Jamaica Bay Watershed Protection Plan
2016 Update

New York City Department of Environmental Protection
Vincent Sapienza, Acting Commissioner
October 1, 2016

Jamaica Bay Watershed Protection Plan

NYC Environmental Protection

Jamaica Bay Watershed Protection Plan 2016 Update

Prepared by
Bureau of Environmental Planning and Analysis
New York City Department of Environmental Protection

Cover Photo Courtesy of National Park Service

TABLE OF CONTENTS

Protecting Jamaica Bay

Jamaica Bay is one of the largest coastal wetland ecosystems in New York State. A beloved network of marsh islands, fringe marshes, maritime shrub and dune communities, shorelines, and open water, it encompasses 12,000-acres. Jamaica Bay is a component of the National Park Service (NPS) Gateway National Recreation Area (GNRA), and the interior 9,100 acres have been designated as the Jamaica Bay Wildlife Refuge. Jamaica Bay is also designated as a Significant Coastal Fish and Wildlife Habitat by the New York State Department of State (NYSDOS).

The Bay holds strong aesthetic, recreational, and ecological value not only for local residents but also regionally and internationally as well. Used for boating, birding, kayaking, etc., the Bay also contains important habitats including: open water, salt marsh, grasslands, coastal woodlands, maritime shrublands, and brackish and freshwater wetlands, which help improve water quality and ecological habitat. The Bay is home to an important and diverse complex of wildlife and plant species. The Bay is also an integral stop on the Atlantic Flyway migration route and is one of the best bird-watching locations in the western hemisphere.

The Jamaica Bay watershed has become one of the most densely urbanized areas in the United States. As a result of human activity and development, the ecologically rich habitat of Jamaica Bay has changed considerably. Unfortunately, the valuable resources that comprise Jamaica Bay are being lost. Over the last 150 years, interior wetland islands and perimeter wetlands have been permanently removed as a result of extensive filling operations; shorelines have been hardened and bulk-headed to stabilize and protect existing communities and infrastructure; deep channels and borrow areas have been dredged, altering bottom contours and affecting natural flows; and natural tributaries along with their important benefits of balanced fresh water and coarse sediment exchanges have essentially disappeared leaving behind deposits of silts and particulates from urban runoff. These activities have synergistically affected historic flow patterns in the Bay, eradicated natural habitat, impacted water quality, and modified the rich ecosystem that was present prior to the extensive urban development of the watershed.

In 2005, under Local Law 71 (LL 71) signed by Mayor Bloomberg, the New York City Department of Environmental Protection (DEP) was tasked with outlining a comprehensive watershed approach towards restoring and maintaining the water quality and ecological integrity of the Bay. The final Jamaica Bay Watershed Protection Plan (JBWPP) is a living adaptive management document that evaluates current and future threats to the bay, as well as the coordinated research, restoration, and water quality. The JBWPP is about awareness and strategies. It is a “vision for a sustainable Jamaica Bay” and a guide to the ongoing planning process. Since the inception of the original Jamaica Bay Protection Plan, huge efforts have been made, with much success, to improve the health of Jamaica Bay. Overall, New York Harbor’s water quality is the cleanest it has been in nearly 100-years.

The protection of Jamaica Bay is intimately connected to its vast watershed and the uses and activities contained within it. The current preservation and protection measures within Jamaica Bay have engaged the efforts of federal, state and city governments and a strong and active network of community organizations and advocates. However, the protection of Jamaica Bay as an environmental resource presents significant challenges. Highways and other development have resulted in restricted access to the shoreline. Urban residential development along the shoreline has brought its environmental stresses and future development still threatens vital wetlands and other open spaces that remain. Therefore, in order to plan comprehensive protection for the Bay, a systems approach is necessary. This approach looks at the larger picture of Jamaica Bay and the interconnected priorities for research, restoration and ecological improvements. As issues facing Jamaica Bay and its watershed continue to be interrelated, they call for a scientific and coordinated approach among all agencies and stakeholders.

The Vision for a Sustainable Jamaica Bay Watershed:

"The Jamaica Bay watershed is a place where New Yorkers and visitors co-exist with natural areas and clean water that harbor healthy waterfowl, fish, and shellfish populations. It is a place where urban communities embrace environmental stewardship and where wetlands and other natural areas are protected and restored for future generations. The Jamaica Bay estuary is once again a cultural and recreational hub for Brooklyn and Queens, where residents swim, fish, boat, and enjoy nature."

Photo by Don Riepe

Jamaica Bay Watershed Protection Plan
Strategy

The Jamaica Bay Watershed Protection Plan assesses the technical, legal, environmental, and economic feasibility of varied protection measures, to ensure a comprehensive watershed approach toward restoring and maintaining water quality and the ecological integrity of the Bay.

The watershed protection plan is intended to serve as a blueprint for future management of the Bay and its watershed. This includes the vision for the Bay and issues that need to be addressed to achieve these vision-specific objectives, strategies, and actions that have been identified. It is an evaluation of the current and future threats to the Bay, and is in place to ensure that research, restoration, and water quality improvements are coordinated in a focused and cost-effective manner.

Water Quality

Water Quality in the Jamaica Bay Watershed:

The water quality and ecological integrity of Jamaica Bay and its tributaries have degraded over time. This degradation is attributed to a number of factors including:

- Increasing human populations
- Increasing volumes of stormwater runoff as a result of impervious surfaces
- Landfilling operations that displace wetlands and disrupt the natural tidal circulation patterns
- The westward expansion of the Rockaway Spit, which may be contributing to reduced circulation and mixing of Bay waters in the estuary
- Dredging operations in the Jamaica Bay estuary that have increased the bathymetric depth of the bay and resulted in decreased circulation and mixing

Yet great progress has been made, and studies show that water quality is recorded as the cleanest it's been in the past 100 years in the New York Harbor.

To improve the water quality of the Bay and its tributary basins:

- Engineered Solutions: rely on costly new facilities/ infrastructure upgrades that reduce nutrient loading to the Bay, or maximize the potential of existing facilities
- Ecologically sustainable practices
- Innovative techniques

Ribbed Mussel Pilot

Description: To study whether the filtering capacity of mussels can be adapted to the practical application of filtering discharges to improve water quality.

Location: Fresh Creek Tributary in Jamaica Bay

Schedule: Ongoing. Initial monitoring period was completed, additional monitoring to be conducted through fall 2018.

Background: The objective of this pilot was to study whether the filtering capacity of mussels can be adapted to the practical application of filtering the water column to improve water quality. As such, several artificial structures were constructed in Fresh Creek, a tributary to Jamaica Bay, to encourage the growth of ribbed mussels. The study monitored mussel growth and qualitative water quality improvements to measure the effectiveness of ribbed mussels in removing nutrients and particulate organic matter from the water. Full monitoring and data analysis was completed in late 2014, with additional limited monitoring to continue through fall 2018. After monitoring is complete, correlations between mussel growth and changes to the baseline water quality data will be analyzed, and the potential feasibility and benefit of larger scale ribbed mussel applications within Jamaica Bay will be evaluated in a Beneficial Ecosystem Restoration Findings Summary Report to be completed in early 2018.

Filtration of the water column by mussels could potentially remove quantities of nutrients from the water. While the filtering capacity of mussels is well known, it is unclear whether that capacity can be adapted to the practical application of filtering within the water column to improve the water quality. DEP has undertaken this pilot study to evaluate if a "wall" of ribbed mussels can be built to support a sufficient mussel population to carry out effective filtration and improve water quality.

Update: Full monitoring of the arrays was conducted on a monthly basis through late fall of 2014, and will continue bi-annually from 2016-2018. If ribbed mussel populations increase to significant densities in the future, we plan to qualitatively analyze correlations between mussel growth and changes to water quality. The potential feasibility and benefit of larger scale ribbed mussel applications within Jamaica Bay will be evaluated in a Beneficial Ecosystem Restoration Findings Summary Report to be completed in early 2018. Once final monitoring events occur, the information collected, lessons learned, and remaining data gaps and needs, will guide future installations.

Ribbed Mussels grown in Fresh Creek.

Oyster Reef Pilot

Location: Jamaica Bay

Description: A small oyster bed and a field of reef balls were placed within Jamaica Bay to evaluate oyster growth, survival and reproduction, as well as potential water quality and ecological benefits.

Schedule: Construction was completed in October 2010 and continuous monitoring continued through 2013. Twice a year monitoring is continuing through 2018.

Background: The restoration of oysters could greatly improve the ecological integrity of the bay, once teaming with oysters, a "keystone species", while providing water quality benefits. As such, DEP conducted two oyster reintroduction pilot studies within Jamaica Bay – the design and construction of an oyster bed off Dubos Point, Queens, and the placement of oyster reef balls in Gerritsen Creek, Brooklyn. These oyster pilot projects were conducted to evaluate whether climatic and environmental conditions within the bay were suitable for oyster growth, survival and reproduction. The study also measured how effective these bivalves were at filtering and removing nutrients from the water column.

The sites were monitored on a bi-weekly basis through 2013 to determine if the oysters could survive, grow, reproduce and provide water quality and ecological benefits. Monitoring activities included discrete and continuous water quality sampling, photo/video documentation, site maintenance, and investigation of sediment and current patterns.

Update: While continuous monitoring has ceased, a twice-a-year assessment of the site is continuing through 2018. The latest assessments in the fall of 2015 revealed that many oysters, in their fifth year of growth, were still alive and appear healthy. Overall, the monitoring results indicated adequate environmental conditions for oyster growth and survival within Jamaica Bay and water quality data demonstrated ranges within normal tolerances for the Eastern oyster.

The potential implementation and benefits of large-scale oyster restoration projects within Jamaica Bay was evaluated in 2015 in a Beneficial Ecosystem Restoration Findings Summary Report. This report will be finalized following the additional monitoring in 2018. A final summary report detailing the monitoring data, lessons learned, and remaining information gaps will be included in the report. If deemed feasible and sustainable, future steps could include developing a program to create a self-sustaining oyster population in Jamaica Bay to improve water quality and increase oyster larvae recruitment.

Oysters growing in Jamaica Bay.

Head of Bay Oyster Project

Schedule: Ongoing. Construction for the project began in September 2016 and monitoring will continue through late 2018.

This project builds upon earlier pilot studies conducted at Dubos Point, Queens and Gerritsen Creek, Brooklyn that demonstrated that oysters could not only survive in Jamaica Bay, but also thrive and reproduce. In contrast to earlier efforts, this project is much larger in scale and focuses mainly on adult oyster reproduction and juvenile survival. A floating "nursery" of 50,000 adult oysters was installed in Head of Bay in an effort to evaluate natural recruitment, as this has been one of the more challenging aspects to fully understand. The project includes donor and receiver beds to study recruitment within Jamaica Bay. In addition to the monitoring of the donor and receiver beds, we will also evaluate the spatial and temporal patterns of oyster reproduction and juvenile settlement through the use of spat collectors in the eastern sections of Jamaica Bay. It is anticipated that oysters will colonize four constructed beds suitable for oyster larvae attachment adjacent to the floating nursery. Additional monitoring will examine adult oyster growth and health, water quality improvements due to oyster filter feeding, and oyster reefs as functional habitat for other coastal wildlife.

Dense beds of eastern oyster (Crassostrea virginica) historically covered much of Jamaica Bay, New York Harbor and the lower Hudson River until the early 20th century. These natural oyster beds were a crucial component of the coastal ecosystem by constructing habitat and feeding grounds for diverse assemblages of fishes, birds, and other aquatic organisms. Oyster beds also provided important ecosystem services to adjacent human communities such as improving water quality and attenuating wave action. Overharvesting, dredging and water pollution led to the decline and closure of oyster fisheries in Jamaica Bay by 1921 (National Park Service, Jamaica Bay: A History, p. 47. 1981.)

This research project includes the initial construction of five artificial oyster bed structures in Head of Bay followed by two years of biological and environmental monitoring. Previous modeling efforts suggest that this area of the bay has the highest potential for retaining oyster larvae as they spend much of the time within the Idlewild salt marsh complex. A floating "nursery reef" containing 50,000 adult oysters will serve primarily as the supply of oyster larvae. These larvae or juvenile oysters float freely in the water with limited mobility for a period of approximately 2 to 3-weeks. Four submerged beds were constructed nearby to serve as suitable settlement locations for the developing juvenile oysters. These four "receiver reefs" are composed of porcelain fragments, clamshells, and oyster shells. The porcelain was salvaged from nearly 5,000 recycled toilets removed as part of DEP's water conservation plan in local public schools. Additionally, 30 sampling locations were established throughout eastern Jamaica Bay to monitor for the settlement of oyster larvae. For the duration of the project, the team will monitor water quality within Head of Bay to examine its effect on juvenile oyster settlement and survival as well as adult oyster health, growth, reproduction and recruitment.

Wild oyster beds offer an important ecosystem service to humans by improving water quality. A single adult oyster is capable of filtering dozens of gallons of water per day through its natural feeding process. To examine the potential benefits of a restored oyster reef in urbanized Jamaica Bay, the team will measure the amount of phytoplankton and particulate matter removed from water flowing through the project site.

Lastly, the team will document the role of restored oyster beds as functional habitat for other coastal organisms. This work will include sampling seafloor sediments and oyster bed materials within the project site.

DEP has contracted with the New York Harbor Foundation, the Hudson River Foundation, HDR, Inc., and Cornell Cooperative Extension to complete this project.

Jamaica Bay Wastewater Treatment Plant Upgrades

Description: DEP is improving the overall water quality and ecology of Jamaica Bay by reducing nitrogen discharges from Jamaica Bay's wastewater treatment plants (WWTPs) through a number of innovative plant upgrades.

Schedule: Ongoing through 2020.

Background: Excess nutrients can lead to increased algae growth and decay, which can in turn reduce oxygen levels in waterways and reduce ecosystem health, especially in warm weather months. Prior to recent upgrades, the 240 million gallons of daily wastewater handled by the four WWTPs on Jamaica Bay resulted in the discharge of more than 50,000 pounds of nitrogen each day. The Rockaway Peninsula and other anthropogenic constrictions prevent adequate circulation of oxygenated water with the bay water, which exacerbates water quality conditions. Current nitrogen discharges into Jamaica Bay have been reduced to around 26,000 pounds per day and additional reductions are expected when biological nutrient removal (BNR) upgrades are completed at Rockaway and Coney Island WWTPs.

Update: Construction for Step Feed BNR at the Jamaica and 26th Ward WWTP is complete, construction of permanent supplemental carbon systems is operational at both the Jamaica and 26th Ward WWTPs, and supplemental alkalinity upgrades are complete at the 26th Ward WWTP. Design associated with future Step Feed BNR upgrades has been completed for Rockaway WWTP, and is in progress for the Coney Island WWTP with a target design completion date December 31, 2016.

Additionally, a number of projects are in design or construction to improve the efficiency of the sewer system and convey and treat more wet weather flow at the WWTPs that will help further reduce combined sewer overflows into Jamaica Bay. Construction is underway at the 26th Ward WWTP to improve operations of headworks and preliminary treatment reliability to enable the plant to capture and treat more wet weather flow. The construction of bending weirs at three regulators has recently been completed and work on a new parallel interceptor is nearing completion. When the entire project is completed it will reduce CSO discharges into Bergen and Thurston Basins. A high-level sewer separation is underway in the Fresh Creek drainage area and some of the later phases of this work are in design. When completed this project will reduce CSO discharges into Fresh Creek and will free up some wet weather capacity at the 26th Ward WWTP.

WWTPs treat 240 million gallons of water daily.

Long Term Control Plan

Schedule: The first LTCP for Alley Creek and Little Neck Bay was submitted to the NYS Department of Conservation (DEC) in June 2013. The Jamaica Bay and Tributaries LTCP is due June 2017.

Description: DEP is developing and executing a detailed water quality planning and improvement process for NYC's local waterways, as documented in ten waterbody-specific Long Term Control plans (LTCPs) and one citywide Combined Sewer Overflow (CSO) LTCP.

On March 8, 2012, DEC and DEP signed a groundbreaking agreement to reduce CSOs using a hybrid green and gray infrastructure approach. As part of this agreement, DEP was tasked with developing ten waterbody-specific LTCPs plus one citywide LTCP to reduce CSOs and improve water quality in NYC's waterbodies and waterways. The goal of each LTCP is to identify appropriate CSO controls necessary to achieve waterbody-specific water quality standards that are consistent with the federal CSO Policy and the water quality goals of the Clean Water Act (CWA).

Each LTCP:

- Assesses the feasibility of attaining current water quality standards, the next highest standards, and fishable/swimmable standards;
- Builds on the Waterbody/Watershed Facility Plan (the first phase of the planning process);
- Requires robust, targeted public participation and feedback processes; and
- Identifies a gray-green balance of CSO management solutions for different watersheds.

The Jamaica Bay and Tributaries CSO LTCP is due to the DEC by June 30, 2017 and a Jamaica Bay CSO LTCP public kick-off meeting was held on September 22, 2016 at the Jamaica Chamber of Commerce.

Up-to-date information regarding LTCP status can be found on DEP's website:

http://www.nyc.gov/html/dep/html/cso_long_term_control_plan/index.shtml

LTCPs aim to reduce the impacts of CSOs on bodies of water in the Jamaica Bay watershed.

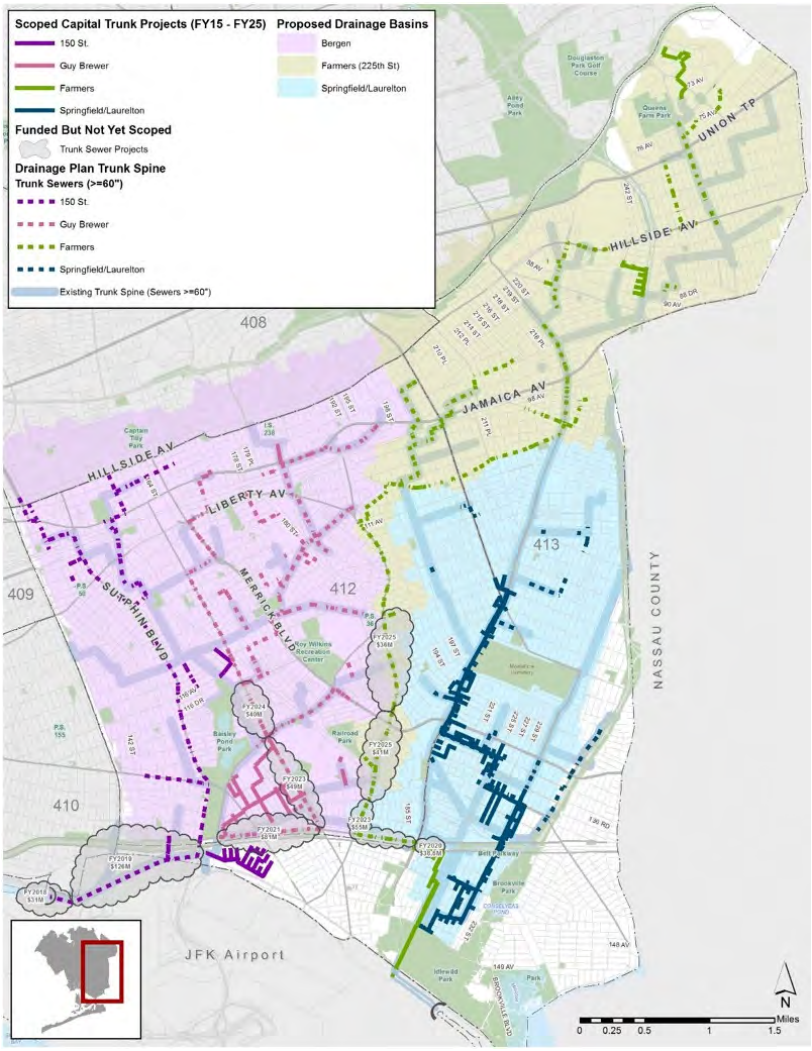
Area-wide Sewer Improvements

Description: DEP is designing and constructing multiple critical infrastructure projects to reduce chronic flooding and increase environmental restoration in southeast Queens, which is in the Jamaica Bay watershed. Additional sewer separation and repair projects are ongoing in the Jamaica Bay watershed as well.

Schedule: Ongoing.

Southeast Queens is a target location for long-term sewer build-out and significant capital investment to alleviate chronic flooding conditions. Recent projects have included completion of construction of sewer improvements at Springfield Gardens and start of construction of improvements in the vicinity of Baisley Pond. Both projects include Bluebelt-style best management practices (BMPs) within Springfield Lake and Baisley Pond respectively.

More recently, the City has made a commitment of $1.5 billion in the 10-year Capital Budget for Southeast Queens to plan and begin full sewer build-out and to provide short-term flooding relief wherever possible. Full build-out requires approximately 450 miles of new storm sewers, and upgrade of 260 miles of sanitary sewers and 30 miles of combined sewers over many years.



Updates to Major Sewer-Related Improvement Projects

The full sewer build-out is designed to:

1. Intercept as much stormwater before it gets to the storm sewer system as possible using green infrastructure
2. Accelerate the planning and design work to build large trunk sewers
3. Build early action storm sewers in the hardest hit areas as quickly as possible
4. Partner with the community to share information on steps property owners can take to prevent damage to their properties

Updates to major sewer related improvement projects in the Jamaica Bay watershed include:

• Albert Road: Nine right of way rain gardens and two larger bioretention cells are currently in construction.

• Complete Sewer Build-out in Rockaways: Projects continue to be identified, but generally involve installation of storm sewers to prevent local street and sanitary sewer flooding. Chandler Street Storm Sewer Buildout, Beach 81st Street Storm Sewer Buildout, Beach 42nd Street Storm Sewer Buildout, Beach 88th Street/ Beach 94th Street Infrastructure Improvements and Broad Channel Improvements, also involve the installation of storm sewer outfalls to the basins lining Jamaica Bay, with associated high quality wetland and beach restoration to improve local ecosystems, and have completed construction.

• Trunk Sewer Build-out: Trunk sewer buildout for four major spines on 150th Street, Guy Brewer Boulevard, Farmers Boulevard and Springfield Boulevard has been prioritized, with design of the lower reaches of Farmers Boulevard and Springfield Boulevard in progress, with construction expected to commence in fiscal year 2017.

• Fresh Creek Storm and Sanitary Sewers: This project involves the construction of a new High Level Storm Sewer (HLSS) and outfall, replacing existing combined and sanitary sewers in the 26th Ward District neighborhood of Brooklyn. Phase 1A is under construction, and Phase 2A is currently in the design phase. These projects are expected to reduce combined sewer overflows to Jamaica Bay

Wastewater Resiliency

Schedule: Ongoing.

Description: DEP owns and operates 14 wastewater treatment plants (WWTPs), three of which discharge into Jamaica Bay – 26th Ward, Jamaica, and Rockaway WWTPs. Treatment plants keep waterways and bathing beaches clean and are fundamental to protecting the environment and public health. As such, DEP is committed to ensuring their continued performance and reliability.

One of DEP's priorities is the hardening of our wastewater infrastructure to increase resiliency against flood damage. There are four wastewater treatment plants that service the Jamaica Bay watershed which are at risk from coastal flooding. Given that the potential for flooding is likely to increase over time, with sea level rise, DEP's NYC Wastewater Resiliency Plan has identified the specific flood pathways at these wastewater treatment plants and specific protective measure that will reduce the impact of flood damage and the time needed to restore these facilities to normal operating conditions.

The Wastewater Resiliency Plan revealed that at treatment plants citywide, over $900 million of infrastructure is currently at-risk. Although the recommended protective measures, totaling $187 million in improvements, are costly they significantly reduce the risk posed by flooding to the equipment, environment, and public health. Specifically, the plan describes the risks for the treatment plants around Jamaica Bay as follows:

26th Ward: The 26th Ward WWTP serves roughly 280,000 people and is located at the intersection of Flatlands and Van Siclen Avenues in southeastern Brooklyn. The risk assessment estimated that the costs to the plant of a 100-year +30 inch flood, would be approximately $82.4 million. The estimated cost of implementing flood protection strategies is $8.2 million.

Coney Island WWTP serves roughly 596,000 people and is located on a 30-acre site along Knapp Street in south central Brooklyn. The risk assessment estimated that the costs to the plant of a 100-year +30-inch flood would be approximately $85.0 million. The estimated cost of implementing flood protection strategies is $15.5 million.

Jamaica WWTP serves roughly 728,000 people and is located on a 26-acre site adjacent to the western end of John F. Kennedy Airport in southwestern Queens. The risk assessment estimated that the costs to the plant of a 100-year +30-inch flood would be approximately $1.7 million. The estimated cost of implementing flood protection strategies is $0.21 million.

Rockaway WWTP serves about 90,000 people and is located on Beach Channel Drive on the southern end of the Rockaway Peninsula. The risk assessment estimated that the costs to the plant of a 100-year +30-inch flood would be approximately $49.3 million. The total estimated cost of implementing flood protection strategies is $15.1 million.

DEP is currently working to determine the best methods of implementing resiliency measures at these sites based on the recommendations made in the NYC Wastewater Resiliency Plan and the availability of post-disaster recovery and resiliency funding.

Restoration Ecology

Restoration Ecology in the Jamaica Bay Watershed:

Habitats have been directly displaced and fragmented over time in the Jamaica Bay watershed largely because of human activity including residential, commercial, and industrial uses. Transportation infrastructure and the landfilling of ecologically sensitive areas, especially tidal wetlands, freshwater wetlands and riparian buffer zones in the upper watershed, along with invasive species, degraded water quality, pollution, and changing climate patterns all contribute to habitat loss and the need for ecological restoration within the Jamaica Bay watershed.

The objectives and initiatives for ecological restoration in the Jamaica Bay watershed include the following:

- To focus on tidal wetland communities, marsh inlands and peripheral wetlands for restoration
- To identify public and private vacant lands that may be suitable for acquisition for preservation and/or restoration
- To manage invasive species
- To monitor the success of completed restoration efforts

Floating Wave Attenuator Study

Schedule: Ongoing. Construction was completed in August 2015. Monitoring is projected to occur through 2018.

Description: A wave attenuator pilot study, acting as a proxy for future oyster beds, was implemented around a section of salt marsh in Jamaica Bay. The objective of the study is to determine if attenuators are cost-effective methods for slowing the rate of wetland loss and accreting marsh sediments to improve salt marsh resiliency. The project was constructed in August 2015.

Background: DEP has implemented a floating island attenuator at Brant Point along the southern shoreline of Jamaica Bay. A floating island wave attenuator is an anchored series of floating mats planted with salt tolerant wetland plants located offshore of a shoreline, set into place to deflect and reduce the energy of waves.

This pilot study will evaluate the potential for using floating island technology as a wave attenuator for a section of an eroding wetland shoreline, with the objective of investigating the potential accretion of beneficial wetland building sediments and decreased rate of shoreline loss due to erosion. The temporary floating islands are being tested as a "proxy" for potential oyster reefs, which are planned to be restored within the Bay in the future.

Update: Several key parameters determined the final design of the floating island wave attenuators. These site specific considerations included: water depth, storm data, wave action, and sediment conditions. DEP determined the placement, sizing and anchoring of the attenuators using modeling, field characterization and research on historical weather patterns. Construction was approved with permits obtained from NYSDEC, NYC Parks and Recreation and US Army Corp of Engineers.

Pilot construction occurred in August 2015 and is being monitored through 2018. Once monitoring is completed, a final summary report will detail monitoring data collected at the wave attenuator and erosion and accretion data collected onshore.

Floating "wetland" wave attenuator.

Spring Creek South Storm Resilience and Ecosystem Restoration Project

Background: The Spring Creek South Storm Protection and Ecosystem Restoration Project is funded by $50 million in Federal funds from the FEMA Hazard Mitigation Grant Program (HMGP), which provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

The funding was awarded to the New York State Department of Environmental Conservation (DEC) for a resiliency and restoration project in lower Spring Creek on the north shore of Jamaica Bay to the south of the Belt Parkway. The project includes a protective berm and over 225 acres of wetland and coastal forest restoration. Landscaping and adding naturally resilient features is expected to counteract the historical degradation of salt marsh community and habitat at that has left the site vulnerable to invasive species such as the common reed Phragmites australis.
Spring Creek South is managed by the National Park Service and is part of the Gateway National Recreation Area.

Update: Wetland delineation and biological community surveys were conducted in October 2015 to categorize existing ecological conditions. Concept plans were subsequently developed, and in December 2015 the Spring Creek South project team attended the Community Board 10 meeting to solicit community feedback on the plans. Soil sampling was conducted in February and March 2016 to characterize the physical properties of the soil as well as to test for potential contamination from historical filling done on-site.

Updates can be found here:

http://www.dec.ny.gov/about/104426.html

In April 2016 the project team returned to Community Board 10 to provide an update, and DEC hosted a coordination meeting for city, state, and federal agencies to update relevant agencies on project progress and facilitate collaboration on upcoming project milestones. Coordination for permitting and environmental assessment activities has begun, and FEMA has been identified as lead agency for NEPA review. Construction is expected to commence in 2017 and should take approximately 2 years.

Mapping of Spring Creek.

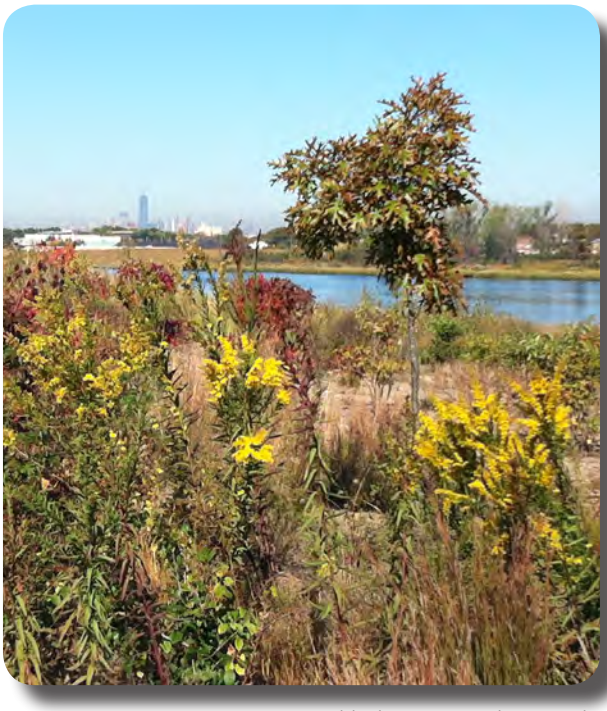
Paerdegat Basin Natural Area Park & Ecology Park

Description: To improve water quality, reestablish native habitat, and create recreational and educational opportunities for the public, DEP established 52 acres of restored wetlands, including a public Ecology Park, along the shores of Paerdegat Basin. This educational park includes restored New York City coastal and adjacent upland habitat.

Schedule: Construction completed January 2013.

Background: In January 2010, DEP initiated a contract funded by the American Resource and Recovery Act (ARRA) to restore 46 acres of wetlands and coastal grasslands adjacent to the Paerdegat Basin Combined Sewer Overflow Facility located in Brooklyn.
Paerdegat Basin is a tributary of Jamaica Bay and this investment is meant to greatly improve the ecology of the area surrounding both the Basin and the Bay. Design objectives of the project also include sustainable stormwater management to promote infiltration and the creation of tidal wetland habitat.
A major element of the restoration project is a five-acre 'Ecology Park' composed of sixteen native coastal plant communities that attract and support a wide variety of wildlife. The habitats include salt marshes; intertidal mudflats; and coastal grasslands, shrublands and forests. Once open to the public, the Ecology Park will serve as an educational resource to promote awareness of the varied coastal environments found throughout the New York City region. Walking trails, viewing platforms, and educational exhibits are provided to enhance public enjoyment of the coastal habitats.
Construction began in spring 2010 and was completed in January 2013.

Update: The project has completed its two-year plant guarantee and site maintenance period (spring 2016) and is now managed by the Department of Parks and Recreation.



Restored habitat at Ecology Park.

Stormwater Management Though Sound Land Use

Stormwater Management through Sound Land Use:

Pollutants, directed by impervious surfaces, are transported into water bodies as stormwater runoff enters combined sewer systems and triggers CSO events. But stormwater best management practices (BMPs) have the potential to reduce the volume of stormwater runoff that makes its way into the sewer system, thus reducing quantities of pollutants that occur on the streets or sidewalks from being directed into the tributaries and the Bay, and allowing for more sewage in the combined sewer system to be treated.

BMPs include:

- Rain Barrels
- Rain Gardens
- Green Streets
- Green Roofs
- Blue Roofs
- Blue Belts
- Regulatory measures that include incentive programs
- Public Outreach

Green Infrastructure

Description: In 2012, DEP and the NYS Department of Environmental Conservation (DEC) signed a groundbreaking agreement to reduce combined sewer overflows (CSOs) using a hybrid green and gray infrastructure approach

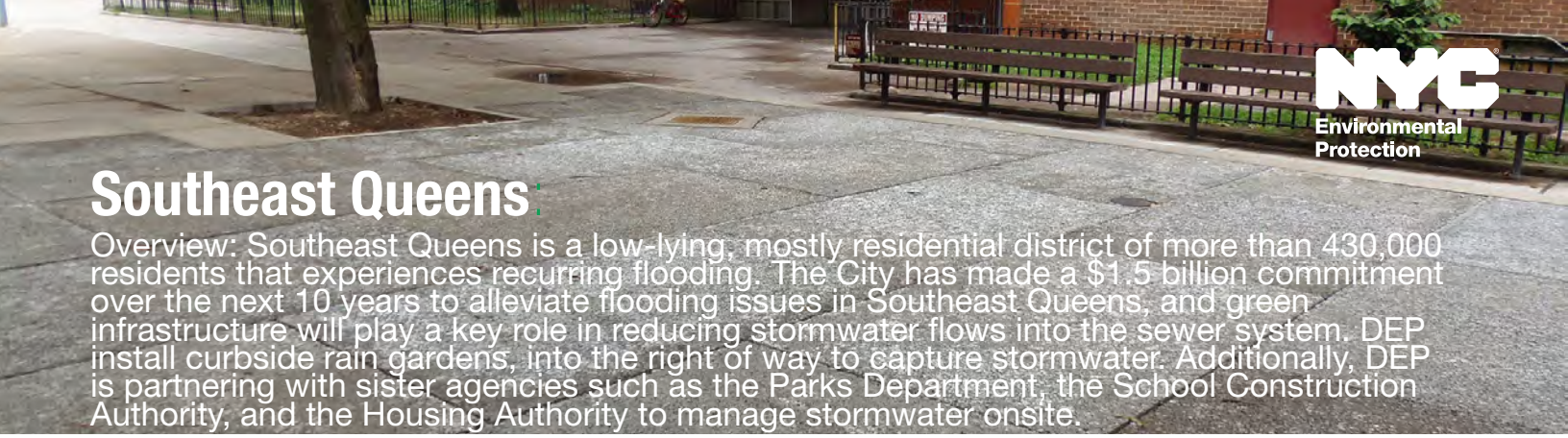
Schedule: Ongoing.

Background: Green infrastructure (GI) practices are designed and constructed to manage stormwater runoff from impervious surfaces such as streets, sidewalks and rooftops while also reintroducing more natural elements of the water cycle. GI also improves air quality, cools temperatures in the hot summer months, and beautifies neighborhoods. In 2015, DEC issued New York City its first citywide Municipal Separate Storm Sewer System (MS4) Permit, which regulates the stormwater flows from the separately sewered system. This permit calls for the inclusion of GI in the City's management plans. Already, DEP has constructed several green infrastructure installations in the Jamaica Bay watershed, including the 26th Ward Neighborhood Demonstration Area. DEP is also managing multiple other area-wide contracts for the design and construction of green infrastructure in streets and sidewalks across the City, working with City agencies to retrofit City-owned property such as public schools and public housing with GI practices, and developed an effective GI grant program for private property owners.

Update: Jamaica Bay Area-wide Contracts: DEP has identified 11 Priority CSO Tributary Areas for green infrastructure implementation within the Jamaica Bay watershed. Through DEP's area-wide strategy, four of these areas have completed design and/or construction contracts for green infrastructure on City-owned streets and sidewalks. The design process for the other seven Priority CSO Tributary Areas have begun and are expected to finish design in 2017. The design process in the remaining areas will begin in the coming years. Additionally, the design process is in progress to incorporate GI into City-owned properties within these Priority CSO Tributary Areas, and will continue to be evaluated, as City-owned properties perform upgrades, retrofits or new construction.

A map of the green infrastructure program can be found here:

https://www.arcgis.com/home/webmap/viewer.html?webmap=0061d39df78d41978b9a662fb8d17981

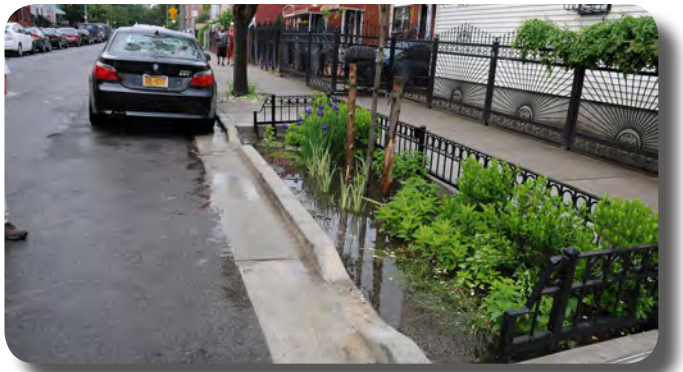


Southeast Queens:

Overview: Southeast Queens is a low-lying, mostly residential district of more than 430,000 residents that experiences recurring flooding. The City has made a $1.5 billion commitment over the next 10 years to alleviate flooding issues in Southeast Queens, and green infrastructure will play a key role in reducing stormwater flows into the sewer system. DEP install curbside rain gardens, into the right of way to capture stormwater. Additionally, DEP is partnering with sister agencies such as the Parks Department, the School Construction Authority, and the Housing Authority to manage stormwater onsite.

Rain Gardens

Rain gardens, also called curbside gardens or enhanced tree pits, are planted areas in the sidewalk that capture diverted stormwater from the road through a curb cut, allowing some or all of it to infiltrate into the ground. As part of this program, DEP has identified an area in the Queens Village neighborhood with a significant history of flooding and sewer backup issues, and is in the planning process of siting green infrastructure practices in the right of way, with a goal of constructing at least 200 rain gardens. The schedule is to complete design in the spring of 2017.



A photo of a rain garden designed by DEP.

Green infrastructure in parks used to treat stormwater at its source.

Parks

Roy Wilkins Park covers 53 acres in St. Albans, and is home to a range of recreation amenities. At this site, opportunities to develop a constructed wetland from an existing manmade pond, rain gardens, irrigation systems, and permeable pavement are being investigated.
Detective Keith Williams Park and William Simmons Community Garden are located on 9 acres just south of Jamaica's central business district. Currently the site includes sports and recreation amenities. Opportunities for green infrastructure include rain gardens and bioretention areas for water capture and infiltration. Railroad Park is located on 16 acres to the east of the Long Island Railroad and Rochdale Village in St. Albans. Opportunities for perimeter invasive plant removal, controlling illegal dumping and green infrastructure include constructed wetlands for water capture and infiltration.

Schools

Onsite green infrastructure is under construction at PS50 and the design for work at PS40 has been completed. Talfourd Lawn Elementary School (PS50) is undergoing reconstruction with designs to improve stormwater capture and treatment, including replacing existing tree pits with bioretention areas.
Q. Samuel Huntington Elementary School (PS40) is undergoing an indoor and outdoor redevelopment project that adds bioretention areas and measures to redirect stormwater and runoff.

Render of GI designs for PS50.

Community Parks Initiative

The Community Parks Initiative (CPI) is a multi-faceted program to invest in under-resourced public parks located in New York City. In close coordination and partnership with the Parks Department, DEP has committed $36 million in capital funding for green infrastructure improvements at many of these sites. There are two of CPI's 'Phase 1' sites where DEP is funding green infrastructure work located within the Jamaica Bay watershed – Grassmere Playgrounds in Far Rockaway, Queens, and Saratoga Ballfields in Brooklyn. These green infrastructure practices will help to reduce pollutant loading into Jamaica Bay by managing stormwater onsite.

Grassmere Playground

Schedule: End of 2017.

DEP funding for green infrastructure: $577,000

Grassmere Playground will have the play equipment and sitting areas reconstructed, along with new planting beds, trees, and resurfacing. In addition to the major improvements to the park itself, the project's stormwater management components will be designed to contain all on-site stormwater as well as capture and attenuate some from the street. It will consist of an integrated approach of surface and subgrade infiltration, following green infrastructure practices, and detention methods, such as subgrade storm chambers. Permeable paving will be installed at the southern and northern entrances of the park with underground storage. Overall across the site, permeability is doubled to collect and clean runoff with bioinfiltration plantings.

Saratoga Ball Fields

Schedule: End of 2017.

DEP funding for green infrastructure: $1,418,000

https://www.nycgovparks.org/parks/saratoga-ballfields

The Reconstruction of Saratoga Ball fields includes new play equipment, spray shower, synthetic turf field, painted track, adult fitness equipment, basketball court, and lighting, fencing, pavement, planting and site furnishings. The green infrastructure components include a system of rain gardens to absorb runoff and a detention system constructed of crushed stone beneath the synthetic turf field. The project will greatly reduce the impervious area of the park by 43%.

Community Resiliency Planning

New York Rising Community Reconstruction Program

Description: Established to provide additional rebuilding and revitalization assistance to communities severely damaged by Hurricane Sandy, Irene, and Tropical Storm Lee.

Schedule: Estimated construction completion middle of 2020

The City has leveraged assistance from the New York Rising Community Reconstruction Program (NYRCRP), which was established by the State to provide additional rebuilding and revitalization assistance to communities severely damaged by Hurricane Sandy, Hurricane Irene, and Tropical Storm Lee.

Each NY Rising Plan was locally driven by a Planning Committee that assessed storm damages and current risk, identified community needs and opportunities, and developed recovery and resiliency strategies. The Jamaica Bay Watershed has 11 of the City's 15 NY Rising Communities, and the Jamaica Bay Regional Working Group (JBRWG) was created from those communities to facilitate collaboration.

Updates can be found here:

http://stormrecovery.ny.gov/community-regions/new-york-city

The JBRWG is made up of representatives from nine NYRCR Planning Areas in Brooklyn, Queens and Nassau County, including: Breezy Point, Rockaway West, Rockaway East, Broad Channel, Howard Beach, Gerritsen Beach / Sheepshead Bay, the Southern Brooklyn Peninsula (Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate), The Five Towns (the Village of Cedarhurst, Hewlett, Village of Lawrence, Woodmere, Village of Hewlett Neck, Village of Hewlett Harbor, Meadowmere, and Inwood), and South Valley Stream.

As of the third Quarter of 2016, there were 33 projects in design and 17 non-capital projects implemented in Brooklyn and Queens. In April 2016, DDC released an RFP for services related the Breezy Point plan, the goal of which is to provide coastal flood protection to both Breezy Point and Roxbury with a system of dunes and other flood protective structures.

DEP is planning and designing green infrastructure within the boundaries of six of the NYRCR Planning Areas:

- Gravesend / Bensonhurst
- Southeast Brooklyn Waterfront
- Canarsie
- Southern Brooklyn Peninsula
- Rockaway West
- Idlewild Watershed

Most of the proposed green infrastructure for this project will be Right-of-Way Rain Gardens (ROWRGs), which are planted areas in the sidewalk that are designed to collect and manage stormwater.

Budget: Estimated $13M over five years for design, construction and construction management

Public Education & Outreach

Public Education & Outreach:

Long-term ecological sustainability is directly linked to the actions and attitudes of the people that live, work, and play in the watershed. The concept of environmental stewardship is that residents understand, value, and care for their environmental resources, and thus are motivated to make decisions that improve the health of the watershed and the Jamaica Bay estuary.

Physical barriers and convenient access issues limit residents from within the Jamaica Bay watershed from fully utilizing it, and this disconnect contributes to a lack of awareness about the Bay and its current conditions, and the related impacts of human activities. From landscaping to pollution and runoff, stakeholders need to come together in coordinated efforts to promote stewardship of the Jamaica Bay watershed.

Strategies to increase public understanding of the importance of Jamaica Bay and the impacts of individual actions on the health and sustainability of the Bay include:

- Fostering environmental stewardship within the community
- Building on existing education and outreach programs to address learning of all types of citizens and stakeholders.

Ecological Atlas

Schedule: Completed

Description: A Geographical Information System (GIS) provides a comprehensive view of the Jamaica Bay watershed so that managers can strategically target vacant lots for potential ecological restoration, stormwater BMPs, and green infrastructure projects. This pilot system can ultimately be applied to watersheds throughout the state of New York.

Background: Building on the strategy identified in the 2007 Jamaica Bay Watershed Protection Plan (JBWPP), DEP developed a Jamaica Bay Watershed Ecological Atlas. The EcoAtlas is an inventory of environmental data pertaining to City-owned land and potential ecological and stormwater restoration opportunities.

This included developing an inventory of existing City-owned block and lot data, field verifying the information, collecting additional information about existing ecological and stormwater characteristics, and developing and prioritizing potential ecological and stormwater restoration opportunities. In 2014, the database and opportunity analyses were updated to reflect the affordable housing priorities of the new deBlasio mayoral administration.

Consistent with New York City's Waterfront Revitalization Plan (WRP), the Jamaica Bay Watershed Ecological Atlas project provides 1) a complete and updated inventory of all vacant City-owned properties and a characterization of their habitat and stormwater attributes; 2) a GIS-mapping and information data layer that can be used by stormwater managers and restoration practitioners to develop and leverage future stormwater management ecological restoration designs; and 3) a prioritized list and map of potential sites for stormwater management and ecological restoration and conservation.

The restoration and conservation actions enabled by this project provide critical benefits for plant and animal species and will be integrated with urban stormwater runoff management practices to benefit comprehensive ecological improvements for the Jamaica Bay watershed.

Update: The Ecological Atlas has gone through an updated PLUTO database update and is planned to be released in fall of 2016.

GIS mapping of an area in the Jamaica Bay watershed.

Jamaica Bay Symposium

Description: A biennial community conference for academics, students, citizens, and professionals to come together to discuss the issues facing the Jamaica watershed and their greater implications.

Schedule: Biennial

Background: The biennial State of the Bay symposia series was initiated through a strategy identified in the 2007 Jamaica Bay Watershed Protection Plan to bring together scientists, decision makers, and community groups to discuss relevant science knowledge and management strategies that enhance the resilience of Jamaica Bay.

2016 Symposium: Hosted jointly by DEP, NPS and the Science and Resilience Institute at Jamaica Bay, the 2016 symposium was held on June 15th at the Aviator Sports Complex at Floyd Bennett Field, and on June 16th at the Brooklyn College Student Center. This year's event emphasized the intersections of human, physical and ecological components of Jamaica Bay and explored opportunities for enhanced resilience within those systems.

The program included speakers from multiple government agencies and environmental experts. Topics included management perspective and decision-making context for healthy ecosystems, community perspectives, a guided tour of Jamaica Bay, a look at the physical systems of the Bay, a look into a number of ecological studies, and discussions on people, place, and social meaning, as well as what is the state of the Bay.

A photo from a lecture at the most recent Jamaica Bay Symposium.

Photo Courtesy of Institute at Jamaica Bay

Jamaica Bay Institute Research Efforts

Description: The Institute produces integrated knowledge that increases biodiversity, well-being, and adaptive capacity in coastal communities and waters surrounding Jamaica Bay and New York City.

The Science and Resilience Institute at Jamaica Bay works with different groups – community and environmental stakeholders, public agencies, and its research networks – to create and translate knowledge that can be used to help improve the resiliency of estuary life in Jamaica Bay and beyond.

Over the past year, the Institute has achieved the following key accomplishments:

Prospects for Resilience: Insights into NYC's Jamaica Bay, published by Island Press, will be available in mid-November. This book sets out a process of grappling with holistic resilience from multiple perspectives, drawing on the insights and experiences of more than fifty scholars and practitioners working together to make Jamaica Bay in New York City an example for the world.

97% of participants at the 2016 State of the Bay Symposium believe that the event provided information and content that they can use professionally. With 150 attendees over two days, the symposium successfully brought together researchers, public agencies, NGOs and community members to identify the key challenges and opportunities facing the Bay.

Research on Jamaica Bay is underway, with 10 NPS/DOI funded research projects nearing completion and the roll out of the Institute's first summer fellowship program. The Fellowship provides funding to support seven Research Development Fellows, two Science Management Fellows and one intern.

The Institute, in partnership with RAND Corporation and BuroHappold Cities Group, led two workshops with the Public Agency Committee and Stakeholder Agency Committees as part of its integrated modeling effort. Two bay-wide scenarios are currently being modeled, with results to be shared at the November PAC and SAC meetings.

Construction is underway on the Institute's research vessel, which is expected to be complete by March 2017. Based on positive feedback following an American Princess cruise around Jamaica Bay during the State of the Bay symposium, there is great interest to use the research vessel for research, education, and outreach.

The Institute, in conjunction with consortium members, has been instrumental in securing $1.305 million in funding, with approximately 10% going towards core Institute Projects. The majority of funding came from two competitive grants awarded to Brooklyn College for a CUNY Strategic Initiative course on environmental experiential learning and a NOAA Environmental Literacy Grant, as well as grant funding to the Institute from the David and Lucille Packard, the Pew Foundation, and NOAA.

Over the summer, the Institute held a series of meetings to discuss the draft strategic plan and incorporation documents with the Executive Committee, comprising senior administrators and faculty from research institutions, public agencies, and co-chairs of the stakeholder advisory committee. Members are in agreement to incorporate as a not-for-profit corporation seeking 501c3 status. The Institute also received positive indications from the research organizations to invest direct resources to the operations of the Institute.

Aerial Photo of Jamaica Bay by Joe Mable

ACOE Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement

In August of 2016, the US Army Corps of Engineers released its Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS) for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay. USACE examined coastal storm risk management problems and opportunities for the project area, and identified and screened alternatives based on the following principal planning objectives: reduce vulnerability; do so sustainably and economically; improve community resiliency; and enhance natural storm surge buffers. Since the problems and opportunities varied within the project area, the USACE tentatively selected a plan that addresses two planning reaches: the Atlantic Ocean Shoreline Reach, and the Jamaica Bay Reach.

The plan along the Atlantic Ocean Shorefront consists of:

- A reinforced dune (composite seawall) with a structure crest elevation of +17 feet (NAVD88) and dune elevation of +18 feet (NAVD88), and a design berm width of 60 feet extending approximately 35,000 LF from Beach 9th to Beach 149th.
- A beach berm elevation of +8 ft. NAVD and a depth of closure of -25 ft. NAVD;
- A total beach fill quantity of approximately 804,000 cubic yards (cy) for the initial placement, with a 4-year renourishment cycle of approximately 1,021,000 cy, resulting in an advance berm width of 60 feet; with sand being dredged from a borrow area located approximately 2 miles south of the Rockaway Peninsula fill operations.
- Extension of 5 existing groins; and Construction of 13 new groins.

The alignment along Jamaica Bay and Rockaway Inlet consists of:

- Reinforced Dune along the shoreline from Beach 149th to Breezy Point.
- Levee from approximately B227th St. north overland across Breezy Point, thence eastward from B222nd St. to B201st St.
- Concrete floodwall south along B201st St. extending east along north side of Rockaway Blvd to B184th St., thence north to existing shoreline. Concrete floodwall continues east to storm surge barrier approximately 2,300 ft. east of the Gil Hodges Memorial Bridge/Marine Parkway Bridge.
- A 3,970-foot storm surge barrier across Rockaway Inlet from near Jacob Riis Park to Floyd Bennet Field;
- A concrete floodwall on land running north along Flatbush Avenue towards the Belt Parkway;
- A berm-faced elevated promenade running west along the waterside of the Belt Parkway to a concrete floodwall at Gerritsen Inlet;
- A sector gate across Gerritsen Inlet, which ties in to a concrete floodwall;
- Elevated promenades (berm faced and vertical faced) extend from Gerritsen Inlet around Plumb Beach westward to the inlet at Sheepshead Bay;
- A sector gate across Sheepshead Bay;
- Seawall reconstruction around the eastern end of Coney Island at Kingsborough Community College with a reinforced dune across sandy beach fronting the college and Manhattan Beach, and Seawall reconstruction from Manhattan Beach to approximately Corbin Place; and
- The Coney Island tie-in, where the line of protection continues west until Norton Point, crossing Coney Island Creek.

The Tentatively Selected Plan has been estimated at a cost of approximately $3.8 billion while providing nearly $509 million in total benefits. The USACE calculated expected damages in the absence of a project at over $476 million, the majority ($444 million) of which was anticipated within the Jamaica Bay Planning Reach.

Thorough coordination and collaboration were conducted with federal, state and local agencies, non-governmental organizations and other interested stakeholders throughout the study process. Presently, reviews (including the public review of the Draft HSGRR/EIS) and higher-level coordination within USACE are ongoing. The study's non-Federal sponsor is the New York State Department of Environmental Conservation, with the NYC Mayor's Office of Recovery and Resiliency being the local sponsor to New York State. Other project partners include NYC Parks, NYC Environmental Protection, and the National Park Service.

USACE may consider a phased decision process that would allow them to move forward with implementation of discrete components first, while finalizing the details associated with more technically complex features. Construction start of first phase is targeted for 2018 but will depend on length of reviews and approvals, and relative complexity of design.