



## **Natural Areas Conservancy**

### **Inventory of Coastal Wetland Restoration Opportunities in NYC**

#### **Summary**

The Natural Areas Conservancy (NAC) developed and prepared a Coastal Wetland Restoration Opportunities Inventory (ROI) on NYC Parkland to advance restoration planning in Parks and to facilitate the integration of wetlands and coastal restoration into citywide waterfront and resiliency planning. The NAC is a non-profit organization that works in partnership with the NYC Department of Parks & Recreation (NYC Parks) to restore and conserve our city's natural ecosystems based upon data-driven land management. With spatial and summary site information on over 120 sites, and design concepts for over 30 of these sites, the ROI enables the identification and prioritization of restoration opportunities to protect and enhance the city's coastline. Sites can be sorted and ranked based upon ecological sensitivity or condition, size, region, specific initiative(s) or plan(s), cost, and viability for community stewardship. Coastal wetland opportunities identified to date total over 275 acres, and include sites identified other regional planning documents, as well as smaller sites not captured in other plans. The ROI is a kit of parts (Excel data set, GIS shapefiles, maps and design concepts) that can be used in a variety of ways. Resource managers, developers and regulators can use the inventory to propose and select sites for wetlands mitigation that are requisite parts of development or capital improvement projects. Decision-makers, planners, designers, developers, conservationists, and community leaders can use the ROI to inform neighborhood resilience plans. The ROI can be also be used by scientists and land managers to identify research projects that advance knowledge of how coastal habitat restoration can be part of green or living shoreline projects rather than strictly "hard" solutions. Finally, the ROI is invaluable for being able to react nimbly to grant or other funding opportunities. The inventory is designed to be a living resource, updated as new sites are added, to provide agency heads and elected officials critical and up to date information for revitalizing coastal communities to match 21st century urban conditions.

#### **Introduction**

With 520 miles of coastline, New York City's historic landscape was shaped by water. Over the past 400 years however, the City's shoreline has been developed and modified, leading to the loss of nearly 90% and thousands of acres of our wetlands. This pattern has contributed to increased risks and vulnerabilities from climate change, which were especially evident after Superstorm Sandy. With population density on the rise, these threats are further magnified.

Yet our coastlines present opportunities for a new kind of city: one in which the restoration and re-creation of naturally resilient wetlands serve to protect communities from storms by soaking up floodwaters. Functioning wetlands along our coastlines make neighborhoods more resilient, store carbon, clean water, and increase biodiversity. Interconnected coastal parklands can be designed to be a central component of daily social life, where people gather, recreate, start businesses, and find inspiration.

The ROI is an original resource, based on current information, to help city planners, natural resource managers, and community members sort, select, and prioritize wetland restoration opportunities as part of neighborhood or watershed resilience planning. Wetland restoration can be integral to development and the ROI will help planners, resource managers and developers combine their objectives. Entities seeking sites for wetlands mitigation can use the ROI with NYC Parks to identify potential locations based upon the extent of development and ecological damage.



The ROI provides the information necessary to establish and sustain a regular citywide wetland resilience capital program. It can be used as a means to leverage public and private funds, coordinate city and regional efforts by comparing, matching, and aligning potential projects, including mitigation strategies and communication with stakeholders. For some sites, accompanying design concepts provide visualizations of specific strategies, showing the type of work that is possible and the potential coastal habitats that can be restored. More detailed designs at a smaller set of sites illustrate phased restoration approaches that incorporate analysis of the challenges to be faced and relevance to other regional proposals and initiatives. These products allow for quick and substantial response to grant opportunities and other funding requests.

### Restoration Site Identification and Prioritization

Our mechanism for identifying potential sites started with a review and classification of opportunities previously identified by NYC Parks Natural Resources Group (NRG), which has been practicing wetland restoration for over 25 years. The document is founded on consultations with NRG and other natural resource managers, field investigations, and compilation of multiple existing data sources, including:

- New York-New Jersey Harbor & Estuary Program (NY-NJ HEP) [Hudson-Raritan Estuary Comprehensive Restoration Plan](#) (updated 2014)
- NYC Special Initiative on Rebuilding and Resiliency [A Stronger, More Resilient New York](#) (2013)
- NYC Wetlands Transfer Task Force [Recommendations for the Transfer of City-Owned Properties Containing Wetlands](#) (2007)
- NRG's United States Environmental Protection Agency (USEPA) funded Marsh Conditions and Vulnerability Assessment project (2013 and 2014)
- NRG's internal lists generated for marine debris removal, post-Sandy debris removal, and potential in-house wetland restoration

The resulting data set is linked to GIS files with unique identifiers for each proposed restoration opportunity. Rapid field surveys on most potential opportunities were performed to assess existing site conditions. These field assessments, conducted largely on filled salt marsh, mudflat or wetlands adjacent areas, include extent and type of fill, debris, and invasive plant cover.

Using the above resources and information, we developed the ROI to include factors such as:

- anticipated restoration activities, for example fill or debris removal or invasive plant control
- sites by planning region, borough, or watershed
- sites by ecological community (e.g. maritime forest, salt marsh), ecological health such as degraded or in good condition, and proximity to and connectivity with adjacent sensitive areas
- sites where restoration work can be accomplished by volunteers, including partner and stewardship groups
- sites by size, cost per acre, and total cost.

Parameter List by SiteID	
Site	ER.X.03.1A.
Field	PartnrNGO1
Planning Region	East River, Harlem River, Western Long Island Sound
Site Name	Harding Park
CRP ID	114
TEC	Coastal Wetland
OtherPlan1	N/A
OtherPlan2	N/A
OtherPlan3	N/A
OtherPlan4	N/A
ProjDesc	0
Opportunity Size	1
EstCost	\$ 1,130,000.00
Output	Harding Park Homeowners Assoc.
Column	47
Row	31

**Figure 1:** The ROI stores information in an Excel spreadsheet with summary tables that can be used to identify individual sites according to multiple criteria.

The data in each of these categories were grouped into indices related to **feasibility** (cost/acre, regional planning efforts, potential partners), and **ecological benefit** (site size, proximity to ecologically sensitive resources, and cover type).



**Figure 2:** Opportunities can be prioritized according to Feasibility and Ecological Benefit indices. NAC's priority restoration sites are in the top 25th percentile of opportunities according to these indices.

### Design Concepts

At 31 restoration opportunity sites (with more detailed designs at 10 of these sites), we developed design concepts that articulate and frame a proposed strategy of restoration both within the site itself and within the context of regional initiatives. The more detailed concepts show proposed habitat and restoration activities (see example at Idlewild Park in Figures 4 below). Where there are phased restoration activities, each phase is coupled with a preliminary cost estimate. The layout, type, location, and phasing of work shown on the plan incorporates an analysis and synthesis of available data, such as NAC's salt marsh assessment results.

The concept design serves as the foundation for a constructible plan while providing a public-facing document that can leverage partnerships with outside organizations, such as NY-NJ HEP, United States Army Corps of Engineers, New York State Department of Environmental Conservation, New York City Departments of Environmental Protection and City Planning, the Mayor's Office of Recovery and Resilience, and contribute to regional planning efforts.

Some of these restoration designs include proposed pilot projects, such as the placement of sand to build out lost salt marsh at fringe wetlands or a multi-varied concept plan for a park like Idlewild. These pilots would apply innovative techniques or would trigger changes to regulatory guidelines, providing an important precedent for addressing areas of marsh loss throughout New York City and creating a structure to develop a chain of interrelated sites throughout a watershed.

### Results

To date, the inventory includes 121 citywide coastal wetlands restoration opportunities, with most opportunities found on NYC parklands in the Bronx, Queens, and Staten Island. Preliminary analysis identifies over 275 potential acres for salt marsh restoration, with 140 acres established through fill removal, and 85 acres created by building out shorelines to replace lost marsh. In addition, 30 acres are in need of debris removal, with 13 acres suitable for volunteer participation. The average site of a potential wetlands restoration project is two acres, with the largest being 21 acres and the smallest 0.1 acres. Few truly large-scale opportunities remain for coastal wetland restoration in NYC Parks. In total, costs are on the order of \$245 million for salt marsh restoration and \$30 million for coastal forest restoration. Many of these sites include multiple ecosystem types, such as salt marsh and coastal forest, as well as a range of approaches, such as fill removal, debris removal, or



sand placement to replace lost marsh. Consequently, restoration opportunities at most sites can be accomplished in phases.

### **Recommendations**

We recommend that local, state, and federal resource management, construction, and planning agencies prioritize a list of sites from the ROI based on agency missions and goals. The NAC and Parks have listed their top sites below, which will continue to evolve as sites are added, data is edited, and criteria for prioritization are adjusted. Nonetheless, land managers can adopt or modify the list according to their own needs.

We also recommend that the City fund a wetlands capital improvement program that allows Parks and its partners to reliably restore sites each year as part of long-term resilience efforts. This type of program would be no different than capital programs for street trees, greenstreets, or forest restoration. It would allow NYC to annually restore land that has been lost or degraded for the purposes of community health and resilience. The Natural Areas Conservancy would assist NYC Parks in long-term care and monitoring of sites as part of adaptive management practices.

Because few large scale opportunities for coastal wetlands restoration remain on NYC Parklands, we recommend piloting new approaches for wetland protection and restoration, such as building out marshes where they have eroded, adding sediment to marshes that are breaking up, and implementing long-term strategies to allow the movement of salt marsh inland as sea level rises. In addition, where possible, land managers should restore wetlands and increase connectivity between natural areas to increase their benefits, including protection from storms. This would potentially generate changes in regulatory policy, a discussion worth having as we develop long-term coastline and waterfront plans. Including the community and gauging their stewardship potential is also essential for neighborhood resiliency planning and design. The ROI should be used as a building block for shorefront improvement projects, wetlands mitigation, and identifying science gaps as they relate to restoration and resilience, and as a standard reference for all coastline initiatives. It is also a means to identify and understand the value of acquisition and transfer of land to NYC Parks or other land conservancies. With this tool, we can continue as a City to generate and restore natural areas and green infrastructure to keep pace with 21<sup>st</sup> century conditions.

**Table 1:** Priority NYC Parks coastal wetlands restoration opportunities from the Restoration Opportunities Inventory (ROI), by borough, selected according to high rank for ecological benefit, feasibility, vulnerability to marsh loss, and known available funding or partnerships. The ROI, and which sites are priorities for certain criteria, changes as opportunities are added, data is updated and edited, and ranking criteria are adjusted.

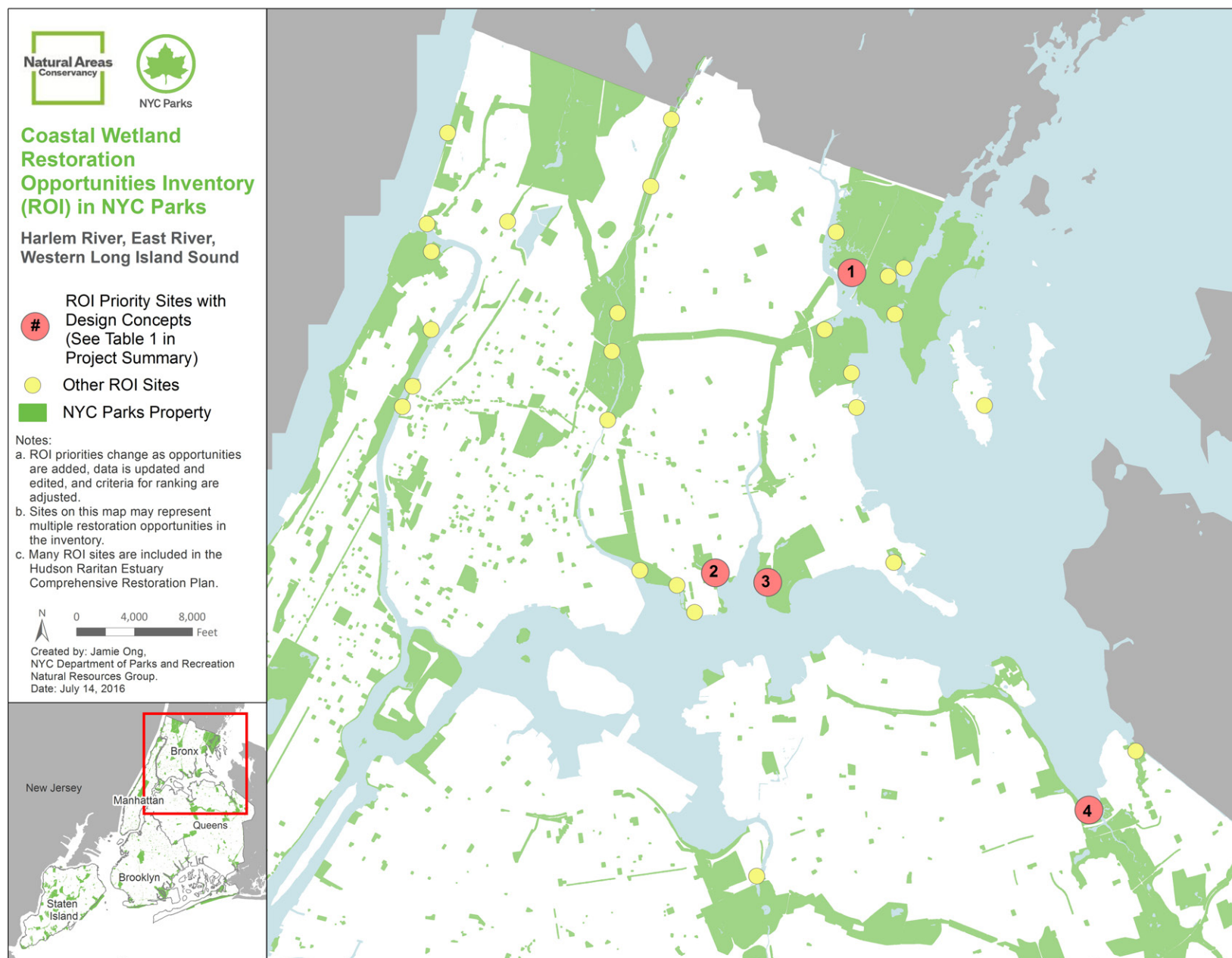
# on Map	ROI Site Name <sup>1</sup>	Watershed	Borough	Ecological Benefit Index	Feasibility Index	Marsh Loss Vulnerability	Available Funding/ Partners	Size (AC)	Estimated Cost
1	Hutchinson River Marsh Buildout	Long Island Sound (LIS)	Bronx	X		X		12.3	\$12.2M
2	Pugsley Creek Debris/Fill Removal	Long Island Sound (LIS)	Bronx				X	5.6	\$5.6M
3	Ferry Point Park Fill Removal	Westchester Creek (LIS)	Bronx		X	X		4.6	\$1.6M
4	Alley Creek Marsh Buildout	Little Neck Bay (LIS)	Queens	X		X		5.7	\$5.7M
5	Four Sparrow Marsh Buildout	Jamaica Bay	Brooklyn	X		X		3.9	\$7.0M
6	Fresh Creek Wetland Restoration <sup>2</sup>	Jamaica Bay	Brooklyn			X	X	8.0	\$6.0M
7	Shellbank Creek Debris Removal	Jamaica Bay	Brooklyn		X			10.4	\$0.1M
8	Brant Point Wetland Restoration <sup>2</sup>	Jamaica Bay	Queens	X			X	2.6	\$2.6M
9	Dubos Point Wetland Restoration <sup>2</sup>	Jamaica Bay	Queens	X			X	4.5	\$4.4M
10	Goose Pond Marsh Buildout	Jamaica Bay	Queens	X		X		10.7	\$13.2M
11	Idlewild Debris Removal	Jamaica Bay	Queens		X		X	3.4	\$0.1M
12	Idlewild Elevation <sup>3</sup> and Buildout	Jamaica Bay	Queens	X		X	X	6.2	\$6.0M
13	Somerville Basin Debris Removal	Jamaica Bay	Queens		X			1.5	\$1.3M
14	Mott Basin	Jamaica Bay	Queens			X	X	3.4	\$3.3M
15	Bayswater Shoreline	Jamaica Bay	Queens	X			X	1.4	\$1.4M
16	Rockaway Park Fill Removal	Jamaica Bay	Queens				X	1.5	\$1.5M
17	Spring Creek Marsh Buildout	Jamaica Bay	Queens	X		X		1.2	\$0.9M
18	Fresh Kills South Fill Removal	Arthur Kill	Staten Isl.	X				6.0	\$6.5M
19	Neck Creek Fill Removal	Arthur Kill	Staten Isl.	X				4.7	\$3.1M
20	Snug Harbor / Harbor Brook	Arthur Kill	Staten Isl.		X		X	1.3	\$1.5M
Total								98.9	\$84.0M

<sup>1</sup> The ROI site name includes the name of the Park, and may refer to the whole site, or to a specific opportunity with a specific strategy at the site.

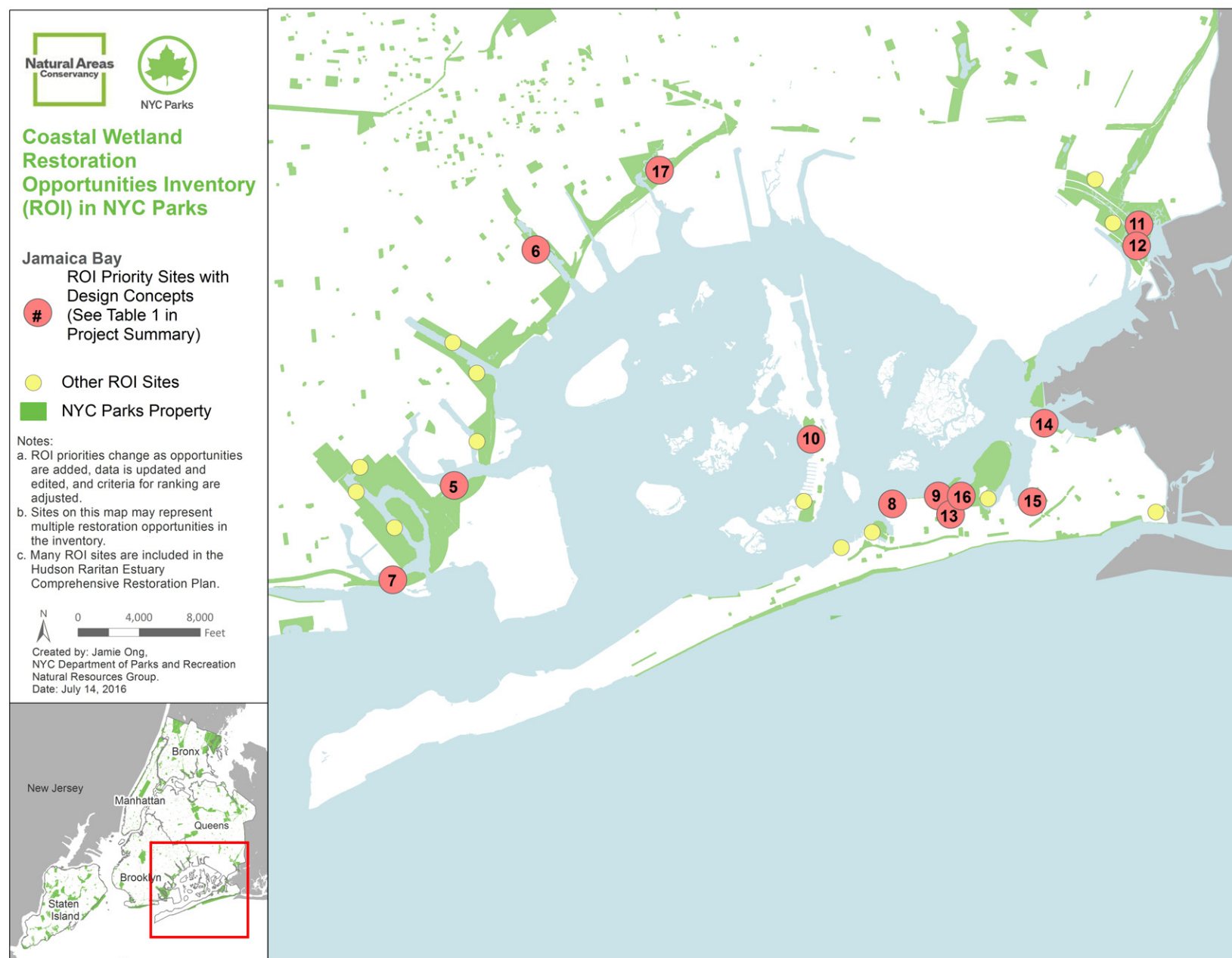
<sup>2</sup> USACE is evaluating these sites for potential recommendation for near-term construction as part of the Hudson Raritan Ecosystem Feasibility Study.

<sup>3</sup> The Idlewild Design Concept in Figure 4a-c describes a smaller pilot project, to increase elevation only, across a total of 2 acres.

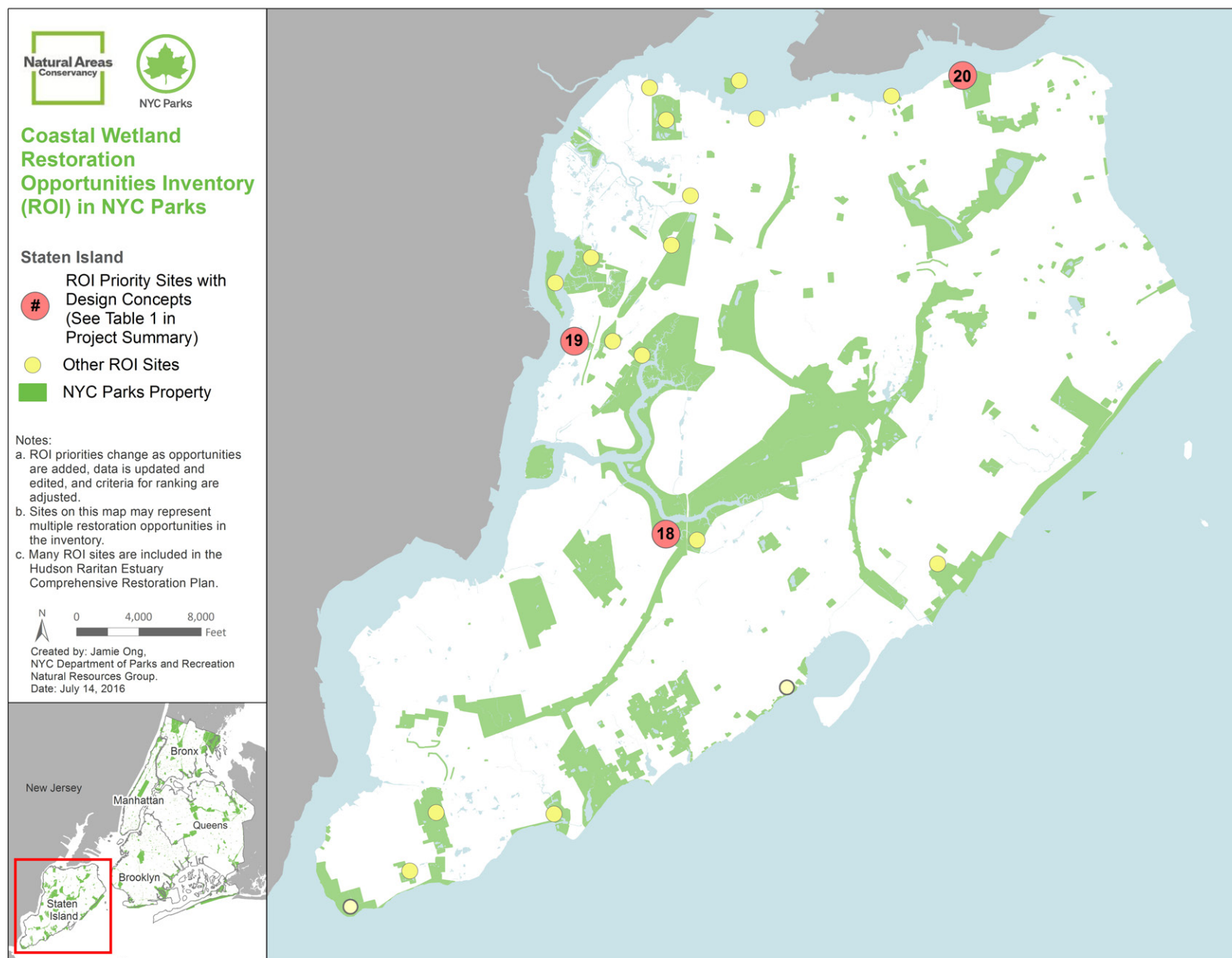




**Figure 1:** ROI sites in the Harlem River, East River, and Western Long Island Sound Planning Region.



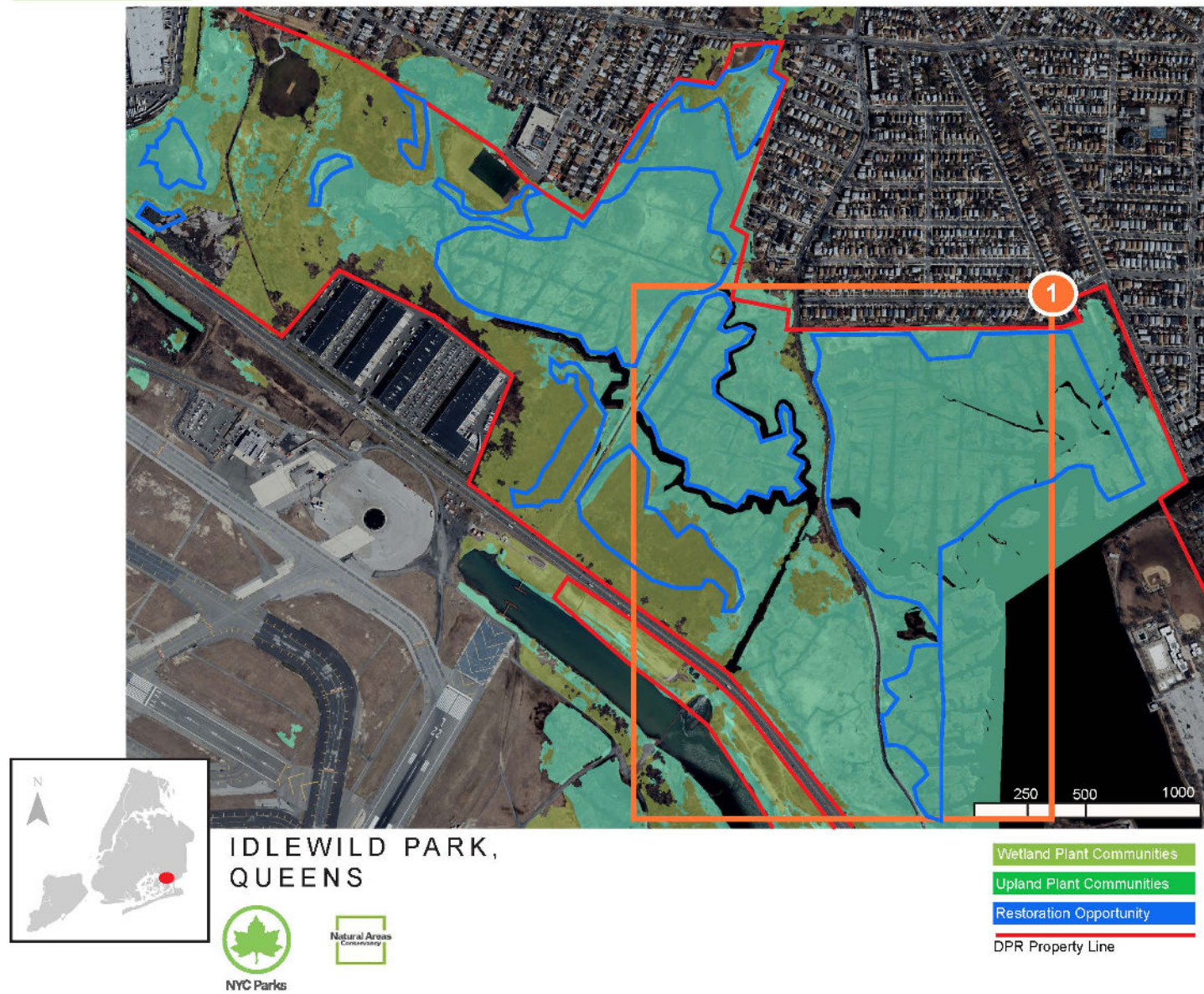
**Figure 2:** ROI sites in the Jamaica Bay Planning Region.



**Figure 3:** ROI sites in Staten Island.



## IDLEWILD PARK



**Figure 4a:** Idlewild Park Design Concept – Location map



## IDLEWILD PARK

*Thin Layer Sediment Application for Marsh Restoration*

1

## PROPOSED HABITAT TYPES

**Low and High Salt Marsh 2 acres**

Existing low marsh has a hummocky peat layer, patches of bare, un-vegetated soil and is susceptible to further degradation with inundation as sea levels rise. A thin application of sand in select sites across this area will slightly raise elevations to allow salt marsh cord grass to establish at higher, more sustainable elevations.



Restoration Opportunity



**Figure 4b:** Idlewild Park Design Concept – Proposed Restoration Area within which 2 acre pilot project will be located

## IDLEWILD PARK

### Project Description and Budget

#### Project Description

Idlewild Park Preserve, in southeast Queens, NY, contains the largest remaining fringing salt marsh in Jamaica Bay and is part of a state designated Significant Coastal Fish and Wildlife Habitat Area. The New York City Department of Parks & Recreation (NYC Parks) proposes trialing the application of a thin layer of sediment at strategic locations in bare or fragmented areas across the low marsh areas in Idlewild Park. This sand and silt substrate will help increase the elevation of the marsh surface to increase the resiliency of the marsh in the face of sea level rise.

Historic ditching and filling has compromised the integrity of Idlewild Park's marsh. High nutrient loads, increased inundation, and accumulations of floating debris have also contributed to its degradation. Yet despite these impacts, Idlewild Park supports breeding sites for important wildlife such as diamondback terrapins and Salt-Marsh Sparrows and habitat for wading birds and fish. The site is also a cultural and educational resource for the community. Adding elevation will help to address multiple causes of marsh degradation to sustain this critical salt marsh habitat.

If successful, elevating the marsh will help maintain, protect and sustain the critical habitat and other functions this salt marsh provides and produce a resilient salt marsh and coastal maritime system with enduring ecological values and natural benefits.

#### Preliminary Estimate for Pilot Project

General Requirements and Erosion Control	\$ 71,425
Removals	\$ 25,000
Site Work	\$ 285,700
Design 10%	\$ 38,212
Construction Supervision 10%	\$ 38,212
Contingency 10%	\$ 38,212
<b>TOTAL</b>	<b>\$496,761.00</b>



**Figure 4c:** Idlewild Park Design Concept – Pilot Project Description