries of National Importance (National Estuary Program); numerous national designations of importance; key location along the North American Atlantic Flyway.
- Technical Significance: regionally scarce freshwater tidal marsh, intertidal shore and tidal marsh; nationally unique large river habitat; lost river side channels due to USACE's historical navigation improvements; tributaries fragmented from barrier construction; presence of federally endangered and threatened species.
- Public Recognition: 94 federal and state agencies and NGOs establishing "Partners Restoring the Hudson"; 21 villages, 41 towns, 10 cities, 10 NY counties.

4 Study Area

125 miles from Troy Lock and Dam downstream to Mario M. Cuomo Bridge including Tributaries



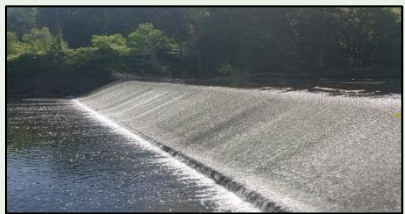
6 Key Problems



Lost Side Channels



Filled/Hardened Shorelines



Fish Passage Barriers

- Over the past 200 years, ~ 4,000 acres of aquatic habitat (shallow water, intertidal and wetland habitats) have been lost:
- ✓ River side channels and islands were lost from **construction, dredging, and filling from the Federal Navigation Channel** (3,300 acres of wetlands, 700 acres of shallow water habitat, 85% of islands and side channels in upper portion of river were filled with dredged material, more than 70 miles of shoreline lost)
 - ✓ USACE constructed longitudinal dikes and dams along the Hudson. Bulkheads and rip-rap were used to harden over 10,100 acres of shorelines (53%)
 - ✓ More than 1,600 dams were constructed in the watershed disconnecting the river from its tributaries

7 Objectives

1. Restore a **mosaic of interconnected, large river habitats**, which together host a diversity of native taxa.
 - Increase the extent and quality of *subtidal, shallow water habitats* (e.g., side channels) and *intertidal habitats* (e.g., freshwater tidal marshes, mud/sand flats).
 - Promote shoreline, riparian and upland habitats contributing to aquatic ecosystem integrity and a balanced mosaic of habitat types.
2. Restore **lost ecological connectivity** within the Hudson River and its tributaries
 - Increase the connectivity of spawning, foraging, and resting habitats for *migratory fish* and stopover, nesting, and foraging habitat for *migratory and resident birds*.



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Plan Formulation

212 Sites
Meet Habitat Restoration Objectives

89 Mosaic / Shoreline Sites
Screened with Five Criteria

123 Tributary Connectivity Sites
Grouped by Tributary

48 Sites
Prioritized based on USACE Impacts

41 Tributaries
Screened with Four Criteria

17 Sites

4 Sites

21 Sites Retained
Grouped based on Interdependencies

Initial Array of 13 Sites

Secondary Screening
and
Site Visit

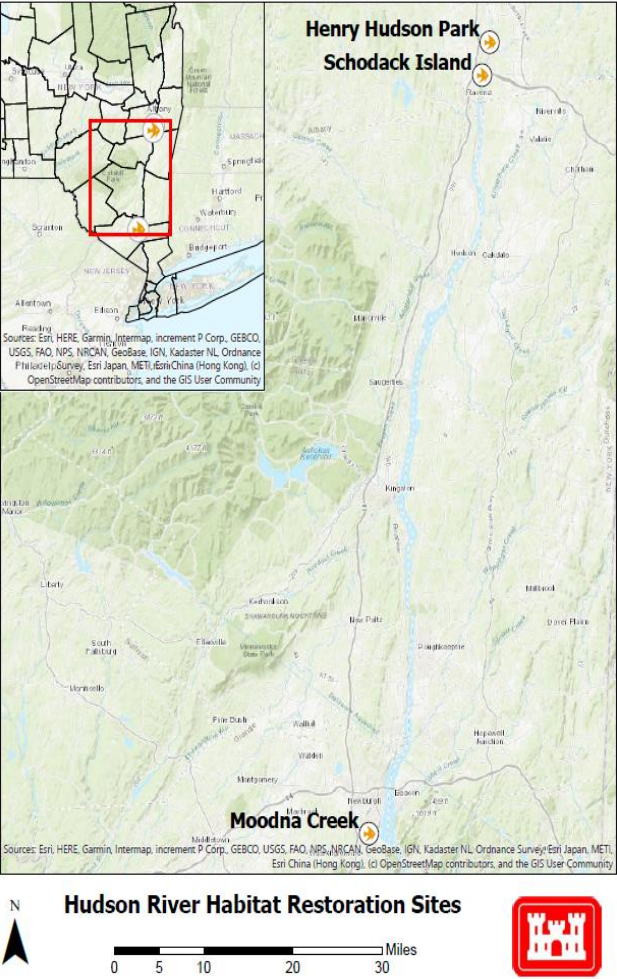
Final Array of Six Sites

- 1665 habitat restoration opportunities identified
- 212 sites met objectives
- 3 restoration categories (mosaic, shoreline and tributary connectivity)
- Preliminary screening
- 13 sites – Recon and secondary screening
- Final Array of 6 sites with 23 Alternatives
- Field work (EPW, profiles, tide gauges, etc)

- Management measures: excavation, dredging, re-contouring, invasive vegetation removal, planting, bank stabilization, dam removal, culvert modification, fish ladder
- Cost estimated/benefits quantified with certified models- Evaluation of Planned Wetlands and Watershed Scale Upstream Connectivity Toolkit
- Plan Evaluation and Comparison: Site and Regional Cost Effectiveness/Incremental Cost Analysis, planning objectives
- Five sites included in Tentatively Selected Plan
- Two sites (Rondout Creek and Binnen Kill) removed due to public and landowner opposition and lack of sponsor support
- Three sites recommended as NER Plan

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National Ecosystem Restoration (NER) Recommended Plan




Henry Hudson Park
Schodack Island

Moodna Creek

Hudson River Habitat Restoration Sites


Shoreline Restoration



Henry Hudson Park

- Tidal wetland restoration (3.7 acres)
- Replacement of the eroding hardened shoreline with a living shoreline (1,760 linear feet of shoreline with 0.6 acres of tidal wetlands)

Large Mosaic-Side Channel Restoration




Schodack Island Park

- Side channel and tidal wetland complex (8.5 acres)
- Tidal wetland restoration (19.1 acres)

Tributary Connectivity


Moodna Creek (collectively reconnect 7.8 miles of habitat)

1




Utility Pipe Removal

2



Firth Cliff Dam Removal

3



Orr's Mill Dam Partial Removal

- **NER Plan includes: 3 Projects restoring Tidal Wetlands (23 acres); 1 Side Channel/Wetlands (9 acres); and 3 Full/Partial Dam Removals on Moodna Creek reconnecting 7.8 miles of tributary habitats to the Hudson River**
- **Future spin-off feasibility studies to be carried out under the existing Study Authority.**

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Environmental Compliance

- Environmental Assessment
- All coordination complete (Endangered Species Act, Fish and Wildlife Coordination Act Report, Essential Fish Habitat)
- National Historic Preservation Act compliance achieved through a Programmatic Agreement with the New York State Historic Preservation Office
- Preliminary Water Quality Certificates and Coastal Zone Consistency
- Supported by State and Federal Resource Agencies

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Cost Summary (FY21)

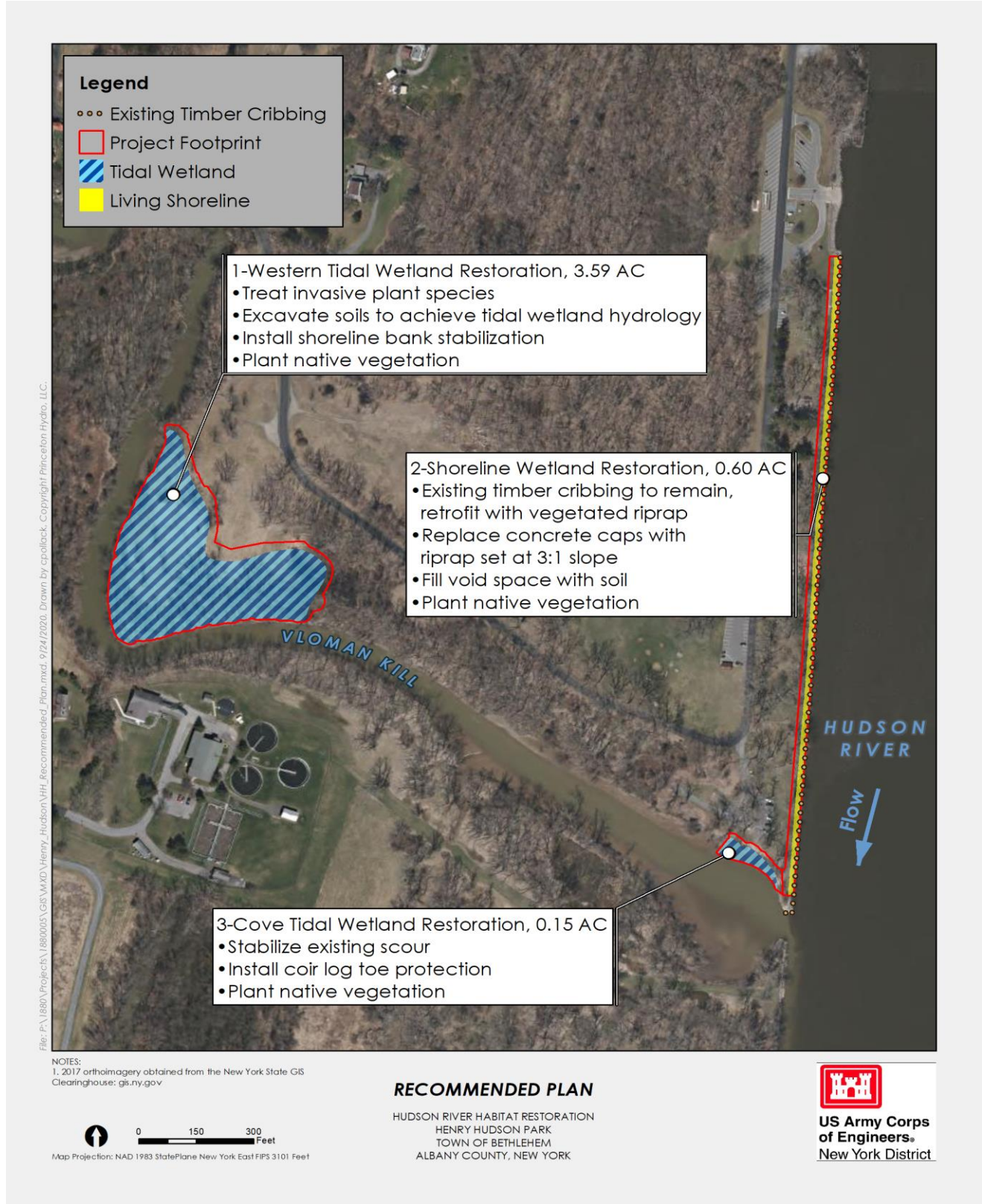
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Average Annual Costs & Benefits

Project total First Cost	\$44,638,000	Total Average Annual Cost	\$1,604,000
Project Total Federal Share (75%)	\$33,478,500	Average Annual OMRR&R Cost	\$9,600
		Total OMRR&R Cost (100% Non-Fed)	\$428,000
Project Total Non-Federal Share (25%)	\$11,159,500	Total Average Annual Benefits (Average Annual Functional Capacity Units)	59 AAFCUs
Lands and Damages	\$1,347,126	Cost/AAFCU	\$27,000
Cash Balance	\$9,812,374		
Project Total Fully Funded Cost	\$64,810,000 (escalated to the mid-point of construction for each site)		

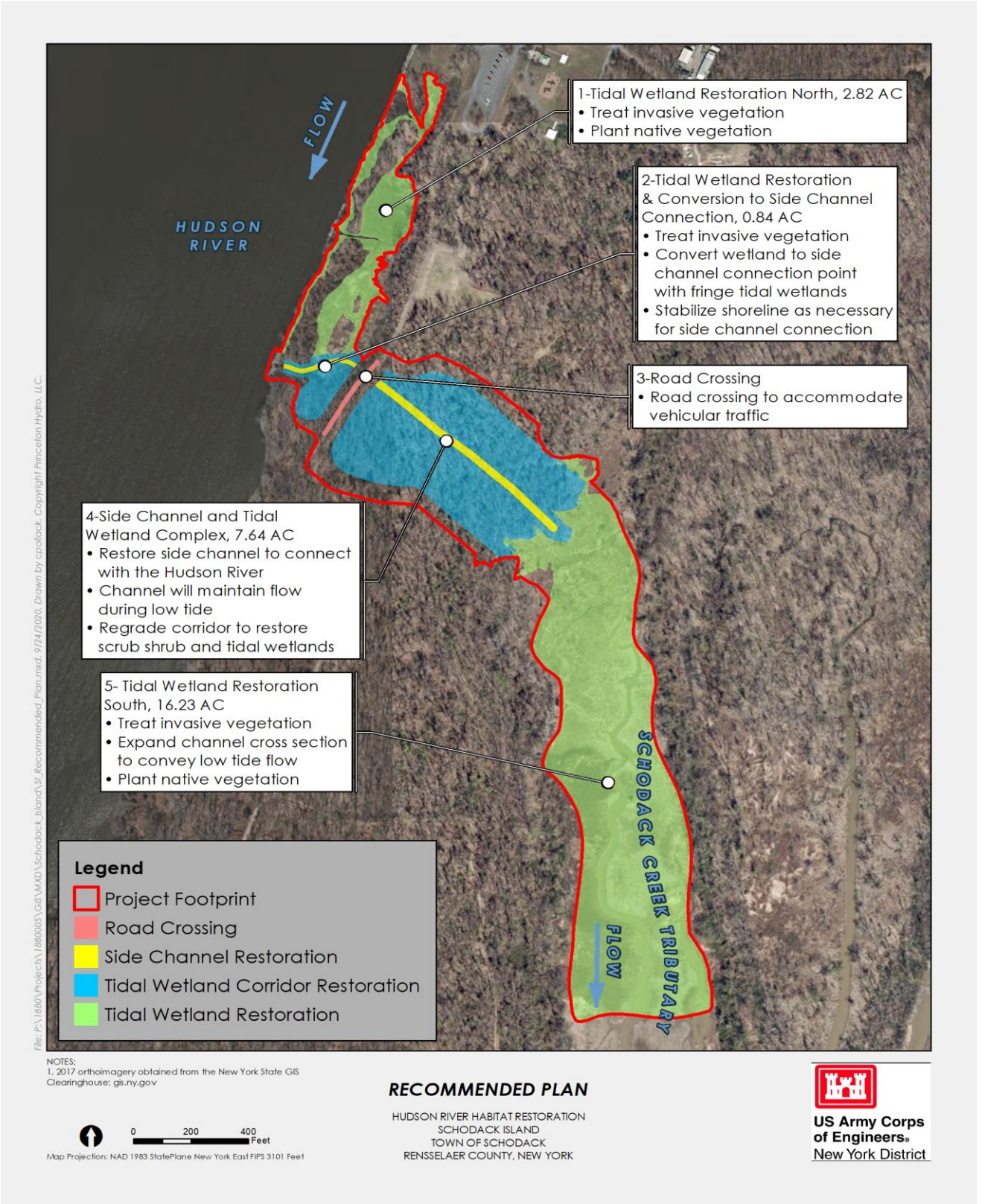
Hudson River Habitat Restoration Recommended Plan

Henry Hudson Park, Bethlehem, NY



\$14,169,000

Schodack Island State Park, Schodack, NY



\$30,219,000

Hudson River Habitat Restoration Recommended Plan

Moodna Creek – Aquatic Organism Passage (AOP)

AOP 1: Utility Crossing, New Windsor, NY



NOTES:
1. 2016 orthoimagery obtained from the New York State GIS Clearinghouse: gis.ny.gov

0 50 100 Feet
Map Projection: NAD 1983 StatePlane New York East FIPS 3101 Feet

RECOMMENDED PLAN
HUDSON RIVER HABITAT RESTORATION
MOODNA CREEK - AOP 1: UTILITY CROSSING
TOWN OF NEW WINDSOR
ORANGE COUNTY, NEW YORK



\$3,781,000

AOP 2: Firth Cliff Dam in Cornwall, NY



NOTES:
1. 2016 orthoimagery obtained from the New York State GIS Clearinghouse: gis.ny.gov

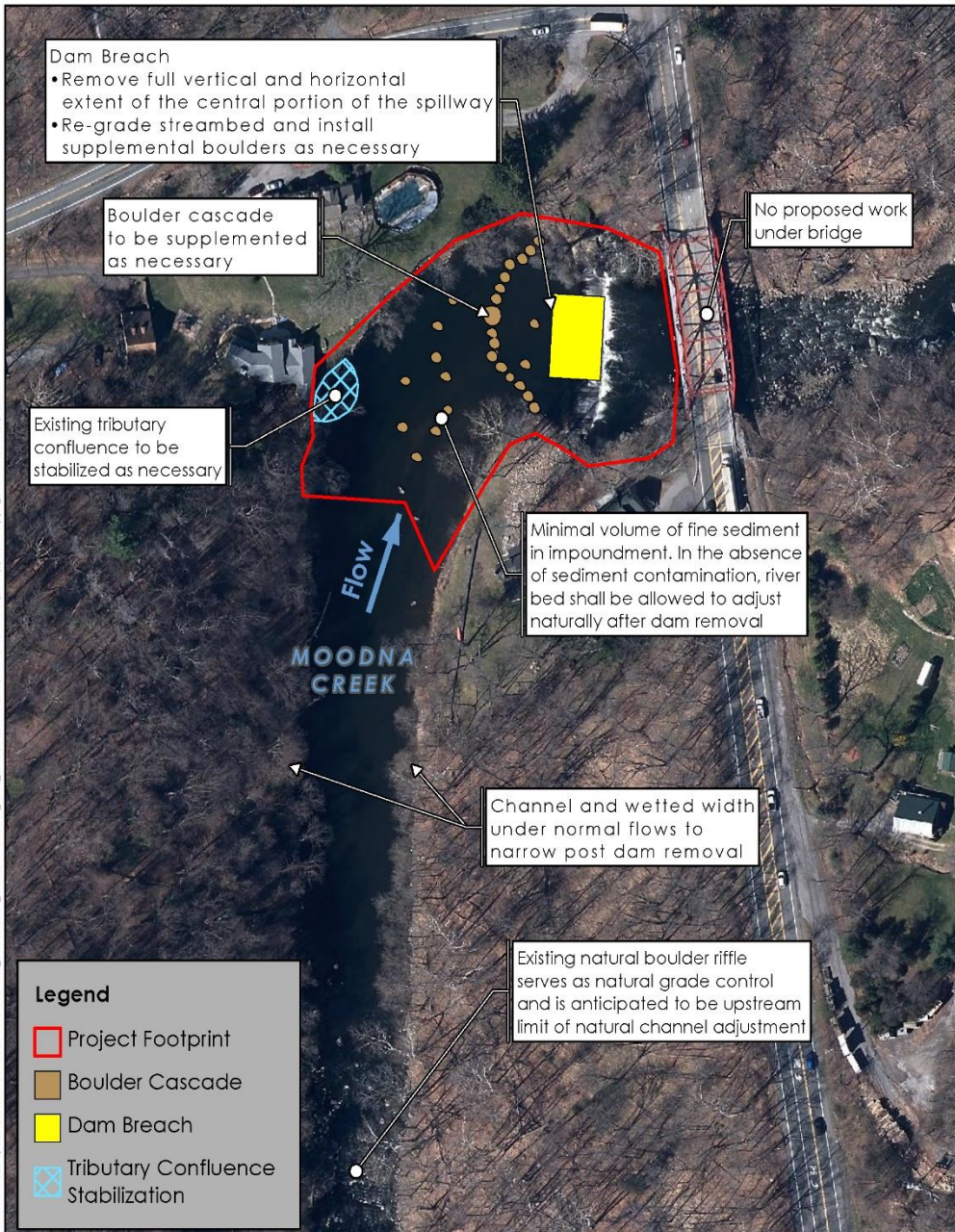
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Map Projection: NAD 1983 StatePlane New York East FIPS 3101 Feet

RECOMMENDED PLAN
HUDSON RIVER HABITAT RESTORATION
MOODNA CREEK - AOP 2: FIRTH CLIFF DAM
TOWN OF CORNWALL
ORANGE COUNTY, NEW YORK



\$7,665,000

AOP 3: Orr's Mill Dam in Cornwall, NY



NOTES:
1. 2016 orthoimagery obtained from the New York State GIS Clearinghouse: gis.ny.gov

0 60 120 Feet
Map Projection: NAD 1983 StatePlane New York East FIPS 3101 Feet

RECOMMENDED PLAN
HUDSON RIVER HABITAT RESTORATION
MOODNA CREEK - AOP 3: ORR'S MILL DAM
TOWN OF CORNWALL
ORANGE COUNTY, NEW YORK



\$8,976,000

Total: \$20,422,000