New York City Overcomes Ecosystem Restoration Challenges in Current Economic Landscape by constructing its first mitigation bank as a means to restore degraded urban wetlands

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Mitigation and Restoration Strategies For Habitat and Ecological Sustainability (MARSHES) Initiative

- Saw Mill Creek Pilot Wetland Mitigation Bank located on city-owned land on Staten Island which serves primary and secondary service area
- Comprised of previously filled and degraded urban wetlands and upland buffers
- Adjacent to Saw Mill Creek, a tidal tributary of Arthur Kill
- Restoration Goals
  - Remove urban fill
  - Improve tidal hydrology exchange
  - Reestablish native plant species
  - Control invasive plant species
  - Minimize contamination risks
  - Increase fish and wildlife habitat
Mitigation Bank Service Area

**Primary Service Area** Portion of Lower Hudson River Basin (HUC06) 020301 within NYC (includes portions of HUC08 subbasins: Lower Hudson River and Sandy Hook-Staten Island)

**Secondary Service Area** Portion of Long Island Basin (HUC06) 020302 within NYC (includes portions of HUC08 subbasins: Bronx River, Long Island Sound, Northern Long Island and Southern Long Island) and Raritan Bay-Lower Bay Deep

- US EPA & Army Corps of Engineers prioritized mitigation banking
- NYC to join NJ and CT (Tri-State Area) Mitigation credits generation
MARSHES Project Stakeholders

City Agencies
- Mayor’s Office: Project Coordination
- EDC: Project Sponsor
- DPR: Site Jurisdiction
- DEP: Wetland Expertise
- DCP: Waterfront Planning

Technical Advisory Committee
- Metropolitan Waterfront Alliance
- Trust for Public Lands
- RPA
- S.I. Borough President
- NRDC
- EDF
- Hudson River Foundation
- NYCEJA
- NYC Audubon
- NYCIF/Columbia

Interagency Review Team
- League of Conservation Voters
- REBNY
- SIEDC
- Army Corps of Engineers
- NYSDEC
- USEPA
- National Marine Fisheries
- US Fish & Wildlife
- NYS DOS
Project Overview

- Site selected because of interest from regulators
- Historically tidal marsh, which was significantly altered through filling, ditching and dumping
- Site identified in *Comprehensive Restoration Plan for the New York-New Jersey Harbor Estuary* developed by Corps, Port Authority, and other federal, state and local agencies

- Mitigation Plan includes
  - Wetland Restoration (Re-establishment) ~7 acres
  - Wetland Restoration (Rehabilitation) ~17 acres
  - Wetland Enhancement ~35 acres
  - Buffer Rehabilitation ~9.5 acres
Restoration Plan: Remove Debris and Excavate

- Proposed restoration requires significant excavation due to historic filling
- Up to 10 feet of fill in some areas
- Louis Berger as Construction contract administrator
- Full-time Construction management provided by LiRo Engineers
- Galvin Bros hired as construction contractor
Phase I Environmental Site Assessment (ESA) – 2013

- No releases observed
- Recognized Environmental Conditions (RECs)
  - Nonindigenous Fill Material
  - Widespread Dumping
  - Potential Impacts to Site by Off-Site Sources
  - Suspected Pesticide Application during early and mid-20th century to reduce mosquito populations
- Phase I ESA indicated that an area-wide site screening plan be implemented
2013 Site Screening & Results

- ~50 samples analyzed for Target Compound List (TCL)+30, TAL metals, TOC, grain size, pH
- Borings confirm fill material placed in wetlands and uplands
- Fill includes brick, glass, concrete, metal, coal porcelain, fabric, wood
- Contaminants include metals, PCBs, pesticides, VOCs and SVOCs
- Concentrations tend to decrease with depth
- Site contaminants of ecological concern could potentially impact fish and wildlife resources under existing conditions
NYCEDC advanced additional soil/sediment borings

- Re-occupied previous boring locations
  - Collected additional samples for toxicity characteristic leaching procedure (TCLP) lead from 2 locations which exhibited high levels of lead
  - Collected samples from different interval depths, corresponding to top 6-inch interval of soil below final cut depth
- Collected additional samples to increase sample frequency
- Analyzed dioxin/furan in two samples from one location as Arthur Kill is connected to Passaic River
- Provided information needed to generate lithologic cross sections
Environmental Conditions:

• Contaminants include metals, PCBs, VOCs and SVOCs/PAHs
• In most locations, contaminant concentrations decrease with depth
• TCLP data did not exceed federal RCRA hazardous waste level
• Dioxin and Furans are below human health action level of 1,000 ppt and NYSDEC Sediment Guidance Value of 0.5 ppt (ecological criteria)
• Contaminants are typical of urban historic fill

Actions:

• Proposed restoration will remove contaminated soils and debris
• In most wetland restoration locations, exposed soils will not contain contaminants of ecological concern
• In limited areas, contaminants present at depth - soil will be over-excavated and 2 feet of clean sand placed
• Waste characterization analysis being performed during construction to classify the materials for disposal method/destination
Approx. Cut Volume Quantities
Northern: 26,490 cy
Central: 10,669 cy
Southern: 4,740 cy
Total Cut: 41,899 cy
Debris Removal
As of June 2018

TIRES
- 18 – 30 CY Containers
- 6 – 10-Wheelers
- 3 – Trailers

Debris
- 29 – 30 CY Containers
- 6 – Trailers

- Total volume of 1,403 CY disposed in upland disposal facility
Restoration Plan: Construct Tidal Channels and Marsh Plain and Replant with Native Plants
Project Performance Measures

- Project performance measured by criteria developed by state and federal agencies on Interagency Review Team (IRT)
- Set forth in Mitigation Banking Instrument (MBI) and special conditions of regulatory permits including
  - Pre-construction characterization of biota
  - Characterization of post-grading sediment concentrations
  - Post-construction monitoring of sediments and biota
- Additional sampling based on agency concerns that wildlife attracted to the “clean” marshes could be exposed to contaminants that may accumulate over time from other sources
Biota Characterization

- 2017 pre-construction biota sampling to determine baseline tissue residue concentrations (whole body composites) within site and reference area
  - mummichogs
  - fiddler crabs
  - wolf spiders
  - long jawed spiders
  - amphipods
- Post-construction tissue sampling will be conducted during monitoring program to determine tissue residue concentrations in these species, and caged ribbed mussels, within site and reference site
- Tissue samples analyzed for TAL Metals, Mercury, Organochlorine Pesticides, PCB Congeners, PCDD/F Congeners, and lipids
- Pre-construction baseline will be compared to post-construction tissue sampling results to assess impacts to wildlife in newly established/enhanced marshes
Post-grading & post-construction monitoring

• Developed Incremental Sampling Methodology (ISM) in collaboration with USFWS before project let out to bid.
• Collected sediment composite samples to determine sediment concentrations in exposed sediments after proposed grade establishment.
• Sediment sampling will be repeated during monitoring program, with post-grading sediment sampling results providing baseline for comparison.
• Chemical analyses of sediments include
  • TAL Metals
  • Mercury
  • Polychlorinated Biphenyl (PCB) Aroclors and Congeners
  • Organochlorine Pesticides
  • Polychlorodibenzodioxin/furan (PCDD/F) congeners
• Sediment sampling in three Wetland Disturbance Areas (WDAs)
• Grab samples were collected from different Decision Units, blended and subsampled
• Each WDA has three Decisions Units (waterway, side-slope, and marshes) x 3 ISM sample replicates = 9
• Each ISM sample consists of 20 discrete locations
• All samples from 0-15 cm surface sediment
Sediment Field Sampling Photos

Sample collection at low tide

- Tough field conditions
- Working long days collecting samples
- Coordination with construction activities
- Sample management for composite samples
- Approval for planting areas turnaround for results
- Planting window limits
Pre-Construction Conditions and Proposed Restoration
Excavation during construction

Contractor at work

- Trees clearing and Debris separation prior to start of excavation
- Use of amphibious and long reach excavators
- Archeological testing prior to proposed channel excavation
- GPS controlled equipment doing marsh grading and excavation
Removal of Debris and Invasives

Work prior to grading and material disposal

- Installation of composite crane mat road for material disposal truck access
- Removal & separation of tires prior to disposal
- Use of specialized equipment for material separation in use
- Phragmites clearing and debris collection
Grading and clean sand placement

Proposed Grading Design implementation in field

- Overexcavation area identified as part of initial investigations
- Channel & marsh grading verification using conventional surveying methods
- Clean sand placement in areas prior to planting
- Tidal flushing and final grade approval before marsh planting
Marsh plant delivery and installation

Planting crew at work

- Marsh plant delivery from nursery (Pinelands & County Gardens)
- Plant transport using new graded channels
- Low & high marsh plant installation at low tides
- Low and high marsh Plantings inundated by tide based on grades
Herbivory Fence Installation for protection against wildlife
Agency Site visits

Walkthroughs during construction

- NYCEDC providing construction update
- GOSR visit June 29, 2018
- NYSDEC & USFWS site visit June 26, 2018
- TAC site visit March 9th 2018 (harsh winter)
- Excited to see yellow iron doing the work
- Positive response from permitting agencies
Monitoring, Maintenance, and Stewardship

- Bank has an active monitoring & maintenance period
- Maintenance funds will be used for control of invasive species; fence and gates maintenance; trash & debris removal; conduct monitoring inspections and replanting if needed
- Specific performance measures established in Mitigation Banking Instrument
- Annual monitoring reports required
- Bank included long-term protection of Site
- Portion of revenues will be set aside for long-term stewardship
SUMMARY

• After Superstorm Sandy, NYC faced billions in infrastructure damage and challenging task on how to rebuild with greater resiliency

• NYC expects Saw Mill Creek Pilot Wetland Mitigation Bank, first ever approved in NYC, will facilitate:
  • larger wetland restoration projects in City’s ecologically sensitive coastal areas
  • directing more public and private funds for restoration of damaged ecosystems
  • Improving sediment and plant ecology
  • Improving City’s resiliency to climate-related disturbances by absorbing coastal flooding
  • Applying lessons learned to other degraded habitats
Questions?

**building strong neighborhoods**

**Saw Mill Creek Mitigation Banking Pilot**

The Saw Mill Creek Wetland Mitigation Banking Pilot project will improve the ecosystem and wildlife habitat. It will establish NYC's first wetland mitigation bank.