

# Canarsie

## NY Rising Community Reconstruction Plan

December 2014

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**This document was developed by the Canarsie NY Rising Community Reconstruction (NYRCR) Planning Committee as part of the NYRCR Program within the Governor's Office of Storm Recovery. The NYRCR Program is supported by New York State (NYS) Homes and Community Renewal and NYS Department of State.**

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# Foreword

## Introduction

In the span of approximately one year, beginning in August 2011, the State of New York experienced three extreme weather events. Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy wreaked havoc on the lives of New Yorkers and their communities. These tragic disasters signaled that New Yorkers are living in a new reality defined by rising sea levels and extreme weather events that will occur with increased frequency and power. They also signaled that we need to rebuild our communities in a way that will mitigate against future risks and build increased resilience.

To meet these pressing needs, Governor Andrew M. Cuomo led the charge to develop an innovative, community-driven planning program on a scale unprecedented and with resources unparalleled. The NY Rising Community Reconstruction (NYRCR) Program, within the Governor's Office of Storm Recovery (GOSR), empowers the State's most impacted communities with the technical expertise and funding resources needed to develop thorough and implementable reconstruction plans to build physically, socially, and economically resilient and sustainable communities.

## Program Overview

The NYRCR Program, announced by Governor Cuomo in April of 2013, is a more than \$700 million planning and implementation program established to provide rebuilding and resiliency assistance to communities severely damaged by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Drawing on lessons learned from past recovery efforts, the NYRCR Program is a unique combination of bottom-up community participation and State-provided technical expertise. This powerful combination recognizes not only that community members are best positioned to assess the needs and opportunities of the places where they live and work, but also that decisions are best made when they are grounded in rigorous analysis and informed by the latest innovative solutions.

Launched in the summer of 2013 and completed in March 2014, Round I of the NYRCR planning process included 50 NYRCR Planning Areas, comprising 102 storm-impacted localities. In January 2014, Governor Cuomo announced a second round of the planning process, serving an additional

22 storm-impacted localities. Four of these localities were absorbed into existing Round I NYRCR Planning Areas, bringing the number of localities participating in Round I up to 106; the other 18 localities formed 16 new Round II NYRCR Planning Areas. Between Rounds I and II, there are 66 NYRCR Planning Areas, comprising 124 localities. The program serves over 2.7 million New Yorkers and covers nearly 6,500 square miles, which is equivalent to 14% of the overall State population and 12% of the State's overall geography.

In Rounds I and II, the State allotted between \$3 million and \$25 million to each participating locality for the implementation of eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program.<sup>2</sup>

Each NYRCR Planning Area is represented by a NYRCR Planning Committee composed of local residents, business owners, and civic leaders. Members of the Planning Committees were identified in consultation with established local leaders, community organizations and, in some cases, municipalities. The NYRCR Program sets a new standard for community participation in recovery and resiliency planning, with community members leading the planning process. Across the State, more than 650 New Yorkers have represented their communities by serving on Planning Committees. Nearly 650 Planning Committee Meetings have been held, during which Planning Committee members worked with the State's team to develop community reconstruction plans, which identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 250+ Public Engagement Events attracted thousands of community members, who provided feedback on the planning process and resulting proposals. The NYRCR Program's outreach has included communities that are traditionally underrepresented, such as immigrant populations and students. All planning materials are posted on the program's website ([www.stormrecovery.ny.gov/nyrcr](http://www.stormrecovery.ny.gov/nyrcr)), providing several ways for community members and the public to submit feedback on the program and materials in progress.

Throughout the planning process, Planning Committees were supported by staff from GOSR, planners from New York State (NYS) Department of State and NYS Department of Transportation, and consultants from world-class planning firms that specialize in engineering, flood mitigation solutions, green infrastructure, and more.

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allotted over \$700 million for planning as well as implementing eligible projects identified in NYRCR Plans. NYRCR Planning Areas are also eligible for additional funds through the NY Rising to the Top Competition, which evaluates applications from Round II NYRCR Planning Committees across three categories—Regional Approach, Inclusion of Vulnerable Populations, and Use of Green Infrastructure. The winner of each category will be allotted a share of the competition's \$3.5 million to fund additional eligible projects.

In April 2014, Governor Cuomo announced that projects identified in NYRCR Plans would receive priority consideration through the State's Consolidated Funding Application (CFA) process and charged the Regional Economic Development Councils (REDCs), which play an advisory role in the CFA process, to support NYRCR projects. In December 2014, Governor Cuomo announced that 24 NYRCR projects received nearly \$12 million in CFA funding. This announcement is an example of the Governor honoring his commitment to leverage the work of the NYRCR Planning Committees to incorporate resilience into other State programs and to find additional sources of funding for NYRCR projects. The NYRCR Program is also working with both private and public institutions to identify existing funding sources and to create funding opportunities where none existed before.

The NYRCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has leveraged the REDC State Agency Review Teams (SARTs), composed of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Planning Committees. The SARTs review projects with an eye toward regulatory and permitting needs, policy

objectives, and preexisting agency funding sources. The NYRCR Program is continuing to work with the SARTs to streamline the permitting process and ensure shovels are in the ground as quickly as possible.

On the pages that follow, you will see the results of months of thoughtful, diligent work by the Canarsie NYRCR Planning Committee, which is passionately committed to realizing a brighter, more resilient future for its community.

### The NYRCR Plan

This NYRCR Plan is an important step toward rebuilding a more resilient community. Each NYRCR Planning Committee began the planning process by defining the scope of its planning area, assessing storm damage, and identifying critical issues. Next, the Planning Committee inventoried critical assets in the community and assessed the assets' exposure to risk. On the basis of this work, the Planning Committee described recovery and resiliency needs and identified opportunities. The Planning Committee then developed a series of comprehensive reconstruction and resiliency strategies, and identified projects and implementation actions to help fulfill those strategies.

The projects and actions set forth in this NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in this NYRCR Plan does not necessarily indicate the Planning Committee's prioritization of these projects and actions. **Proposed Projects** are projects proposed for funding through an NYRCR Planning Area's allotment of CDBG-DR funding. **Featured Projects** are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program. **Additional Resiliency Recommendations** are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects. The Proposed Projects and Featured Projects found in this NYRCR Plan were voted for inclusion by voting members of the Planning Committee. Those voting members with conflicts of interest recused themselves from voting on any affected projects, as required by the NYRCR Ethics

Handbook and Code of Conduct.

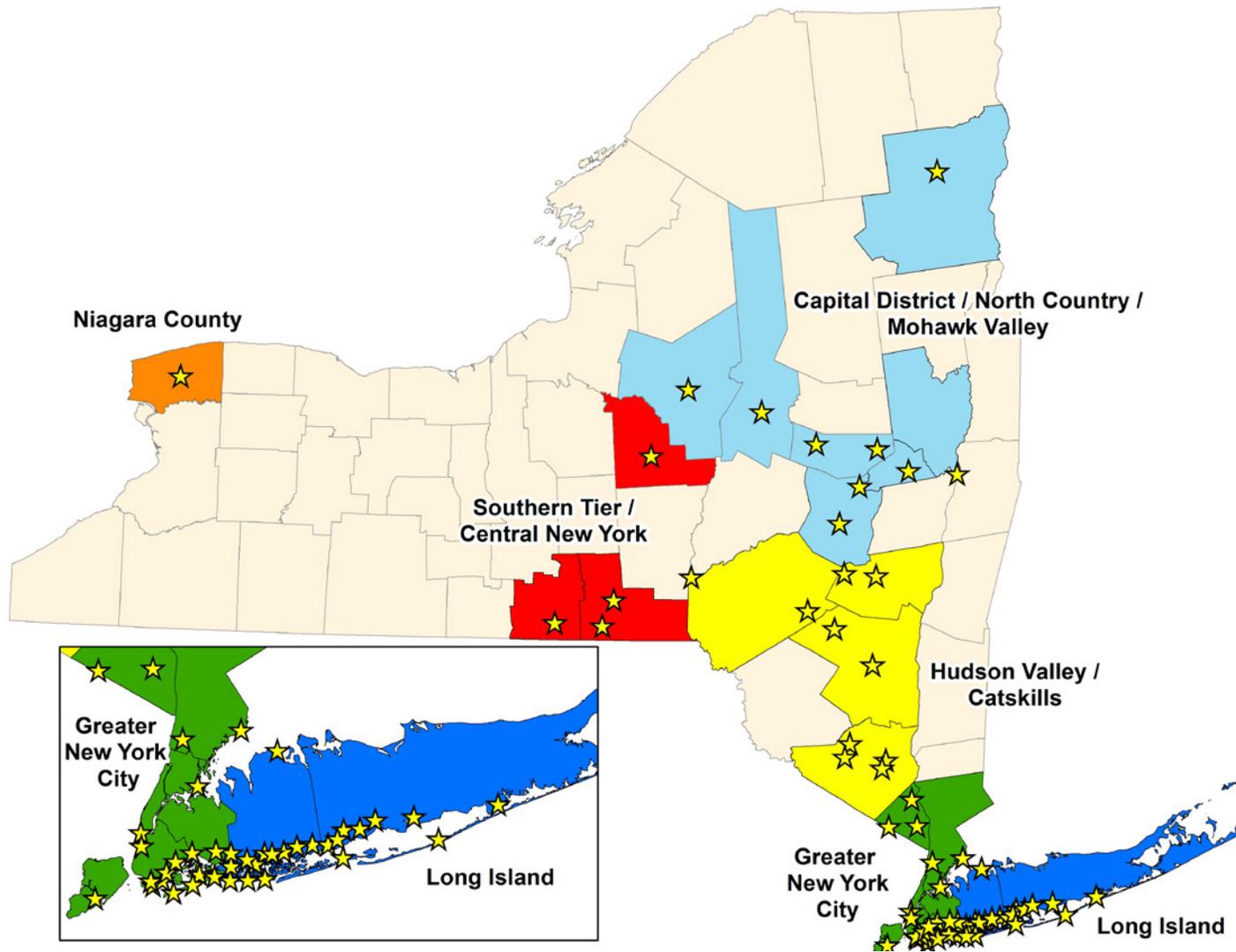
As part of Round II of the NYRCR Program, the Canarsie NYRCR Planning Area has been allotted up to \$11.9 million in CDBG-DR funds for the implementation of eligible projects identified in this plan.

While developing projects for inclusion in NYRCR Plans, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. Projects and actions implemented with this source of Federal funding must satisfy a Federally-designated eligible activity category, fulfill a national objective (i.e., meeting an urgent need, removing slums and blight, or benefiting low- to moderate-income individuals), and have a tie to the natural disaster to which the funding is linked. These are among the factors that GOSR will consider, in consultation with local municipalities and nonprofit organizations, when determining which projects and actions are best positioned for implementation.

The total cost of Proposed Projects in this NYRCR Plan exceeds the NYRCR Planning Area's CDBG-DR allotment to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in this NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act. Inclusion of a project or action in this NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented. Projects will be implemented on a staggered timeline, and the NYRCR Program will choose an appropriate State or local partner to implement each project. GOSR will actively seek to match projects with additional funding sources, when possible.

In the months and years to follow, many of the projects and actions outlined in this NYRCR Plan will become a reality, helping New York not only to rebuild, but also to build back better.

# NY Rising Communities



Map displays the 66 NYRCR Planning Areas from Rounds I and II. (Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.)

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Canarsie Pier, a popular destination for residents who enjoy fishing, picnicking, and stunning views of Jamaica Bay.



# Executive Summary

## Canarsie

Canarsie, a serene neighborhood with striking waterfront views, sits on a rectangular peninsula in Southeast Brooklyn and borders three expansive bodies of water—Jamaica Bay, Paerdegat Basin and Fresh Creek. The Community is also home to Canarsie Park, a 132-acre park under the jurisdiction of the NYC Department of Parks and Recreation, that includes ball fields, playgrounds, and a skate park. Canarsie Pier, extending out from the neighborhood into Jamaica Bay, reinforces the Community's relationship with nature, and is a popular destination for fisherman and others looking to enjoy the waterfront.

The neighborhood is home to approximately 90,000 residents, most of whom hail from the Caribbean. Nearly half of Canarsie's residents are homeowners and reside in primarily brick, low-density attached homes. Commercial corridors run through the center of the neighborhood along Avenue L and Rockaway Parkway, while single and multifamily homes and low rise apartment buildings sit at the Community's edges. Public transportation, while present in the Community, is lacking, with more than three-quarters of Canarsie residents commuting over an hour to downtown Brooklyn, where most are employed.

Superstorm Sandy produced widespread damage in Canarsie, flooding homes and critical facilities. High storm surge, coupled with a high-tide condition during a full-moon cycle, led to waters rising above the height of bulkheads and natural river banks. Jamaica Bay, Paerdegat Basin, and Fresh Creek, while community amenities, also served as gateways for rising waters during the storm. Water rose through storm sewers, eclipsing manholes and flooding streets while wastewater rose up from toilets in residents' homes. Power outages were also rampant, closing businesses and preventing residents from accessing supplies and support services. Superstorm Sandy exposed vulnerabilities in the Community, most notably the lack of a sufficient emergency response plan.

The NY Rising Community Reconstruction (NYRCR) Program was established to provide additional re-building and revitalization assistance to communities severely damaged during Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Through Community Development Block

Current Flood Insurance Rate Map



2016 Preliminary Flood Insurance Rate Map



 NY Rising Community Reconstruction Program  
Canarsie Planning Area

 Planning Area

 VE zone (waves > 3')

 100 year floodplain (1% annual chance of flooding)

 500 year floodplain (0.2% annual chance of flooding)

The revision of the Flood Insurance Rate Maps in 2016 will bring a substantial change in the number of homes in the floodplain.



Food trucks are a consistent presence on Canarsie Pier.

## Community Vision Statement

**“Canarsie, a proudly diverse and peaceful community surrounded by bountiful natural and recreational resources, will become a self-reliant, empowered, prosperous community, and a model of sustainability and resilience.”**

Grant Disaster Recovery (CDBG-DR) funding from the U.S. Department of Housing and Urban Development, New York State has allotted up to \$11.9 million to fund eligible projects developed by the Canarsie NYRCR Community. The community-driven process has led to projects and policy recommendations that intend to enhance the physical, environmental, social, and economic resiliency of the Community. The projects identified in this Plan address Superstorm Sandy-related impacts and better prepare communities for severe weather-related events in the future.

### Community-Driven Process

The Committee was comprised of 9 volunteer members including homeowners, civic leaders, and business leaders. They collaborated to devise strategies to protect and prepare residents from future storms.

Throughout the participatory planning process, the Committee solicited feedback from the wider community by hosting Public Engagement Events. Over the course of many months, more than 300 residents, elected officials, and professionals participated in 3 dynamic Public Engagement Events, providing their feedback on the needs, strategies, and potential projects identified by the Committee. A fourth Public Engagement Event is scheduled for January 2015. Ten Planning Committee Meetings were held, all of which were open to and observed by the public. Through active discussion and interactive exercises for soliciting feedback, the Committee learned about resiliency measures tailored to the needs of their Community.

With the public’s input, the Committee developed a list of the most pressing needs and opportunities in Canarsie. They include more resilient water management infrastructure, flood protection from storm surge, effective emergency management and planning response, and homeowner assistance, to name a few. The needs were used to draft a comprehensive list of resiliency strategies, which served as the foundation for project development.

## Recovery Support Functions

The Governor’s Office of Storm Recovery has structured each plan to focus on a set of criteria, known as the Recovery Support Functions. These Recovery Support Functions were utilized when developing needs, opportunities, strategies, and projects to ensure that a comprehensive approach is reinforced throughout the effort to shape a well-rounded resiliency strategy for the Community.



Health & Social Services



Community Planning & Capacity Building



Economic Development



Natural & Cultural Resources



Housing



Infrastructure Systems

Building on this foundation of needs, opportunities, and corresponding strategies, the Committee developed resiliency projects. Proposed Projects are projects recommended for funding through a NYRCR Planning Area’s allotment of CDBG-DR funding. Featured Projects are projects and actions that the Planning Committee has analyzed in depth and identified as important resiliency recommendations, but has not proposed for funding through the NYRCR Program. Additional Resiliency Recommendations are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

The Canarsie NYRCR Plan contains 6 strategies, 10 Proposed Projects, and 2 Featured Projects, intended to improve the resiliency of Canarsie. The list below follows the order of projects as demonstrated in the Project Profiles in Section V of this document. Each project is listed underneath the strategy to which it corresponds most directly.

### Reduce Vulnerability to Coastal Flooding and Sea Level Rise

#### Fresh Creek Coastal Protection (Proposed)

This project would fund a flood wall and adjoining bioswales to capture storm surge and rising waters at the most vulnerable areas along Fresh Creek. A flood wall is a small wall that reduces flood risk from sea-level rise and 10-year storm events.<sup>3</sup> A bioswale is a landscaped element that reduces gutter flow and manages water surface ponding.

### Activate and Enhance Access Along the Shoreline

#### Fresh Creek Long-Term Restoration & Resiliency (Featured)

This project proposes a comprehensive plan for the length of Fresh Creek, incorporating green infrastructure, improved access, and public amenities.

#### Canarsie Pier Access Improvements (Proposed)

This project would fund safety improvements to the Belt Parkway underpass and roundabout to improve and encourage pedestrian and cyclist access between Canarsie Pier and the Community.



Fresh Creek, the water body that separates Canarsie from East New York.

[Canarsie Pier and Beach Community Enhancements \(Featured\)](#)

This Featured project would upgrade the facilities at Canarsie Pier to create a waterfront destination that better serves visitors and local residents.

[Canarsie Youth and Environmental Education Program \(Proposed\)](#)

This project would fund the development of an environmental education program for youth in Canarsie where they can learn about the Jamaica Bay and adjacent waterways.

**Improve Wastewater and Stormwater Management**

[Canarsie and Southeast Brooklyn Waterfront Stormwater Study and Pilot Projects \(Proposed\)](#)

This two-phase project would fund a study to examine the feasibility, costs, and benefits of various stormwater capture and retention projects in the Canarsie and Southeast Brooklyn Waterfront NYRCR Planning Areas. The Proposed project would also provide funding for the implementation of recommended scalable pilot projects within both Planning Areas.



A typical commercial corridor in Canarsie.

### **Build and Coordinate Local Capacity for Emergency Response**

#### Recovery Community Center (Proposed)

This project would establish a Recovery Community Center with resilient lighting and power, the ability to distribute supplies, coordinate efforts with government agencies, and host trainings and capacity building initiatives.

#### Critical Facility Upgrades Program (Proposed)

This project would fund resilient retrofits for a community-based organization in Canarsie to ensure continuity of critical services. The organization would also be required to provide assistance with recovery efforts after an emergency event.

#### Canarsie Corps (Proposed)

This project would establish a Canarsie Corps summer youth employment program to support resiliency and other community projects in Canarsie.

### **Make Homes More Physically and Financially Resilient**

#### Homeowner Audit and Grant Program (Proposed)

This project would provide technical assistance and financial tools to low and moderate income single- and multi-family homeowners who want to retrofit their homes so they can mitigate future flood risk.

### **Strengthen Economic Resiliency**

#### Resiliency Workforce Development (Proposed)

This project would train and connect local residents with sustainable job opportunities while simultaneously building a community that can more effectively recover from future storm events.

#### Resilient Streetscaping (Proposed)

This project would fund capital improvements along Avenue L and Rockaway Parkway that help to strengthen the economic viability of local businesses and provide support to residents during and after future disasters.



Canarsie Park borders Jamaica Bay and is an important amenity in Canarsie.

## Outline of the Plan

The first section of the Plan includes a Community Overview, which provides an orientation to the Community, the critical issues revealed by Superstorm Sandy, and the Committee’s process in the context of ongoing resiliency and recovery work.

The next section, Assessment of Risk and Needs, describes the diverse assets at risk from future flooding and storms, and applies the Committee and public feedback to catalog those risks. Using the risk assessment tool developed by the NYRCR Program, this section identifies key opportunities for action that support the resiliency strategies and projects proposed by the Committee.

The following section, Reconstruction and Resiliency Strategies, describes strategies developed by the Committee that respond to the needs, opportunities, and risks to assets measured through the risk assessment process

The Proposed and Featured Projects are described in greater detail in the Project Profiles section. The final section, Additional Materials, describes Additional Resiliency Recommendations strongly supported by the Community, but which lack an identified funding source. The public engagement process is also described in more detail, along with additional supporting documentation for the Plan.



Fishing is a popular activity along the southern edge of Fresh Creek.

# **I. Community Overview**



## Geographic Scope

**The Canarsie NY Rising Community Reconstruction (NYRCR) Planning Committee (Committee) defined the NYRCR Planning Area according to multiple factors including** the Canarsie Community's (Community) geographic boundaries, Superstorm Sandy damage data, and areas where assets are most at risk. To aid in the Planning Area's recovery and to help improve its resiliency, New York State has allotted up to \$11.9 million to Canarsie in Community Development Block Grant Disaster Recovery (CDBG-DR) funding from the U.S. Department of Housing and Urban Development (HUD).

**Canarsie is located in southeast Brooklyn and borders Jamaica Bay.** Water acts as a natural border for much of this Community, from Paerdegat Basin along the southwest, to Fresh Creek along the northeast. The North Channel of Jamaica Bay borders the southeast portion of the Community, with the 130+ acre Canarsie Park and Pier serving as a natural and recreational buffer between the water and the Community.

The northern boundary of Canarsie runs from Williams Avenue, extending beyond Fresh Creek and the New York City Housing Authority (NYCHA) Breukelen Houses, and includes Stanley Avenue, the MTA L train line, Linden

Boulevard, and Ditmas Avenue. The eastern boundary of the Community spans Ralph Avenue from Ditmas Avenue until it approaches Paerdegat Basin at Flatlands Avenue, with a slight break out along Farragut Road, East

56th Street, Avenue H, and Glenwood Road to include the NYCHA Glenwood Houses. Surrounding neighborhoods include East New York, East Flatbush, Brownsville, Bergen Beach, and Flatlands.



Fresh Creek borders the eastern edge of Canarsie.

## Community Overview

**Canarsie is a low- and middle-density waterfront community with a vibrant cultural history dating back thousands of years to the Canarsees tribe of Native Americans.** Canarsie’s legacy echoes throughout the landmarks of the present-day neighborhood, from the Wyckoff House—one of the first structures built by European colonizers on Long Island—to the Canarsie Pier—built for the expectation of future commercial maritime activity that never materialized. Over the decades Canarsie has established itself as a place for working-class families seeking a peaceful refuge from the city, shifting from an Italian and Jewish population from the 1940s–1990s to a West Indian and Jewish population in the 2000s.

**Present-day Canarsie is home to approximately 87,600 residents in over 29,400 households,** and blends both the neighborhoods of higher density upland along with the more suburban waterfront communities. Currently, Canarsie includes a sizable population that has immigrated from, or who are first-generation descendants of immigrants from Haiti and other Caribbean nations. There are a number of undocumented immigrants who live in Canarsie as well—over 15,000, according to the Brooklyn Community Foundation. The population of the neighborhood has remained mostly stable over

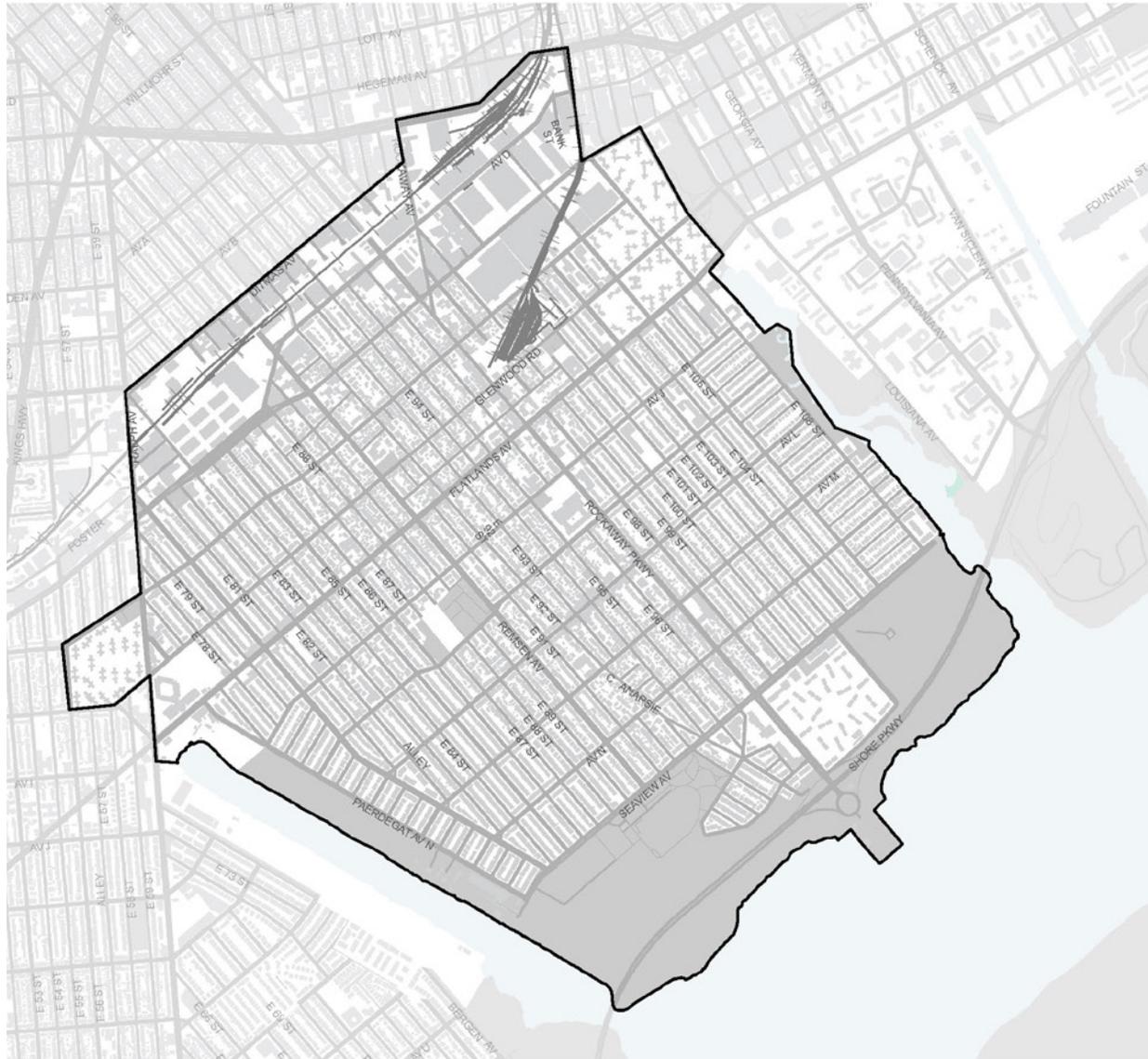


*Aerial view of Canarsie. Courtesy of Butch Moran.*

the past decade and a half with a racial composition that is majority Black (84%), along with a small minority of residents reporting as White (8%), Other or Two or More Races (5%), and Asian (2%). Nine percent of residents identify as Hispanic. The median age in Canarsie is 36 and the Community has a large percentage of young residents, with just 10% of Canarsie’s population over 65, and nearly 36% of its population under 24.<sup>1</sup>

**The educational background of Canarsie is mixed,** with a higher percentage of high school graduates (85%) than New York City overall (79%) and a similar percentage as New York State (85%). However, Canarsie has a smaller percentage of college graduates (24%) than both New York City (34%) and New York State (33%).<sup>2</sup>

**Figure I-1: Canarsie Planning Area**



NY Rising Community Reconstruction Program  
Canarsie Planning Area

□ Planning Area

New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines



**Canarsie is a middle-class neighborhood characterized by older, lower-density housing.** The Community developed further out onto Jamaica Bay in the 1950s, when marshland was filled to build new housing, creating the areas that would eventually bear the brunt of inundation from Superstorm Sandy. Today, the median household income of \$54,900 is slightly above New York City’s median income of \$51,800 and slightly below New York State’s median income of \$57,600. The neighborhood is home to the largest concentration of New York City municipal employees, reflecting its middle-class character and high quality of life.<sup>3,4</sup> The median home value in Canarsie is nearly \$500,000, with a number of homeowners renting out their basement apartments to supplement their income. Approximately 47% of the homes are owner-occupied and 53% are renter-occupied—a much higher share of owners when compared to Brooklyn as a whole (28%).<sup>5</sup>

**Most of the housing in the Community is low density and attached.** Eighty-two percent of the Community resides in homes with one to four units, and only 9% are single-family detached homes. Five percent of residential buildings are comprised of 5-19 units and the remaining 13% have 20 or more units. Canarsie also has several large NYCHA developments, including the Glenwood, Bayview and Breukelen Houses,



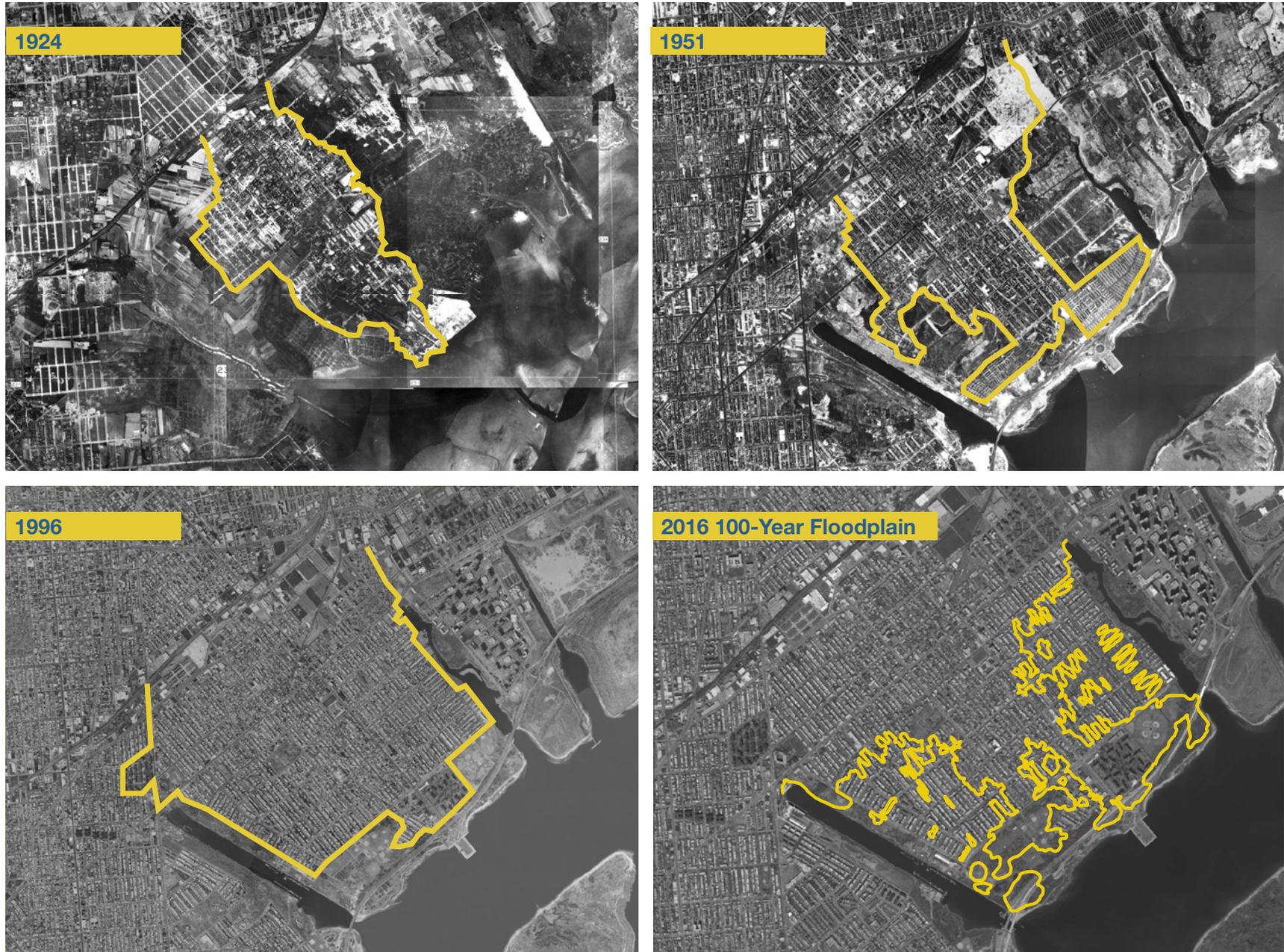
Basketball courts at Canarsie Park.

each housing between 2,500 and 4,000 residents alongside community meeting areas and open space.

The housing in Canarsie is of good quality, with nearly 88% of the housing stock over 40 years old. Only 580 units have been constructed since 2000, accounting for just 2% of total units.<sup>6</sup>

**Canarsie has limited public transit access,** served solely by one subway line, the L train. The L line has two stops in Canarsie, one at East 105th Street and the other at Canarsie-Rockaway Parkway, the final stop on the line. Bus service is more comprehensive in Canarsie, with the BM2 express bus running between Flatlands Avenue and 57th Street in Manhattan, the B6 between Bensonhurst and East New York,

**Figure I-2: Historic Growth in Canarsie in Relation to the Present Day Flood Map**



the B17 between Canarsie and Crown Heights, the B42 between Canarsie Pier and Rockaway Station, the B60 between Canarsie and Williamsburg, the B82 between Coney Island and Spring Creek Towers, and the B103 running between Canarsie and Downtown Brooklyn.

**There are a few concentrations of neighborhood-serving retail along Rockaway Parkway, Flatlands Avenue, and Avenue L.** The corridor currently stretches from around East 92st Street to Rockaway Parkway, with a mix of Caribbean bakeries alongside salons, churches, event spaces and learning centers. Until the mid-2000s, a cinema entertained residents on the strip but now sits vacant.

Two big box stores—a BJ’s Wholesale Club and PetSmart at Avenue D and East 89th Street on the outskirts of Canarsie—have recently opened in the area, serving residents driving in from the outer Brooklyn region. A merchants association, in existence since the late 1950s, has spent the last 10 years formalizing and growing the organization, becoming a registered 501(c)(3) non-profit in 2010, and expanding to encompass businesses outside of the original Avenue L boundaries in 2014.<sup>7</sup>

The Community is largely separated from the neighboring East New York, on the northern

border, by a large manufacturing district, which is part of the Flatlands/Fairfield Industrial Business Zone governed by the City of New York. This district is home to hundreds of businesses varying from food-packing plants to the many tenants who occupy the Brooklyn Terminal Market, where wholesale and retail shoppers can find seasonal decorations alongside spices, produce, and a vast array of goods from the Caribbean and West Indian islands.

**Canarsie Pier and Park are major recreational resources for the Community,** with the Park providing wide-open lawns and ballfields mixed alongside more passive and wild spaces. Space is abundant in the park, even at peak use, adding to the feeling of tranquility provided by this amenity. The resource is highly utilized by picnicking families spending weekend afternoons alongside large groups playing cricket and football. The Canarsie Pier, though physically disconnected from the Community by the Belt Parkway, is also a well-utilized resource for locals who enjoy fishing, kayaking, barbecuing, or a walk along the grasses of Canarsie’s shoreline.

**The basins provide additional open and natural space.** Along the eastern border is the New York City Department of Parks and Recreation (NYC DPR)-maintained Fresh Creek



Peter Wyckhoff House on Canarsie Lane (1934). *Library of Congress, Prints & Photographs Division, Historic American Buildings Survey, HABS NY,24-BROK,32--1*

Nature Preserve. Along the western edge of the Community, adjacent to Paerdegat Basin, is the New York City Department of Environmental Protection (NYC DEP)-controlled green space, which is inaccessible to the public. Paerdegat Basin is also home to the Sebago Canoe Club, which hosts free kayaking trips in Jamaica Bay on a weekly basis during the summer, and provides more extensive trips and use of equipment for members spring through fall.

**Most of Canarsie is on a separated sewer system,** meaning that sanitary and stormwater is carried along different water lines, with stormwater emptying directly into Jamaica Bay via Paerdegat Basin and Fresh Creek. The

northwestern area of the Community above Avenue J is on a combined sewer, as is the bulk of New York City. In a combined sewer system, sanitary and stormwater is carried in the same water lines and treated at wastewater treatment plants. However, during heavy rain events, systems can become overwhelmed, resulting in untreated sanitary waste flowing directly into Paerdegat Basin, Fresh Creek, and ultimately, Jamaica Bay.

**To mitigate direct, unsanitary water flow into area waterways, NYC DEP opened a retention facility in 2011.** It is located at the end of Paerdegat Basin and stores combined waste during heavy rain events. The facility is estimated to annually prevent 1.2 billion gallons of untreated wastewater from being deposited into Jamaica Bay, resulting in greatly improved water quality.<sup>8</sup>

**Finally, Canarsie is home to a rich array of community and faith-based organizations** that represent the cultural fabric of the neighborhood. These include organizations that helped provide assistance to residents after Superstorm Sandy, such as Canarsie Strong, the Canarsie Coalition, MyTime Inc., Holy Family Church, and the Hebrew Educational Society. A number of other organizations provide valued and varied programming year-round. Canarsie



Students traveling home after school along Rockaway Parkway.

Blooms maintains a community garden at East 94th Street and educates the residents about growing vegetables and herbs. The Bridge Street Development Corporation, a non-profit faith-based developer provides affordable housing, homeownership counseling, and senior services. Millennium Development offers youth programming, including community gardening, athletic and arts classes, job training, and anti-bullying classes.

## Description of Storm Impacts

**The greatest impact from Superstorm Sandy on the Community came from extensive flooding from the three adjacent waterbodies and from sewer backup.** The combination of a high storm surge coupled with a high-tide condition during a full-moon cycle resulted in waters rising above the height of bulkheads and natural river banks at Paerdegat Basin and Fresh Creek. Once local edges were crested, waters ran unabated through the mostly flat street network, with waters from Paerdegat Basin inundating access points up to Remsen Avenue and waters from Fresh Creek submerging the residential streets up to Rockaway Parkway. Waters from Jamaica Bay also flooded low-lying homes immediately adjacent to the Belt Parkway along Canarsie Road.

**Surge as high as 6–9 feet passed through residential neighborhoods,** particularly those located nearest to Fresh Creek. According to HUD, 96% of damage within Canarsie was from flooding. Canarsie Pier was inundated with water over 9 feet, the highest of any area in Canarsie. Those residential properties most severely damaged experienced flooding from both wastewater sewer backup and storm surge. Some of these properties experienced a surge as high as 3–6 feet, which, when coupled with sewer backup, was enough to flood basements with water levels reaching 7 feet.

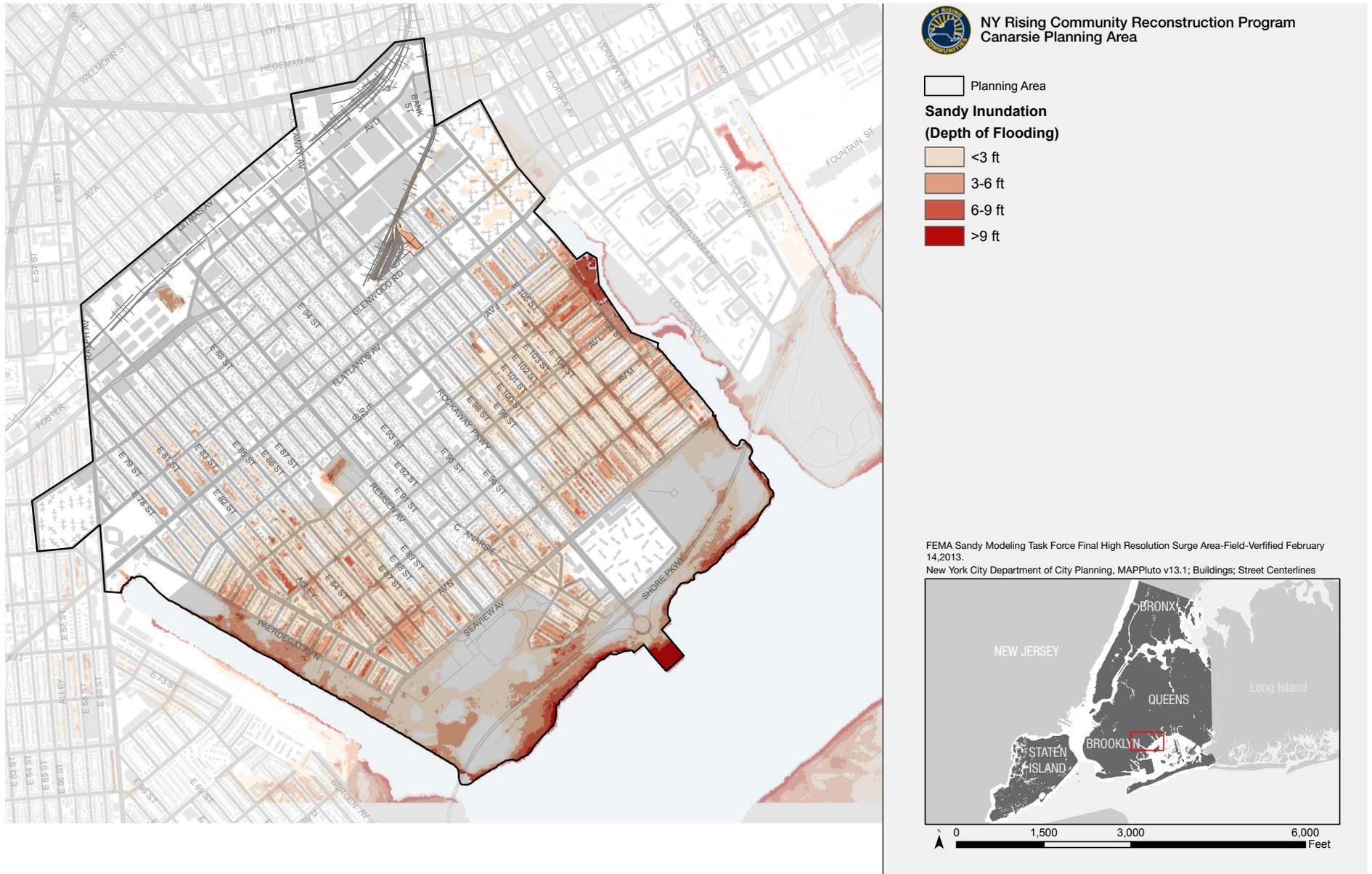
According to HUD's *Analysis of Communities Impacted by Hurricane Sandy*, 83% of Canarsie and neighboring Flatlands homes were damaged during Superstorm Sandy, with the estimated average damage

valued at \$30,000.<sup>9</sup> Considering that 47% of Canarsie households are occupied by homeowners, the individual homeowner recovery costs were significant.



Street flooding caused by Superstorm Sandy adjacent to Fresh Creek. *Courtesy of Canarsie Courier.*

**Figure I-3: Superstorm Sandy Inundation Map**





Fallen trees brought down during Superstorm Sandy. *Courtesy of Canarsie Courier (left), and Maria Garrett (right).*

**Although the two NYC DEP pumping stations that service Canarsie did not sustain damage, wastewater sewer and storm sewer backup affected many residents.** Wastewater sewer backup was likely caused by a combination of infiltration of stormwater into wastewater pipes,

as well as the forced shut down of the Coney Island and 26th Ward wastewater treatment plants during Superstorm Sandy, both of which service Canarsie’s wastewater sewers. The City of New York enacted these shutdowns in order to maintain the integrity of each facility, which

were overwhelmed by floodwaters. Canarsie’s recovery from sewer backup was a slow process, and individual homeowners and businesses needed private pumping and remediation services to restore their properties.

**Storm surge also impacted the conditions of the streets**, exacerbating existing sinkholes, overflowing catch basins, and damaging trees and other vegetation. According to members of the Community, the street flooding caused by Superstorm Sandy created sinkholes that measured up to 3 feet in width.

**The damage caused by Superstorm Sandy displaced many residents for weeks and in some cases months following the storm.** Those who stayed were stranded for days, unable to access food and water beyond the supplies they had stored. Power was spotty and took days to return in certain places. Full L train service remained down for a week and a half, limiting the mobility of residents.

**Volunteers and local organizations established relief centers throughout coastal Brooklyn in order to provide supplies and needed assistance, yet many residents did not know they existed.** While some local community institutions opened their doors to help with the relief effort, there was confusion as to which churches, schools, and businesses were offering aid. Residents did not know where or when supplies—especially food and water—were being delivered to Canarsie, which was a major barrier to recovery, especially for vulnerable populations which include low-income

households and seniors. The American Red Cross provided some supplies, but many residents were not aware of their presence. In the days following Superstorm Sandy, many people chose to seek shelter within their homes—which were often heavily damaged—surviving

on supplies they had on hand. Residents lost a significant amount of personal property, including cars that floated away from the force of the surge. The lack of a designated local relief site was especially problematic for people who suddenly had no means of transportation.



Residents lining up for gas post-Superstorm Sandy. *Courtesy of Canarsie Courier.*

**Power outages and damage to roads forced businesses and local organizations to remain closed,** keeping people from their jobs, limiting the availability of supplies and interrupting the overall economy of the Community. Residents report that a number of businesses never re-opened, leaving only vacant storefronts.

The damage of Superstorm Sandy continued to affect Canarsie long after the flooding subsided and the power returned. Most homes in Canarsie have basements, exacerbating the severe damage to homes and personal belongings. Of the 7,300 flooded units in Canarsie and the upland Flatlands Community, over half experienced 2 or more feet of water in their basements. Most homes and businesses took several months to clean up, become habitable, and re-open. Residents who repaired their apartments too quickly, not letting them properly dry out, soon faced mold infestation, forcing them to find alternative places to live during remediation.

**The experience of Superstorm Sandy has taught the Community the value of preparing for future storm events and improving the overall strength and resiliency of Canarsie.** With the help of borough-based organizations, like the Brooklyn Community Foundation, community members have attempted to pull



Vacant storefronts are common along commercial corridors in Canarsie, a situation made worse by Superstorm Sandy.

together a holistic and unified response through new working groups and organizations, such as the Canarsie Coalition and Canarsie Strong. Having never experienced inundation of Superstorm Sandy's magnitude, Canarsie was caught off-guard by both the enormity of the event and the widespread damage it caused. As the Community continues to recover, there is a strong sense that Canarsie is ready to engage

in meaningful efforts to build on the capacity of local organizations in order to better prepare for future storm events.

## Critical Issues

**Superstorm Sandy created and exposed a number of critical issues across the Canarsie Planning Area.** Through the NYRCR planning process, the Committee and public raised issues that informed strategies for Canarsie. These include storm drainage, risk of flooding, responding to the physical and financial effects from Superstorm Sandy, poor maintenance of streets and trees, limited commercial growth, and lack of community space.

### Infrastructure

**One of the most critical ongoing issues identified by the Community is poor wastewater and stormwater drainage.** Prior to Superstorm Sandy there was a consistent problem with drainage during heavy rains, creating flooding in basements and on streets—a problem that has been reported to have become much worse across the Community since the storm. The maps on pages I-16-17 show the volume of drainage complaints to the City via 311 from January 2010 to October 2012 compared to the 2 weeks after the storm. In particular, the heaviest concentration of complaints occur within the floodplain adjacent to Paerdegat Basin and Fresh Creek, although additional problematic pockets exist throughout the neighborhood.

**Paerdegat Basin and Fresh Creek are at risk of flooding from storm surge, with**

**insufficient infrastructure to protect them against a 100-year flooding event.** These inlets were the primary source of flooding during Superstorm Sandy, and remain vulnerable to storm surge. There have been efforts since the storm to fill land at a height adequately above the base-flood elevation along certain parts of NYC DEP-owned Paerdegat Basin wetlands, although this represents only a minor measure of mitigation. Residents feel that homes along Fresh Creek are especially vulnerable to flooding due to the lack of infrastructure, the close proximity of homes to the water body, and low-lying topography in and around the Fresh Creek Nature Preserve.

**Additionally, some Community members report an increase in road quality issues** with large sinkholes creating hazards to both pedestrians and vehicles. Many communities hard hit by Superstorm Sandy described sinkholes forming after the storm, mainly attributable to damage incurred along storm and wastewater sewer lines.

### Natural and Cultural Resources

**Both the Planning Committee and members of the public have stated that the natural coastline along the Fresh Creek Nature Preserve was eroding and has further deteriorated since Superstorm Sandy.**



Street flooding from Superstorm Sandy may have damaged many roadways in Canarsie.

**Figure I-4: 311 Complaints 2 Weeks Following Superstorm Sandy**



NY Rising Community Reconstruction Program  
Canarsie Planning Area

□ Planning Area

**311 Complaints 2 weeks following Sandy (10/29/13-11/12/13, 214 complaints)**

Sewer Back-up (154 complaints)

• Sewer Back-up Complaint

Low volume

High volume

Street Flooding (35 complaints)

• Street Flooding Complaint

Low volume

High volume

Catch Basin Clogged/Flooding (23 complaints)

• Catch Basin Clogged/Flooding Complaint

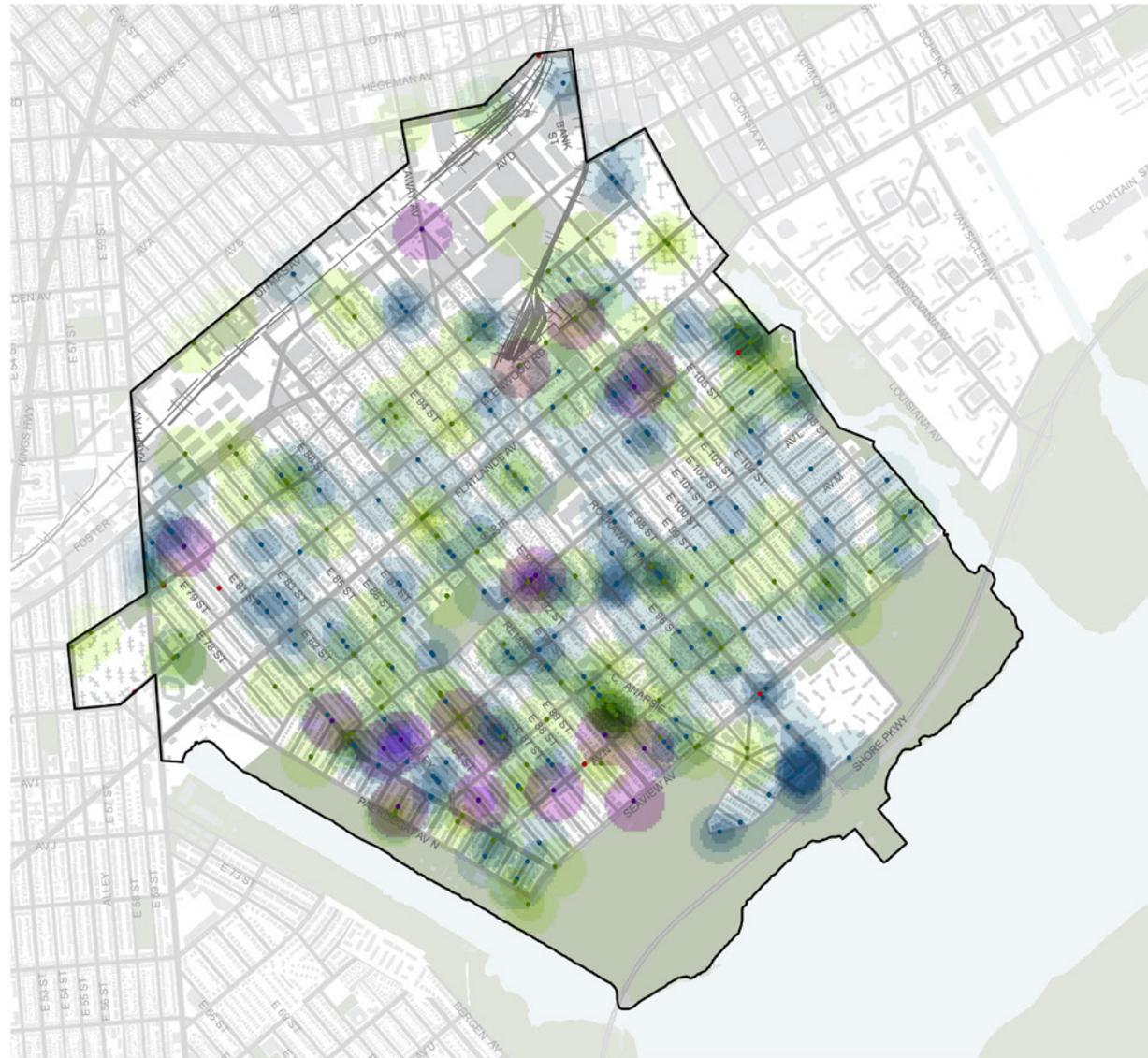
Low volume

High volume

NYC 311 Complaints  
New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines



**Figure I-5: 311 Complaints July 2013-14**



NY Rising Community Reconstruction Program  
Canarsie Planning Area

□ Planning Area

**311 Complaints in the Previous Year  
(07/01/13-07/01/14, 505 complaints)**

Sewer Back-up (256 complaints)

• Sewer Backup Complaint

Low volume  
High volume

Street Flooding (24 complaints)

• Street Flooding Complaint

Low volume  
High volume

Catch Basin Clogged/Flooding (140 complaints)

• Catch Basin Clogged/Flooding Complaint

Low volume  
High volume

NYC 311 Complaints  
New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines



For example, many trees remain tenuously situated in the ground with exposed roots, while others uprooted during the storm remain as debris. Illegal dumping within the Preserve has been an ongoing issue, which has worsened since the storm. The Community has organized multiple clean-ups of this area over the last decade in response. Edge conditions are languishing, with an eroding shoreline and degraded bulkheads providing little protection for nearby homes. Access to Fresh Creek remains limited to residents, and is further hampered by unsafe conditions for pedestrians due to insufficient sidewalks and pathways along the creek.

### Housing

**Lingering effects from Superstorm Sandy are creating financial stress in the neighborhood as well,** particularly impacting homeowners who are no longer able to rent out basement apartments damaged by the storm. Most residents have returned to their homes since the storm but are unable to afford to make the necessary repairs. Canarsie has a high percentage of home ownership compared to the rest of Brooklyn, and was severely hit by the foreclosure crisis. The decreased revenue from inhabitable basement apartments is increasingly pushing homeowners over the brink and in danger of foreclosure. In addition, some



Future storms could bring down electric lines precariously close to trees.

homeowners who incurred damage but did not qualify for Build it Back, the City of New York's managed home repair program, took out loans with the U.S. Small Business Administration, further adding to their debt. Compounding these issues are larger policy changes, which include decreasing Federal subsidies for flood insurance and expansion of the designated flood plain, which may increase the financial

pressures on homeowners now in the floodplain. Notices of foreclosure have increased 37% over the last year in Canarsie and Flatlands.<sup>10</sup>

### Economic Development

**Commercial growth in Canarsie is limited.** While the past decade has seen a modest increase in the number of Canarsie businesses, according to the Canarsie Merchants



Many storefronts on Avenue L, such as this old cinema, are vacant.

Association, many establishments closed along Avenue L, Rockaway Parkway, and Flatlands Avenue after Superstorm Sandy. The area's small mom-and-pop shops struggled during the aftermath of the storm, even though most were not directly damaged. Many have faced challenges staving off the competition from surrounding larger retailers, such as those at Gateway Center in East New York and Kings Plaza in Mill Basin. Numerous storefronts

along Canarsie corridors remain vacant, and attracting new businesses is an ongoing challenge.<sup>11</sup>

Although Canarsie is an area with a median income and unemployment rate comparable to the State and City overall, there are pockets within the Community where the unemployment rate is over 15% and 25% of households live below the poverty line.<sup>12</sup>

### Community Planning and Capacity Building, Health and Social Services

**There is a lack of large meeting and community space within Canarsie, which hampered both short- and long-term recovery efforts.** After Superstorm Sandy, it was difficult to locate spaces for food and supply distribution, as well as volunteer coordination. In everyday situations, the absence of these spaces leaves the neighborhood without an important amenity that could strengthen ties within the Community. Although Canarsie has two public libraries, both close most nights at 6 p.m., and only one location is open on Saturdays, leaving the Community without many options for evening or weekend meetings and events.

**Furthermore, ongoing support for residents still experiencing distress from the effects of the storm is not believed to be sufficient.** The psychological toll and post-traumatic stress lingers long after the storm, and the Community does not feel they have adequate resources to address this issue.

# Community Vision

**From the devastation caused by Superstorm Sandy, the Canarsie Community has come together in ways it never has before.** The Community collaborated to create a vision for what it will become in the future, and developed strategies to start building its resiliency today.

**The NYRCR Program aimed to engage the entire Community throughout the planning process.** The Planning Committee discussed ideas and engaged with residents across the Planning Area to gather feedback and consensus. Three vibrant public meetings were held and attended by hundreds of residents representing a mix of stakeholders. The goals and vision that follow were formulated by the Committee during the planning process and reflect the collective voice of this large and diverse Community.

## Short-term Goals (2–5 Years)

- Improve safety
- Increase resources for youth
- Improve transit and access to natural assets
- Integrate green infrastructure improvements to guard against flooding
- Install resilient infrastructure for homes & public spaces

## Long-term Goals (5–10 Years)

- Revitalize commercial corridors
- Reduce sewer backup into homes
- Establish community space for residents
- Create a completely self-reliant neighborhood



### Community Vision Statement

**“Canarsie, a proudly diverse and peaceful community surrounded by bountiful natural and recreational resources, will become a self-reliant, empowered, prosperous community, and a model of sustainability and resilience.”**

## Relationship to Regional Plans

**Regional Perspectives: Jamaica Bay From Sea Gate and the other NYRCR Communities on the western edge of the Southern Brooklyn Peninsula to South Valley Stream at its headwaters in Nassau County, neighborhoods in and around Jamaica Bay suffered enormous damage from Superstorm Sandy.** This area is home to more than 800,000 people. Jamaica Bay—a unique ecosystem in an urban landscape—is famous for its salt marsh islands, inter-tidal flats, horseshoe crabs, and migratory birds that use the area as a refuge during their seasonal travels. Beyond the water, Jamaica Bay is surrounded by woodland and forests that host an array of wildlife.

**All of the Jamaica Bay neighborhoods suffered significantly during and after Superstorm Sandy, some from flooding or surge and some from wave action.** Homes, businesses, beaches, parklands, schools, roadways, and mass transit were all damaged; the area also endured one of the most extensive and long-lasting power outages in the City.

**Future flooding risks are likely to be exacerbated throughout Jamaica Bay by projected sea-level rise associated with climate change.** According to the Federal Emergency Management Agency’s (FEMA) preliminary work maps, the 100-year floodplain has been

especially dramatic for the Jamaica Bay area where the number of buildings in the floodplain has increased by 70%.<sup>13</sup> It is anticipated that this trend will continue, and the low-lying areas surrounding Jamaica Bay communities are likely to continue experiencing more frequent flooding at greater flood depths.

**There are also ecological factors to consider: Jamaica Bay is a tidal estuary.** Though severely degraded over the 19th and 20th centuries, Jamaica Bay remains a dynamic ecosystem, providing critical habitats to a variety of species, including a number of protected and threatened birds that inhabit both the beach and Jamaica Bay. Habitat loss and degradation of Jamaica Bay’s chemical, physical, and biological environment has largely been due to human activities; although City and Federal policies have yielded dramatic improvements in the quality of Jamaica Bay’s water and habitat.

**In this hydrologically connected system, projects and interventions in one area of Jamaica Bay can have ecological and coastal protection ramifications across the estuary.** The cumulative impact of projects implemented in different locations around Jamaica Bay can be greater than the sum of their individual impacts. At the same time,

interactions between projects can sometimes have negative effects including, though rarely, induced wave or surge activity.

### Planning for Jamaica Bay

**The NYRCR Program recognizes that solutions for Jamaica Bay will affect all of the neighborhoods that front its borders and extended waterways.** This includes NYRCR Communities from Brooklyn, Queens, and Long Island. Acknowledging that strategies for Jamaica Bay are complicated and consensus building will be achieved through dialogue, the NYRCR Program formed the Jamaica Bay Regional Working Group to bring affected communities together to research current and planned projects, and to meet with local, State, Federal officials, and other groups working in Jamaica Bay. The Working Group will continue to meet over the next several months to analyze options and opportunities, discuss goals and challenges, and strive to arrive at a consensus on a long-term approach to resiliency in Jamaica Bay.

**To maximize benefits and minimize risk, NYRCR Communities, as well as the various City, State, and Federal agencies active within Jamaica Bay, will need to coordinate.** In addition to the NY Rising effort, there are many agencies, organizations, and



Aerial view of western Canarsie. *Courtesy of Butch Moran.*



Aerial view of Fresh Creek. *Courtesy of Butch Moran.*

stakeholders involved in Jamaica Bay. The recently formed Jamaica Bay Resiliency Institute, established through an initiative led by the City University of New York in partnership with the City of New York, the National Park Service (NPS), and the Trust for Public Land, among other organizations, is a potential partner and presents an opportunity for NYRCR

Communities in Jamaica Bay to collaborate with other organizations and agencies.

### **Existing Plans, Studies, and Projects**

**Due to the many challenges and risks associated with the region, plans and projects to improve resiliency and the overall urban environment existed before Superstorm**

**Sandy at the Federal, State, regional, and City levels.** Attention on the region has only grown since Superstorm Sandy, as have the number of planned and active projects.

**To avoid duplication of plans and to best identify how the NYRCR Program may fill existing gaps, it is essential to understand**

**and assess the scope of, and potential relationships to, existing initiatives.** This includes overall resiliency and Superstorm Sandy-specific recovery plans, as well as other hazard mitigation, waterfront, infrastructure, and sustainability plans. The analysis and recommendations included in these reports contribute valuable information and ideas to the NYRCR planning process and project definitions.

**Unlike other communities in Jamaica Bay, there has been considerably less planning in Canarsie by outside entities since Superstorm Sandy.** To fill this void, members of the Community have begun to form their own coalitions to provide a more unified response to the event. While much work has been done in a wide variety of working groups, these efforts have not yet yielded specific planning proposals. Key programs, plans, and projects—and their link to Canarsie’s rebuilding, resiliency strategies, and projects—are described below.

### Federal Initiatives

Efforts in **Jamaica Bay by the U.S. Army Corps of Engineers (USACE)** are ongoing. USACE is a major player in both coastal protection and ecological restoration efforts within Jamaica Bay and is currently running dredging and ecosystem restoration studies along with a number of related studies and projects that

could provide resiliency benefits. These include studies that predated Superstorm Sandy as well as post-Superstorm Sandy updates to the previous plans and studies. While initiated and led by the USACE, the projects that stem from these studies may have many implementation partners, including multiple State and City agencies.

Among ongoing USACE studies, the ***East Rockaway Inlet to Rockaway Inlet (Rockaway Beach) Reformulation Study*** is of primary importance to coastal protection planning for Canarsie and the rest of Jamaica Bay. This project reevaluates the existing USACE plan in light of the impacts of Superstorm Sandy. This report will investigate and evaluate potential coastal storm-risk management reduction measures to address flooding along the ocean side and throughout Jamaica Bay. The USACE expects to present the refined alternatives at public information sessions in early-2015.<sup>14</sup>

In addition to its coastal protection work, the USACE is undertaking ecosystem restoration projects throughout Jamaica Bay. Thirty-nine potential ecosystem restoration opportunities in Jamaica Bay are identified in the ***Hudson Raritan Estuary (HRE) Comprehensive Restoration Plan (CRP)***. Adopted in 2009, the USACE and Port Authority of New York

and New Jersey developed the HRE-CRP in collaboration with Federal, State, municipal, and non-governmental organizations as well as other regional stakeholders. It sets forth a consensus vision, master plan, and strategy for future ecosystem restoration in the New York/ New Jersey Harbor.

Some of these ecosystem restoration opportunities are currently being reevaluated by the USACE to assess post-Superstorm Sandy changes and their potential to provide additional resiliency benefits. The ***Jamaica Bay, Marine Park and Plumb Beach, NY Feasibility Study*** (ongoing) is an interim draft report that identified eight priority restoration sites (550 acres) from the HRE-CRP, including Paerdegat Basin, which is located between Georgetown and Bergen Beach and the Canarsie Planning Area. At Paerdegat Basin, water quality improvements were the main goal of USACE’s work. However, because of NYC DEP’s work developing a combined sewer overflow (CSO) retention facility at Paerdegat Basin, the report concludes that significant progress has been made at Paerdegat and does not require further intervention.

In addition to the USACE, HUD has had a very active role in coordinating Superstorm Sandy recovery efforts across the region. Primarily, it has provided leadership and oversight in

programming CDBG-DR funds for recovery and resiliency. It has also led a cutting-edge initiative, Rebuild by Design, to catalyze development along the coastlines.

The **NPS's Gateway National Recreation Area: Final General Management Plan Environmental Impact Statement (2014)** updates the Park's prior General Management Plan from 1979. It presents several vision and management strategies for Gateway National Park, which includes parts of the Canarsie shoreline and Canarsie Pier, in the wake of Superstorm Sandy and has recommended a trajectory for the Park toward more active and recreational uses. The report presents other potential general management strategies, assesses Superstorm Sandy affected environments and environmental consequences, and reviews the community participation process NPS undertook to develop the General Management Plan.

### City and Local Initiatives

In addition to the Federal initiatives and projects centered on Jamaica Bay, there are a number of New York City-wide initiatives relevant to resiliency planning in Canarsie. Other City and local initiatives take a specific look at or have projects within Canarsie.

The **Special Initiative for Rebuilding and Resiliency (SIRR)** was convened by Mayor Bloomberg in December 2012 to assess the damage wrought by Superstorm Sandy and consider the implications going forward for New York City in light of climate change and sea-level rise projections. In June 2013, SIRR released its findings in a comprehensive report that outlined New York City's plan for rebuilding post-Superstorm Sandy and ensuring resiliency into the future. While the SIRR report on Southern Brooklyn does not include Canarsie, the report does prioritize expanding NYC DPR's Greenstreets program in the Canarsie Park area and makes recommendations for comprehensive coastal protection solutions that would better protect all of the neighborhoods around Jamaica Bay. The plan contains further detailed, actionable recommendations for other communities affected by the storm as well as chapters covering citywide issues, including coastal protection, buildings, insurance, utilities, liquid fuels, health care, transportation, parks, water and wastewater, and other critical networks. Updates to SIRR will be occurring within the PlaNYC (the City's comprehensive sustainability and resiliency plan) timeline, with a formal update every four years starting in 2015 and sections of the annual progress report dedicated to SIRR initiatives. The report and latest updates on implementation can be

found on the SIRR website: <http://www.nyc.gov/html/sirr/>.

New York City has also released the **2014 New York City Hazard Mitigation Plan**. Replacing the previous Hazard Mitigation Plan (HMP) from 2009, the new plan was developed by the New York City Office of Emergency Management (NYC OEM) in partnership with the Department of City Planning (NYC DCP) and will be effective from April 17, 2014, to April 17, 2019. The HMP assesses New York City's risk and lays out citywide mitigation strategies for a variety of hazards that include coastal storms, coastal erosion and flooding. As this plan assesses the risks faced by New York City as a whole, it rarely discusses these issues at a level smaller than the boroughs. However, many of the risks discussed in the HMP, such as coastal storms and flooding, are highly relevant to Canarsie, and are occasionally called out in graphics (e.g., citywide storm surge modeling with a call-out box in Canarsie detailing the local results). The report also provides a retrospective analysis of Superstorm Sandy. The report can be found on the NYC OEM website: [http://www.nyc.gov/html/oem/html/planning\\_response/planning\\_hazard\\_mitigation\\_2014.shtml](http://www.nyc.gov/html/oem/html/planning_response/planning_hazard_mitigation_2014.shtml).

In addition to resiliency, the City has launched several initiatives under the **New York City**

**Mayor's Office of Housing Recovery Operations (NYC HRO)** (2013) to help residents across the five boroughs recover from the damage caused by Superstorm Sandy, which are ongoing. The Build it Back Program seeks to assist homeowners, landlords, and tenants whose homes were damaged by the storm. Some of these recovery programs support resiliency investments and will help improve individual homes and businesses in the communities surrounding Jamaica Bay. More information on the NYC HRO program can be found here: <http://www.nyc.gov/html/Recovery/>.

Particularly relevant to NYRCR Communities are ongoing and potential future updates to the **New York City Building and Zoning Codes** (2013). New York City's Building Resiliency Task Force identified 33 recommendations to the New York City Council. Many of these recommendations are still in various states of review, and 16 initiatives have been passed. In addition, the NYC DCP's Flood Resiliency Zoning Text Amendment was approved by the New York City Council on October 9, 2013. The amendment removed obstacles to homes that are rebuilding in the flood zone, allowing homes to build to the new standards.

The **New York City Regional Economic Development Council's (NYC REDC)**

**Five-Year Strategy Plan** (2011) entails a comprehensive economic strategy to address and promote poverty prevention, job training, government fiscal responsibility and infrastructure investment, and balanced investment among all of New York City's businesses. The NYC REDC outlines four key objectives to address these principles: improve quality of life, create a pro-growth, pro-jobs environment, invest in the future, and foster innovation and inter-regional cooperation. Specific approaches supporting small businesses and neighborhood revitalization align with the goals of the NYRCR Program.

The NYC DCP established the **Resilient Neighborhoods Initiative** (2014) in the wake of Superstorm Sandy to develop recovery and resiliency action plans for coastal communities across the city, including a Southern Brooklyn study area, which includes Canarsie. As part of the Resilient Neighborhoods program, the NYC DCP is collaborating with community members to produce neighborhood planning studies that aim to reduce risks, strengthen local communities and economies, and coordinate land use planning. Building on input received during NY Rising and Rebuild by Design, these studies will incorporate community suggestions about zoning and land use changes and suggest other strategies for improving resiliency and mitigating flooding risk. Through the

NYRCR process in Canarsie, the NYC DCP has remained engaged, attending meetings and presenting an overview of the program at a Planning Committee meeting. Several NYRCR Committee members intend to remain involved in the initiative.

The NYC DCP began issuing reports, most recently **Designing for Flood Risk**, and **Urban Waterfront Adaptive Strategies** (2013) as a follow up to the Vision 2020 Waterfront Plan; when Superstorm Sandy struck, these reports evolved to reflect new, post-storm conditions and challenges. Designing for Flood Risk offers architectural strategies and design principles for complying with higher flood protection standards in a manner that reflects New York City's diverse neighborhoods and building typology. The Urban Waterfront Adaptive Strategies Report identifies strategies for improving coastal resilience, assesses the costs and benefits of these strategies, and provides a framework for communities to evaluate the applicability of a given strategy for their neighborhood. While these documents are not targeted toward Canarsie specifically, the design strategies for 1 to 2 family homes in the Designing for Flood Risk report and the evaluation framework for assessing resiliency strategies are particularly appropriate for Canarsie.



Aerial view of upland Canarsie. *Courtesy of Butch Moran.*

The NYC DEP created the ***NYC DEP's Green Infrastructure Annual Report and Plans*** (2014) to address water quality impacts that result from CSO events. Under this program, the NYC DEP and its partner agencies design, construct and maintain a variety of sustainable green infrastructure practices that include green roofs, rain gardens, and right-of-way bioswales. These green features capture and retain water thereby reducing water from entering the system, and are planned for New York City-owned property such as streets, sidewalks, schools, and public housing. The program also provides grants for green infrastructure projects on private property. Canarsie-specific green infrastructure projects include three bio-retention areas in a parking lot near the Canarsie L train station. Projects in Jamaica Bay include a long-term control plan to achieve specific water quality standards for the Jamaica Bay CSO area in Paerdegat Basin. Additionally, the NYC DEP is currently operating the Jamaica Bay Neighborhood Demonstration Project, a trial project in the Jamaica Bay CSO tributary area to assess the benefits of green infrastructure use at a neighborhood level. The results of these projects will be published in the 2016 Performance Metrics Report. By the end of December 2014, over 1,600 green infrastructure projects will be completed, in construction or will be progressing to the final

design stage in the Jamaica Bay and CSO tributaries area.

**New York City Department of Transportation's (NYC DOT) Planning and Improvements** (2014) include a variety of recently completed, under construction, and planned street and infrastructure projects in the Canarsie area. One such major investment involves the Jamaica Bay Greenway—a proposed 28-mile multi-use path linking communities surrounding Jamaica Bay. To date the NYC DOT and its collaborators have developed 10 miles of Greenway, including sections in Canarsie, and they are currently undertaking community engagement efforts to determine additional route development. Priorities for the final route development and implementation are expected to be released in spring of 2015. These projects include the following elements: the recent reconstruction and ongoing landscaping of three major bridges on the Belt Parkway in Canarsie (Fresh Creek Bridge, Rockaway Parkway Bridge, and Paerdegat Basin Bridge); the establishment of the Canarsie Park Connector to facilitate exchange between neighborhood commercial corridors, the waterfront and the developing Jamaica Bay Greenway; and assorted traffic calming efforts throughout the neighborhood.

***Brooklyn Recovery Fund's Brooklyn Communities Speak: An Action Guide for Local Decision-Makers*** (2014) surveys conditions in six coastal Brooklyn Neighborhoods in the wake of Superstorm Sandy and provides both borough-wide and neighborhood-specific recommendations for government recovery and resiliency programs. Issues of specific concern in Canarsie include addressing high foreclosure rates, ensuring that services are available to Canarsie's large immigrant and undocumented immigrant population, which the report estimates at over 15,000, hiring local residents to work on construction projects, encouraging small business re-openings, improving bus service, and addressing widespread rotting trees.

The Brooklyn Recovery fund was established by the Brooklyn Community Foundation in partnership with the Office of the Brooklyn Borough President and the Brooklyn Chamber of Commerce. The Brooklyn Chamber of Commerce and New York Business Development Corporation launched a \$10 million loan fund through the New York City Business Solutions Center to promote small businesses in Brooklyn, with particular emphasis on immigrant- and veteran-owned enterprises. Loan allowances range from \$25,000 to \$350,000. The first loans were granted in December 2013. The fund also began a number of local initiatives

across the borough, some of which are based in Canarsie. These efforts have included:

**Canarsie Recovery Coalition** (2012) consisted of a variety of local community-based organizations convened to provide a voice, develop recovery plans and facilitate recovery programs in the Community. To accomplish this, the Coalition hired a full-time Project Director and conducted a community assessment to determine post-storm housing needs. Additionally, the Coalition organized a Canarsie Day to increase interaction between service agencies and Canarsie residents, distributed \$100,000 in homeowner grants, and organized a rebuilding program in the neighborhood. Funding for the full-time Director of the Coalition by the Brooklyn Recovery Fund ended in the summer of 2014.

**Neighborhood Housing Services of East Flatbush: Canarsie Emergency Repairs Assistance Program** (2013) was a grant giving program funded by the Brooklyn Recovery Fund and administered by Neighborhood Housing Services of East Flatbush (NHS). The program provided 50 grants and forgivable loans of up to \$10,000 to homeowners for emergency repairs. The NHS also currently provides loans of up to \$20,000 to qualified building owners through their Emergency Loan Programs.

**Canarsie Strong, Canarsie New York Resilience Network** (ongoing) is a coalition of neighborhood block associations in Canarsie that aims to encourage collaboration and community partnerships in order to build resiliency, disaster response capabilities, and environmentally responsible communities in Canarsie. Canarsie Strong is part of the Canarsie New York Resilience Network and has established working groups around a range of issues: housing, transportation, drainage, and economic resiliency, and others.

## **II. Assessment of Risk and Needs**



# Description of Community Assets

Assets are locations, features, infrastructure and development located within or outside of the Canarsie NY Rising Community Reconstruction (NYRCR) Community (Community) whose loss or impairment due to flood/storm events would compromise any essential social, economic, or environmental functions and/or critical facilities of the Community.

Assets may facilitate economic and social activities or refer to critical infrastructure required to support those activities. Assets may also be part of the built or the natural environment. The goal of the asset inventory is to assemble a description of the Community's most important assets with sufficient information to assess risk to the assets under current and future conditions. Assets identified through the NYRCR Program fall within at least one of two categories:

- Community assets that have been damaged from past storms or are at risk of damage from future storms (i.e. assets within high or extreme risk areas, as illustrated in figure II-1);
- Community assets that are critical in the preparedness, response, or recovery from future storms or other emergencies.

## What Do The Risk Areas Mean?

New York State Department of State (NYS DOS), with the assistance of the National Oceanic and Atmospheric Administration (NOAA), mapped geographic areas representing the likelihood for coastal flooding. They identified three risk areas:

**Extreme:** Areas currently at risk of frequent inundation and vulnerable to erosion and wave action over three feet (FEMA V zone), subject to shallow coastal flooding (within the National Weather Service's shallow coastal flooding advisory threshold), or likely to be inundated in the future due to sea level rise (assumes three feet).

**High:** Areas outside the extreme risk area that are currently at risk of infrequent inundation (FEMA A zone, meaning there is a 1% annual

chance of flooding) or at future risk of shallow coastal flooding with sea level rise (assumes three feet).

**Moderate:** Areas outside the extreme and high risk areas but currently at moderate risk of inundation from infrequent events (FEMA shaded X zone, meaning there is a 0.2% annual chance of flooding) or at risk of being in the 100 year floodplain with sea level rise (assumes three feet), and any areas expected to be inundated by a category three hurricane.

A more detailed description of the NYS DOS Risk Assessment Area Mapping Methodology can be found on the NY Rising Community Reconstruction (NYRCR) Program website, as can a link to an online viewer for the risk assessment area maps, at <http://stormrecovery.ny.gov/community-reconstruction-program>.

Assets were identified using a combination of publicly available data and input from the Canarsie NYRCR Planning Committee (Committee) and the public. The inventory and associated maps were initially generated using New York City land use and infrastructure data to identify assets within the Canarsie NYRCR Planning Area (Planning Area). The maps were

refined by the Committee and presented to the Community at the initial Public Engagement Event for feedback. The assets described here reflect the input and feedback of the Committee and the wider Community. The asset inventory is organized by the NYRCR asset class, the categories of which are highlighted in the following sections.

## Recovery Support Functions

Functions are used to frame needs and opportunities identified by the Community. These functions are derived from the Federal Emergency Management Agency’s (FEMA) National Disaster Recovery Framework developed by President Barack Obama in 2011 and provide a structure for analyzing the community recovery needs and the subsequent assistance that must be provided. They also tie closely to the asset categories used in the asset inventory. They are defined as follows:



### Natural & Cultural Resources

Natural infrastructure systems can play an important role in resiliency and recovery. The ability of natural features to withstand disruptive events and mitigate damage is addressed by this function. Cultural resources can play an important role in recovery through provision of spaces and forums for recovery.



### Health & Social Services

This function addresses the ability of public health services, health care facilities, and essential social services to be restored after a disruptive event.



### Housing

The resiliency of a community’s housing stock is addressed by this function—including both physical resiliency and financial health and resources.



### Community Planning & Capacity Building

This function addresses a community’s ability to implement immediate storm recovery activities and organize long-term resiliency plans. Formal and informal community networks, dedicated emergency education and planning efforts, and experience recovering from past emergency events are characteristics that may enhance this function.



### Economic Development

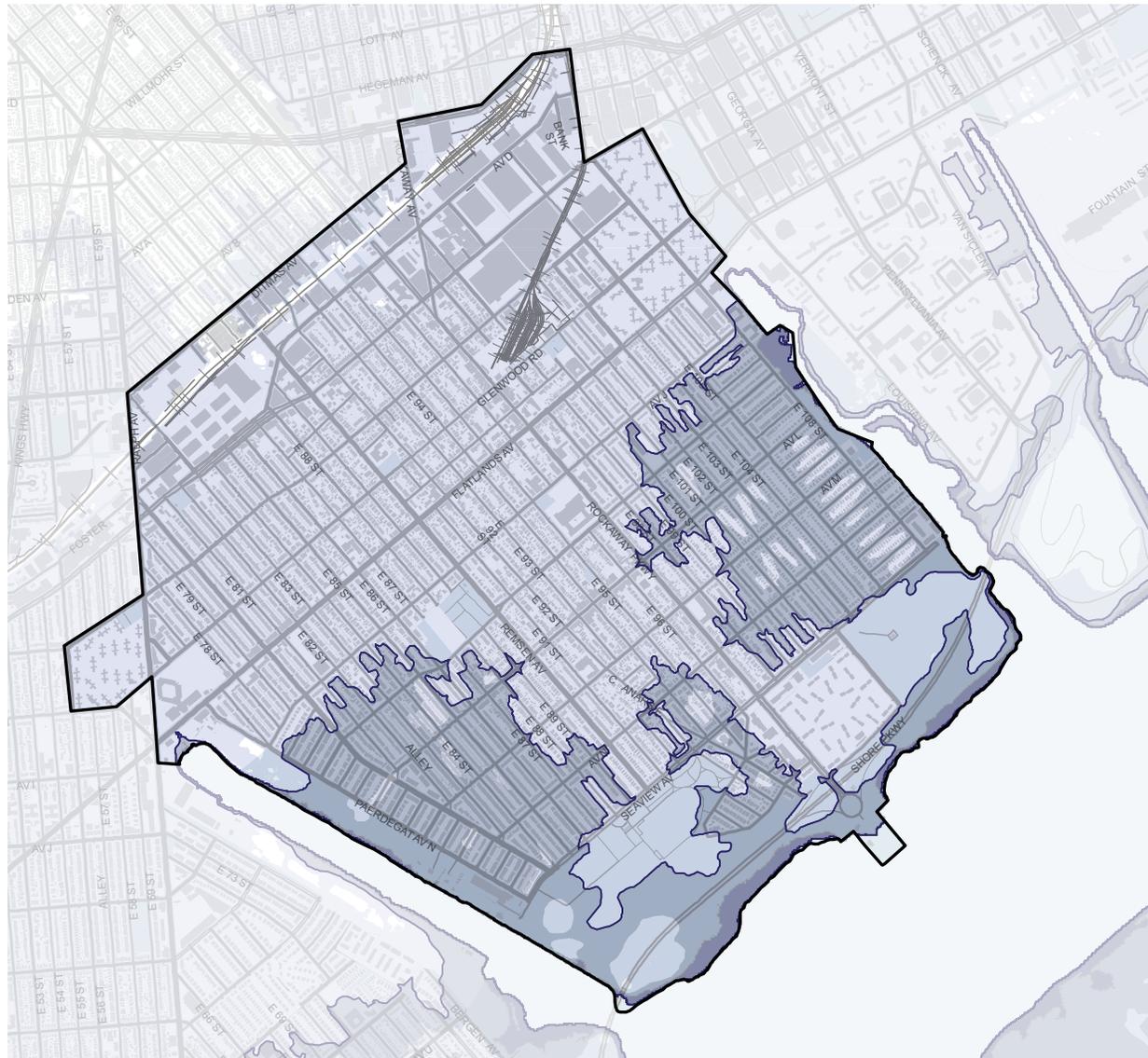
This function addresses the ability for economic and business activities to return to normal. Developing new economic opportunities that result in a sustainable and economically strong community is a component of this function.



### Infrastructure

This function relates to local and regional transportation, water management, utility systems, and the ability of these to withstand and recover from disruptive events. The economic development and job creation capacity of these systems are also critical to this function.

**Figure II-1: NYS Department of State Risk Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

Planning Area

Extent of High & Extreme Risk Areas

**NYS DOS Risk Areas**

Moderate

High

Extreme

**NYS DOS, with the assistance of the National Oceanic and Atmospheric Administration (NOAA), mapped geographic areas representing the likelihood for coastal flooding. They identified three risk areas:**

**Extreme:** Areas currently at risk of frequent inundation and vulnerable to erosion and wave action over three feet (FEMA V zone), subject to shallow coastal flooding (within the National Weather Service’s shallow coastal flooding advisory threshold), or likely to be inundated in the future due to sea level rise (assumes three feet).

**High:** Areas outside the extreme risk area that are currently at risk of infrequent inundation (FEMA A zone, meaning there is a 1% annual chance of flooding) or at future risk of shallow coastal flooding with sea level rise (assumes three feet).

**Moderate:** Areas outside the extreme and high risk areas but currently at moderate risk of inundation from infrequent events (FEMA shaded X zone, meaning there is a 0.2% annual chance of flooding) or at risk of being in the 100 year floodplain with sea level rise (assumes of three feet), and any areas expected to be inundated by a category three hurricane.

A more detailed description of the NYS DOS Risk Assessment Area Mapping Methodology can be found on the NYRCR website, as can a link to an online viewer for the risk assessment area maps, at <http://stormrecovery.ny.gov/community-reconstruction-program>.

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines





### Health and Social Services Assets

Canarsie is home to many medical facilities and community centers that serve the Community's diverse population. Fairview Adult Day Care and Four Seasons Nursing and Rehabilitation Center serve the Community's senior population while numerous day cares, some of which are operated out of private residences, tend to the youngest residents. Although there is no comprehensive primary care hospital within Canarsie, Staten Island University Hospital's property near the Canarsie-Rockaway Parkway subway station, home to their methadone maintenance clinic, and the Evelyn Douglin Center for Serving People in Need serve uniquely vulnerable populations. No facilities or organizations offer comprehensive in-patient services within the Community, but there are multiple Brooklyn hospitals just outside of the Planning Area that do, including Brookdale University Hospital and Medical Center, just north of Canarsie on Rockaway Parkway. No one facility acted as the central point of relief and provision of supplies during the aftermath of Superstorm Sandy, but both the Hebrew Educational Society and the Church of the Holy Family played a critical role in providing those affected with a place of temporary refuge and solace. My Time, Inc. provided vital resources and services to the disabled and other vulnerable populations.



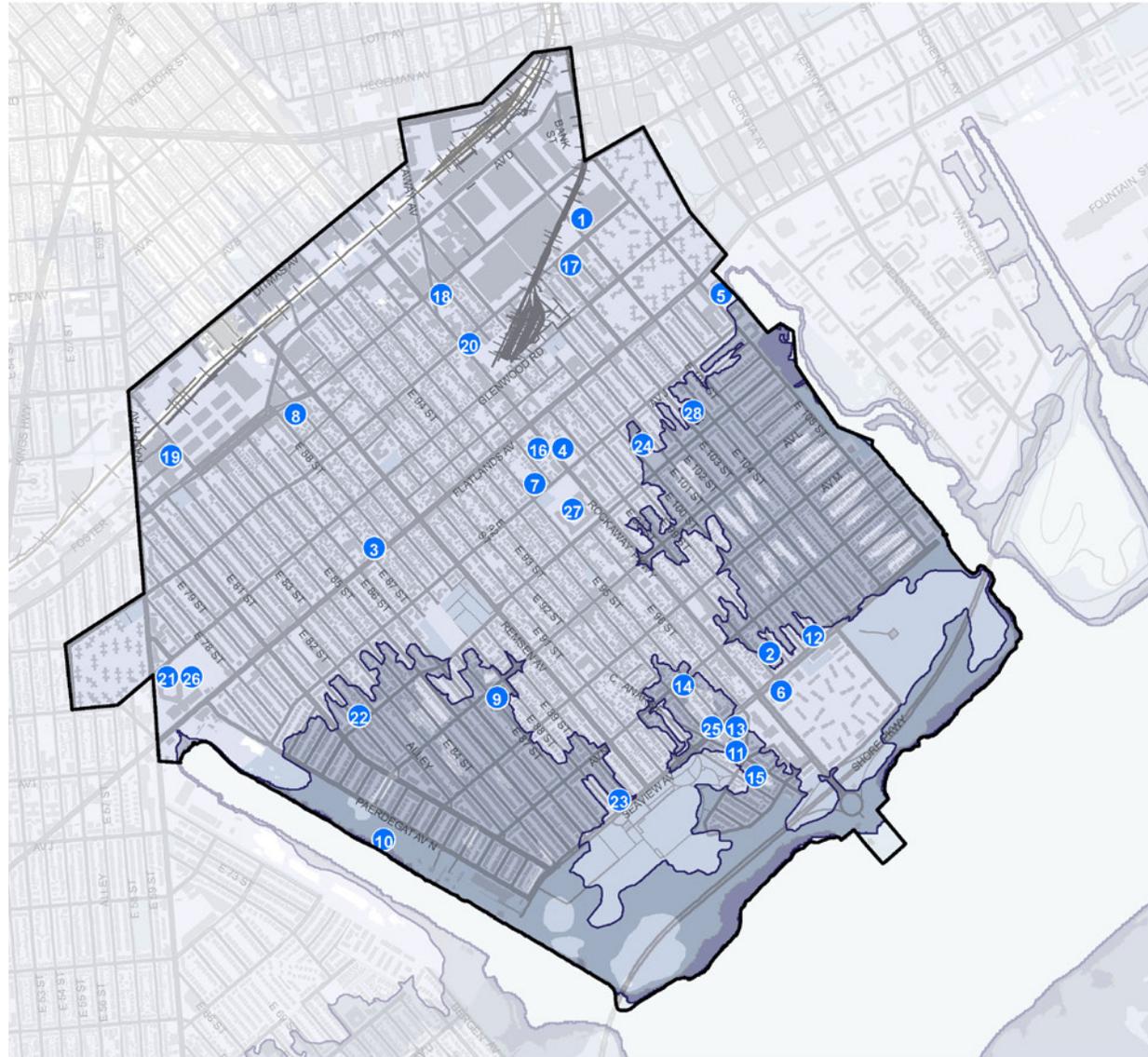
Atrium, a nursing home located outside the flood plain.

The Pacplex sports, recreation, and education complex along Paerdegat Avenue is the largest of its kind within the borough of Brooklyn. The South Shore Educational Complex, formerly South Shore High School, houses the Brooklyn Theatre Arts High School as well as the Academy for Conservation and the Environment, within its campus. All of these facilities are large structures that serve the

Community, primarily through educational and recreational programs.

Canarsie is served by the 69th Precinct of the New York Police Department (NYPD) and the New York Fire Department (FDNY) Engine Company #257. Both of these facilities are located within the moderate risk area and are critical to the safety and resiliency of Canarsie.

**Figure II-2: Health & Social Services Asset Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

Planning Area

Extent of High & Extreme Risk Areas

**Health and Social Service Assets**

Health, Social Service, & Emergency Response Assets

**NYSDOS Risk Areas**

- Moderate
- High
- Extreme

- |  |   |
|--|---|
| 1 STATEN ISLAND UNIVERSITY HOSPITAL                        | 20 FDNY ENGINE 257, LADDER 170                        |
| 2 FAIRVIEW ADULT DAY CARE CENTER                           | 21 SCHOOL SAFETY BKLYN. SO. OFFICE (SOUTH SHORE H.S.) |
| 3 FIRST MEDCARE PRIMARY CARE CENTER                        | 22 YESHIVA ATERES YISROEL                             |
| 4 GATEWAY DIALYSIS CENTER                                  | 23 YESHIVA GEDOLAH OHR YISROEL                        |
| 5 LAKESIDE/PARKSHORE ADULT DAY HEALTH CARE CENTER          | 24 JOHN WILSON INTERMEDIATE SCHOOL 211                |
| 6 SUSAN LEVIT MEDICAL ARTS CENTER                          | 25 JASA SENIOR DAY CARE CENTER                        |
| 7 SUNRISE/PARKSHORE ADULT DAY HEALTH CARE CENTER           | 26 SOUTH SHORE EDUCATIONAL COMPLEX                    |
| 8 VERSACARE HEALTH CENTER                                  | 27 CANARSIE EDUCATIONAL COMPLEX                       |
| 9 BIG APPLE DAY CARE                                       | 28 HERMAN SCHREIBER PUBLIC SCHOOL 279                 |
| 10 PACPLEX SPORTS RECREATION AND EDUCATION COMPLEX         |   |
| 11 GAN JEWISH DAY CARE CENTER & HEBREW EDUCATIONAL SOCIETY | OUTSIDE THE PLANNING AREA:                            |
| 12 LITTLE PRINCETON NURSERY AND DAY CARE CENTER LLC        | 29 BROOKDALE UNIVERSITY HOSPITAL & MEDICAL CENTER     |
| 13 BROOKLYN HEBREW SCHOOL                                  | 30 MAIMONIDES MEDICAL CENTER                          |
| 14 EI HAB HUMAN SERVICES                                   | 31 FDNY EMS CENTER, PENNSYLVANIA AVE                  |
| 15 EVELYN DOUGLUN CENTER SERVING PEOPLE IN NEED            | 32 JCC CANARSIE, COUNCIL TOWERS                       |
| 16 FOUR SEASONS NURSING AND REHABILITATION CENTER          | 33 KINGS COUNTY HOSPITAL                              |
| 17 RIVER MANOR CARE CENTER                                 | 34 DOWNSTATE UNIVERSITY HOSPITAL                      |
| 18 NYPD 69 PRECINCT  | 35 KINGSBROOK JEWISH MEDICAL CENTER                   |
| 19 EMS STATION 58  |   |

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines





### Economic Assets

Canarsie’s economic assets were also identified as essential. Economic corridors and individual businesses are important to the Community’s preparedness, response, and recovery as they are critical to the supply of basic goods. They also play an important day-to-day function as sources of goods, jobs, and socialization for Canarsie’s residents.

Canarsie is served by three commercial corridors, almost all of which are entirely out of the floodplain: Avenue L, which runs from Rockaway Plaza to East 91st Street; Rockaway Parkway, which runs from the Canarsie-Rockaway Parkway subway station southeast towards the Jamaica Bay shoreline; and Flatlands Avenue, which runs perpendicular to Rockaway Parkway. These avenues are similar, with primarily one- to two-story buildings interlaced with mixed-use and residential properties. Rockaway Parkway is the most robust economic corridor, featuring not only various small retail businesses, national chain storefronts and gas stations, but also providing access to key infrastructure and health and social services such as private medical practices.

Land usage along all three commercial corridors is a diverse mix of residents and businesses.



Industrial and business districts in Canarsie.

For instance, a three-block stretch of Flatlands Avenue between East 95th Street and East 92nd Street features an office building, single-family residences, and mixed-use two-story buildings. This diversity adds vibrancy to Canarsie’s



commercial corridors, and contributes to the character of the Community.

**Figure II-3: Economic Assets Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

- Planning Area
  - Extent of High & Extreme Risk Areas
- Economic Assets**
- - - - - Commercial Corridors
  - 1 Avenue L
  - 2 Flatlands Avenue
  - 3 Rockaway Parkway
- NYSDOS Risk Areas**
- Moderate
  - High
  - Extreme
- Economic Use**
- Mixed Residential & Commercial, Condominiums
  - Mixed Residential & Commercial, Residence - Multiple Use
  - Mixed Residential & Commercial, Store Buildings (Taxpayers Included)
  - Mixed Residential & Commercial, Walk Up Apartments
  - Commercial & Office Buildings, Office Buildings
  - Commercial & Office Buildings, Store Buildings (Taxpayers Included)
  - Industrial & Manufacturing, Factory And Industrial Buildings
  - Industrial & Manufacturing, Warehouses

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines





## Housing Assets

Canarsie's homes are its most important assets. Those homes within the high and extreme risk zones have been identified as the housing assets at greatest risk from future storms. There are approximately 5,400 residential buildings either partially or entirely in the high and extreme flood zone, the majority are one- and two-family residences. The most at-risk residences are those closest to Paerdegat Basin, Fresh Creek, and low-lying areas near Jamaica Bay. As residential property tends to be the most valuable asset held by households, and with 47% of Canarsie residents owning their homes, the protection of the Canarsie housing stock is critical to the livelihoods of these residents.

There are a number of one- to four-unit multi-family walk-up buildings, on Paerdegat Avenue, close to Paerdegat Basin. These residences are typically three-story structures with recessed garages, making them particularly prone to garage and basement flooding. There are also three large New York City Housing Authority (NYCHA) properties within Canarsie, but none are in the high or extreme risk areas.



Typical attached brick homes in Canarsie.

**Figure II-4: Housing Assets Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

- Planning Area
- Extent of High & Extreme Risk Areas
- Housing Assets**
- One and Two Family Residences in High and Extreme Risk Areas
- Multi-Family Walk-Up Buildings in High and Extreme Risk Areas
- NYSDOS Risk Areas**
- Moderate
- High
- Extreme

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines





### Infrastructure Assets

A number of infrastructure assets are located in Canarsie, all of which contribute to the Community's preparedness, response, and recovery from future storms.

Canarsie is served by two subway stops on the Metropolitan Transit Authority's New York City Transit (MTA-NYCT) L line, East 105th Street and Canarsie-Rockaway Parkway. Rail yards storing idle subway cars are located between the two stations. Canarsie-Rockaway Parkway, which is the terminus station of the L line, is also a bus station and important transfer point between the two transit systems. In 2013, the MTA-NYCT reported an average weekday ridership of 13,254 passengers per day at the Canarsie-Rockaway Parkway station, and an additional 3,818 passengers per day at East 105th Street. Providing a connection to points north within Brooklyn and into Manhattan, the L train is an important transportation asset both during an emergency and for the day-to-day livelihood of Community residents. Another major component of transportation infrastructure serving the Community is the Belt Parkway, a highway that connects Canarsie to other Brooklyn waterfront neighborhoods, and bridges to Manhattan, and Queens.



The terminating stop on the L train, the Rockaway Parkway station.

The majority of the Planning Area is served by separated sanitary and storm sewer systems, meaning that wastewater is piped out and treated at wastewater treatment plants, while stormwater is collected in a separate system or flows into surrounding waterbodies. Canarsie is serviced by two wastewater treatment plants: the 26th Ward Wastewater Treatment Plant in East New York and the Coney Island Wastewater Treatment Plant in Sheepshead Bay. Both of these plants are outside of the Planning Area although they are critical to the

functionality of Canarsie's separated sewer and stormwater system.

There are two New York City Department of Environmental Protection (NYC DEP) pumping stations within the Community that have been identified by the NYC DEP as potentially at risk to future storms: the Paerdegat Pumping Station, which resides within an above-ground structure on Flatlands Avenue, and the below-grade Avenue M Pumping Station.

**Figure II-5: Infrastructure Assets Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

Planning Area	Extent of High & Extreme Risk Areas
<b>Infrastructure Assets</b>	<b>NYSDOS Risk Areas</b>
Infrastructure Systems Assets	Moderate
Belt Parkway	High
	Extreme

- 1 GAS STATION
  - 2 GAS STATION
  - 3 GAS STATION
  - 4 GAS STATION
  - 5 GAS STATION
  - 6 GAS STATION
  - 7 GAS STATION
  - 8 GAS STATION
  - 9 GAS STATION
  - 10 GAS STATION
  - 11 GAS STATION
  - 12 GAS STATION
  - 13 CANARSIE-ROCKAWAY PARKWAY STATION (L TRAIN AND BUS)
  - 14 MTA FACILITY
  - 15 AVENUE M PUMPING STATION (NYC DEP)
  - 16 PAERDEGAT PUMPING STATION (NYC DEP)
  - 17 BELT PARKWAY
  - 18 E 105 STREET STATION (L TRAIN)
- OUTSIDE THE PLANNING AREA
- 19 26TH WARD WASTEWATER TREATMENT PLANT
  - 20 CONEY ISLAND WASTEWATER TREATMENT PLANT

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPInfo v13.1; Buildings; Street Centerlines





### Natural and Cultural Resources Assets

Canarsie has extensive parkland and open space, concentrated primarily along the Jamaica Bay shoreline, Paerdegat Basin, and Fresh Creek. These shorelines contain marshlands and natural areas, as well as recreational spaces. Natural and cultural resources that have been damaged in previous storms, or are located within the high and extreme risk areas, were identified as at risk and are included in the asset inventory.

Canarsie Park is located along the southeast edge of Canarsie, is bounded by Fresh Creek, the Belt Parkway, Paerdegat Basin, and Seaview Avenue, and provides a mix of recreational space, ballfields, nature trails, and natural habitats for a variety of birds, animals, and plant species.<sup>1</sup> Canarsie Park is the most active and largest park in the Community.

The natural areas of Canarsie's Jamaica Bay shoreline are part of the National Park Service's (NPS) Gateway National Recreation Area (Gateway). As such, this shoreline ties into the larger NPS recreation area for Jamaica Bay, including the Jamaica Bay Greenway. At the center of this shoreline is Canarsie Pier, an important recreational asset for the Community and a feature of the park highlighted in the recently updated NPS General Management



Canarsie Playground, a popular natural asset in Canarsie.

Plan for Gateway. On a nice day, fishermen line the pier, families cook out, and visitors enjoy the impressive views of Jamaica Bay and its surrounding inlets and islands.

Paerdegat Basin, on the southwestern edge of the Planning Area, is a natural resource providing marine and coastal habitats for native

plant and animal species and supporting water-based recreation to Canarsie and neighboring Bergen Beach. The NYC DEP is in the process of restoring the tidal wetlands of the basin, which will augment water quality and ecological improvements along the basin.<sup>2</sup> The excavation of the shoreline has resulted in berming along the basin's northern shoreline. These berms

**Figure II-6: Natural and Cultural Resources Assets Map**



**NY Rising Community Reconstruction Program  
Canarsie Planning Area**

- Planning Area
- Extent of High & Extreme Risk Areas
- Natural and Cultural Resource Assets**
- Natural and Cultural Resource Assets
- Jamaica Bay Greenway
- Parks and Open Space
- NYSDOS Risk Areas**
- Moderate
- High
- Extreme

- 1 JAMAICA BAY GREENWAY
- 2 CANARSIE PIER (GATEWAY NATIONAL RECREATION AREA, NATIONAL PARKS SERVICE)
- 3 FRESH CREEK
- 4 FRESH CREEK NATURE PRESERVE
- 5 PACPLEX SPORTS RECREATION AND EDUCATION COMPLEX
- 6 PAERDEGAT BASIN
- 7 CANARSIE PARK (NYC PARKS)
- 8 WILSON PLAYGROUND (NYC PARKS)
- 9 HEBREW EDUCATIONAL SOCIETY
- 10 BAYVIEW COMMUNITY CENTER (NYCHA)
- 11 HOLY FAMILY ROMAN CATHOLIC CHURCH

Source: New York State Department of State (DOS) Risk Assessment Areas; New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines





The berm along Paerdegat Basin could provide future protection for homes.

do not span the entire length of Paerdegat and may not provide any real protection from storm surge unless they are extended to protect all vulnerable points of the basin's edges.

Similarly, Fresh Creek, on the northeastern edge of the Planning Area, is a natural asset shared with neighboring East New York. Fresh

Creek has been identified as an ecosystem restoration opportunity in the Hudson Raritan Estuary Comprehensive Restoration Plan (HRE-CRP). It is also being studied by the U.S. Army Corps of Engineers (USACE) as a potential opportunity to provide a reduction of coastal storm damage as well as ecosystem restoration benefits. Ecological problems identified

at Fresh Creek include poor habitat quality, filled historic wetland, poor water quality due to combined sewer outflow (CSO) discharges, and the presence of invasive species. Additionally, the basin was a significant source of flooding during Superstorm Sandy. Unlike Paerdegat Basin, many homes along Fresh Creek are located directly on the water's edge, making them more exposed to floodwaters. The land is largely owned by the New York City Department of Parks and Recreation (NYC DPR), which has acknowledged the coastal restoration and protection opportunities within the Creek. Additionally, NYC DEP and USACE have identified Fresh Creek as a potential restoration opportunity (costing approximately \$31 million), and a plan is being considered by the New York City Department of Transportation (NYC DOT) to make roadway improvements along 108th Street, which runs parallel to the Creek's shoreline. Although there is currently no funding for restoration or protection within Fresh Creek, the attention given by these various agencies speaks to the Creek's potential and provides a unique opportunity to leverage NYRCR funds to realize improvements.

# Assessment of Risk to Assets and Systems

The assessment of risk to assets identified by the Community informs the evaluation and relative priority of projects. The waterbodies that serve as natural borders for much of the Community—specifically, Fresh Creek along the northeast, Paerdegat Basin along the southwest, and the North Channel of Jamaica Bay along the southeast—were entry points for inundation during Superstorm Sandy and remain exposed to future coastal flooding. The low-lying blocks along the waterfront, located within an NYS DOS high risk area, remain the most at risk of flooding from storms and sea-level rise and are where the most at-risk community assets are concentrated. Although most of the Community further inland is located within the moderate risk area, these areas remain vulnerable to flooding from storm surge and sewer backup, especially if pedestrian and vehicular egress during an emergency is blocked.

In addition to physical factors, there are many issues with respect to community capacity that contribute to the vulnerability of residents and assets throughout Canarsie. The lack of an emergency response plan or a designated local recovery site, as well as poor communication regarding recovery efforts and available aid, hindered the Community's ability to effectively respond to and recover from Superstorm Sandy. These issues remain unaddressed, thus

## Assessing Risk

The NYRCR Program defines risk as the potential for an asset to be damaged or destroyed in a future storm event. The assessment of risk to assets or systems of assets in a community produced important information to evaluate needs and opportunities and help guide Committee decisions about resiliency strategies and projects. NYS DOS developed a risk assessment tool that is aimed at understanding flood risk and community functions to support this process. The tool assigns each asset a risk score by evaluating three factors:

**Hazard** – the likelihood and magnitude of future storm events

**Exposure** – the local topographic and shoreline conditions that may increase or decrease the impact of coastal hazards

**Vulnerability** – the capacity of an asset to return to service after a storm, taking into account its material strength relative to the coastal hazard as well as its regenerative capacity

Collectively, hazard, exposure, and vulnerability determine the risk that an asset could be damaged or destroyed by a coastal storm event. This analysis identifies which assets within the Community are most at risk from future storms in comparison to other assets. Furthermore, it allows potential projects to be evaluated by their ability to reduce risk to assets. For access to the NYS DOS Risk Assessment Tool and additional information on how to use it, see <http://stormrecovery.ny.gov/resources-0>

increasing the vulnerability of residents and of assets throughout the Community.

The assessment of risk to assets provides background information to help in the development

of projects, particularly those projects that protect assets from flooding. The assessment will also be used as input for the subsequent evaluation of NYRCR projects, to reduce identified risks to the assets, which will be discussed in



In-home day cares such as these are in the high risk area.

future sections. The output from the NYS DOS Risk Assessment Methodology is included in Table V-3.

### **Health and Social Services Assets at Risk**

A number of important health and social services assets are located in the high risk area of the Community. These assets serve a variety of functions for the Community, including day care, healthcare, and education services. For instance, Big Apple Day Care and Yeshiva Ateres Yisroelare are both located within several blocks of Paerdegat Basin. The Evelyn Douglin Center for Serving People in Need, Eihad Human Services, and Fairview Adult Day Care Center, are located just inland of Jamaica Bay. The John Wilson Intermediate School 211 and the Herman Schreiber Public School 279 are located blocks from Fresh Creek. The Hebrew Educational Society is similarly located in the high risk area and remains vulnerable to future storms. These health and social services assets are critical in providing support throughout the Community before, during, and after storm events, and many provide special assistance to vulnerable populations in the Community, including seniors, people with disabilities, low- and very-low-income populations, young children, and people at risk of becoming homeless. Because of this, loss or damage to these assets

could severely hinder the Community's ability to recover and protect vulnerable populations.

### **Economic Assets at Risk**

The three main economic corridors in Canarsie are located primarily in the moderate risk zone, with the exception of a portion along the Avenue L corridor northeast of Rockaway. Following Superstorm Sandy, individual businesses needed private pumping and remediation services to address sewer backup, and a number of businesses have closed permanently after Superstorm Sandy. As few efforts have been made to address these vulnerabilities, economic assets remain at risk of damage from storm surge and sewer backup.

### **Housing Assets at Risk**

Many one- and two-family residences, in addition to some multi-family walk-up buildings, are located within the high risk area. During Superstorm Sandy, the residential neighborhoods located nearest to Fresh Creek experienced the greatest storm surge of 6–9 feet, and the homes remain exposed to future flooding due to the low-lying topography of the area around the Fresh Creek Nature Preserve and their proximity to the shoreline. These homes are particularly vulnerable as most have basements and first floors unprotected from floodwaters. Homes throughout Canarsie have

continued to experience sewer backup since Superstorm Sandy, suggesting that the vulnerability of the sewer system continues to pose a threat during future storms. Financial stress for homeowners as a result of loss of revenue from damaged basements that can no longer be rented, as well as rising flood insurance costs, threaten residents' ability to afford repairs and upgrades, further exacerbating the vulnerability of housing throughout the Community.

### **Infrastructure Assets at Risk**

The Belt Parkway is the only infrastructure asset within the Planning Area that is located in the high risk area, but many other assets are located within the moderate risk area and could still incur damage during future storms. The Belt Parkway is at less risk than other roadways due to its high elevation. Other at-grade roadways in the high and moderate risk areas are more vulnerable, and sinkholes have plagued the ability of drivers to navigate these streets in recent years. During and after Superstorm Sandy the precariousness of the road network was evident, as flooding from Paerdegat Basin and Fresh Creek engulfed access points up to Remsen Avenue and Rockaway Parkway, and sinkholes on streets increased. The risk of flooding, in conjunction with the poor condition of the roadways and limited subway access, leaves the transportation system susceptible to future damage.

Poor stormwater drainage is a lingering concern within the Community, particularly along the floodplains of Fresh Creek and Paerdegat Basin. Many residents experienced sewer backup during Superstorm Sandy and report similar backup during heavy rain events. This suggests that the sewer system remains vulnerable to flooding.

The Paerdegat and Avenue M Pumping Stations that service Canarsie are located in the moderate risk area. These stations provide essential functions in preventing sewer backups but face a threat from both sea-level rise and increased storm severity. While neither station was damaged or lost function during Superstorm Sandy, the Avenue M station is below grade and exposed to potential flooding. Large populations and assets are dependent on the operations of these stations and need them to remain online. The Paerdegat Pumping Station services 130,000 people and a nearby beach, and the Avenue M Pumping Station serves 19,000 people.<sup>3</sup> The NYC Wastewater Resiliency Plan recommends elevating key machinery at the Avenue M station and constructing a barrier around Paerdegat Pumping Station to reduce risk of potential shutdown.

### **Natural and Cultural Assets at Risk**

Natural and cultural assets which are located in the high risk area and heavily exposed to future storm surge include the recreational amenities and parkland along Paerdegat Basin, Fresh Creek, and the Jamaica Bay shoreline. The recent restoration efforts along Paerdegat Basin, which now provide wetland and upland habitat buffers between the basin and adjacent homes, may prove to reduce the exposure of the park and surrounding assets from future storm events. The highest inundation experienced during Superstorm Sandy was at Canarsie Pier along the Jamaica Bay shoreline, with water levels exceeding 9 feet. There is continued risk of flooding along this waterfront during future storms. Canarsie Park and Pier serve as both a natural and recreational buffer between Jamaica Bay and the Community, but the threat of high surge with future storms may result in greater inundation of the inland areas. The Pacplex Sports Recreation and Education Complex is at risk of flooding from the adjacent Paerdegat Basin, and the Fresh Creek Nature Preserve is at risk due to its proximity to the Creek. Many trees in the Preserve were partially uprooted during Superstorm Sandy, contributing to the erosion of the Creek's edge. Space within Canarsie Park is less vulnerable due to the lack of free standing structures, allowing it to return to service faster following a storm.



View of Fresh Creek with the Belt Parkway in the background.

## Needs and Opportunities Assessment

Through the NYRCR Planning Process, the Committee and members of the public identified the Community’s key resiliency needs and opportunities.

Needs are safety and resiliency measures identified by the Community that will help address their critical issues and minimize extreme weather events, rising sea levels, and other impacts associated with climate change. Needs may also demonstrate those elements that will help the Community become more resilient overall if addressed.

Opportunities include important, underutilized assets and existing programs that can be leveraged to reduce risks or address issues.

Together, needs and opportunities inform Canarsie’s strategies and projects throughout the NYRCR process.

Canarsie’s experience during Superstorm Sandy exposed greater levels of vulnerability than previously understood. Residents witnessed the shortcomings of their disaster planning and the inadequacy of existing infrastructure systems, as well as the existing flood maps. The needs that follow reflect this first-hand experience, and demonstrate the steps the Community has identified in order to

be better protected from future events. Other needs aim to build social resilience within the Community, establishing robust networks that can be called upon in emergency situations.

As such, the Community identified several needs that cut across the following recovery support functions: natural and cultural resources, infrastructure, health and social services, housing, economic development, and community planning and capacity building. Residents also identified corollary opportunities that could be used to address these needs, representing untapped potential throughout the Community. In doing so, Canarsie can begin to take action, implementing immediate solutions that will better position the Community to complete its recovery and catalyze a stronger future. Canarsie identified the following needs:

- More resilient water management infrastructure (Infrastructure);
- Resilient power and communications infrastructure (Infrastructure);
- Flood protection from storm surge (Infrastructure, Natural and Cultural Resources);



Staff from NYC Office of Emergency Management supporting residents post Superstorm Sandy. *Courtesy of Canarsie Courier.*

- Greener, safer streets and improved connectivity (Infrastructure, Community Planning and Capacity Building);
- Effective emergency management planning and response (Health and Social Services, Community Planning and Capacity Building);
- Informed and financially stable homeowners (Housing);
- Increased economic vibrancy and recreational amenities (Economic Development).



### More Resilient Water Management

#### Needs

Canarsie needs improved systems of drainage that minimize flooding from heavy rain events and eliminates sewer backup as a common occurrence. On a micro level, most households lack the proper equipment to prevent ongoing sewer backup, such as a backflow prevention valve. Trees also need improved maintenance, including the removal of trees damaged during

Superstorm Sandy. Lack of tree maintenance can lead to sewer blockages when untamed roots damage sewer infrastructure.

Additionally, Canarsie is a predominately car-based neighborhood with substantial non-permeable surfaces—a problem that contributes to poor drainage as these surfaces do not absorb water. Canarsie Pier’s most distinguishing feature, aside from the scenic views of Jamaica Bay, is a large, impermeable 350-space parking lot. Similar, but smaller, impermeable surfaces are replicated throughout the neighborhood, particularly in the retail centers.

#### Opportunities

- Canarsie is graced with large green spaces that separate segments of the residential community from the water that surrounds it. These grand amenities create an opportunity to layer in infrastructure that can improve the drainage of the surrounding areas. Additionally, these areas can be used to create an ecological transition between the residential neighborhood and green spaces, creating clearer connections to the neighborhoods they serve and extending the utility of this infrastructure.
- In June 2014, NYC DPR commenced a tree removal program to remove trees

damaged during Superstorm Sandy. This program deploys trained foresters to survey and identify trees that will need to be cut down and replaced, throughout the inundation zone. NYC DPR is expected to remove and replant 10,000 trees throughout New York City by June 2015.<sup>4</sup>



### Resilient Power and Communications

#### Needs

Power and communications systems are vital assets in the aftermath of a storm. Canarsie needs more resilient systems that can function in emergency situations, including the diversification of power sources. Power infrastructure is vulnerable in this Community and across New York City even in non-storm conditions. The 2003 blackout in which a large portion of the eastern grid went dark, and Superstorm Sandy underscore this need.

Power outages can lead to disruptions in cell phone service, rendering the Community completely non-digital. In the days after Superstorm Sandy, hand-written signs became a common method for communicating important

information throughout New York City. Ensuring that a functional communication system is in place will result in a real-time understanding of what is happening on the ground—allowing resources to get to people in need.

### Opportunities

- Local alternative sources of power (solar photovoltaic cells, wind turbines, and others) are becoming increasingly affordable to implement as they are adopted on a wider scale. Moving from a single source of power for essential services would greatly benefit the Community and increase the resiliency of Canarsie by limiting the downtime of power systems.



### Flood Protection from Storm Surge

#### Needs

As a coastal Community with exposure to the 100-year floodplain, Canarsie needs strengthened flood protection to ensure the safety of at-risk homes and businesses. Raising homes in the neighborhood's floodplain, however, is broadly unfeasible due to the dominant type of attached brick, multi-unit building structures.



The berm along Paerdegat Basin has the potential to protect adjacent homes from future storm surge.

Further, while the Paerdegat Basin berm and Canarsie Park provide a minor level of coastal protection, it is not sufficient to meet the future risk faced by the Community and needs to be strengthened.

Canarsie has not historically been affected by storm surge, but faces increasing risk due to sea-level rise. The projection of stronger and more frequent storms hitting a diminishing

coastline, means that storms, once considered generational events, may now be experienced every 10 or 20 years. As such, a mix of hard and soft infrastructural solutions is required to protect those who live and work along Jamaica Bay and its inlets.

### Opportunities

- The NYC DPR recently restored the green spaces around Paerdegat Basin, including

the construction of a berm on the Canarsie side of the basin. This wide swath of public land provides an opportunity to extend this berm further along the basin.

- A number of opportunities may exist to further the USACE identification of ecosystem restoration opportunities in wetlands, which include Fresh Creek.<sup>5</sup> These may

only have targeted impacts on coastal protection; however, the net effect of stringing together multiple projects can offer a significant reduction in exposure. Marshlands act as sponges that absorb water, specifically helping to provide protection against more common flooding events.



Young people crossing the street show the need for safer pedestrian routes along Williams Avenue.



### Greener, Safer Streets and Improved Connectivity

#### Needs

Some residents have reported feeling unsafe in the neighborhood, stressing the need for improved lighting and safer streets. The need for increased security is highly relevant during states of emergency. Calm prevailed in the wake of Superstorm Sandy, but other examples from around the country have shown how perceptions of disorder can hinder recovery efforts and put the lives of citizens at risk. In these instances, it is important to ensure that the Community’s infrastructure is able to support residents during an emergency.

Adequate lighting is essential to instill feelings of safety and security, both on a regular basis and to aid in recovery efforts. Canarsie needs more lighting, specifically resilient lighting, as existing light sources are dependent on power fed from the grid. After Superstorm Sandy, police were forced to spend time and resources setting up generator-powered lights—a stop-gap measure that can be improved upon.

The desire for safer streets in Canarsie extends

to general pedestrian safety. As a result of the Community's car-based infrastructure, there are many locations throughout the neighborhood where people do not feel safe walking, due to speeding cars and the absence of sidewalks. Unsafe locations include the approach to Canarsie Pier and along 108th Street adjacent to Fresh Creek.

With limited access to the subway, there is a need for diversified transportation options within the Community. The L train stop is a critical hub within the neighborhood and is fed by a network of connecting buses that allow a broader base of residents to use mass transit. Rethinking the transit infrastructure in Canarsie will provide better access to job opportunities, and the Community's retail hubs and parks.

### Opportunities

- The need for safer streets in New York City has been acknowledged by both New York City and New York State governments, and has become a high-priority agenda item representing a major opportunity for the Canarsie Community. New York City's Vision Zero initiative aims to make streets safer for pedestrians, by reducing the speed limit. This goal has been supported by New York State Governor Andrew Cuomo, who signed legislation in



Volunteers passing out supplies after Superstorm Sandy.

August 2014 mandating a 25 mph speed limit within New York City limits.<sup>6</sup>

- The NYC DOT has also been active in the Community through its implementation of the Jamaica Bay Greenway, which requires safer streets so that residents can access this new amenity.

- The last five years have seen the gradual roll-out of Bus Rapid Transit (BRT) systems in New York. In its purest form, BRT occupies the middle ground, as a form of transit between trains and buses, and is designed to create a fast and efficient means of transit without the intensive capital expenditures and permitting necessary

to create new rail lines. It commonly features express boarding procedures, dedicated lanes, and vehicle design that easily identifies these unique City buses. The NYC DOT has targeted Flatlands Avenue in Canarsie as a candidate for phase II of BRT in New York City, as part of a greater Southern Brooklyn East-West Corridor line running from East New York to Sunset Park.<sup>7</sup>



### Effective Emergency Management Planning and Response

#### Needs

In Canarsie, there is a strong sense that better coordination among service providers and government entities is necessary to ensure that the basic needs of residents are being met. Superstorm Sandy laid bare the challenges of emergency response at the community level. In Canarsie, as in many places in New York City, there was an extended period of uncertainty over who was providing which services and where these services could be accessed. The Community needs an integrated emergency preparedness plan and easily recognized

location where food, supplies, medicine, and information will be available in an emergency.

More broadly, the Canarsie Community has expressed a need for more social services and programming, both to strengthen capacity for future storm preparedness and to build the social cohesion and resilience of the Community as a whole. This need is especially great for vulnerable populations, including youth and seniors. There is a strong consensus on the lack of services for young people and concern about their limited opportunities to contribute to the Community's resiliency. In addition, the need for meeting spaces has been continually emphasized by the Committee, with residents citing limited locations for community groups to meet and collaborate.

While Canarsie has access to a number of hospitals and medical service providers just outside the neighborhood boundaries, the Community has voiced a desire for a broader array of services within the Community. Having adequate healthcare resources embedded within at-risk neighborhoods would ease the process of recovery by reducing the time and distance to reach populations in need of care. Some members of the Community are specifically concerned about the lack of services to support mental health.

Canarsie needs secure access to food in order to be a more self-reliant Community. Some grocery stores lost power during Superstorm Sandy and this, along with limited mobility, made it very difficult for residents to get access to food. The area from 88th Street to 93rd Street, north of Flatlands Avenue to Farragut Road, is considered a low-income, low-access food desert by the U.S. Department of Agriculture, meaning that portions of the Community lack easy access to groceries and fresh food.<sup>8</sup> The Community could benefit from education that builds capacity to grow and maintain healthy food.



A typical residential street in Canarsie suffered significant flooding during Superstorm Sandy.

- During the implementation of resiliency projects, there is a great opportunity to enlist members of the Community to play active roles in recovery. Such roles can range from volunteer positions to job training and paid employment, all of which contribute to the capacity of the Community to swiftly respond to and recover from emergency situations. For example, there is an opportunity to augment the existing New York City Community Emergency Response Team (CERT) that is active in Canarsie, by recruiting young people. Post- Superstorm Sandy, there were many able-bodied young people who did not participate in recovery efforts. Connecting these young residents with emergency preparedness organizations prior to disasters could have a profound effect on the resiliency of the Community.

### Opportunities

- Canarsie already is home to a small network of block associations, creating a hyper-local system for coordination, organization, and emergency response. These groups provide a working model that could be replicated throughout the

neighborhood, allowing for quick dissemination of information and supplies. Residents know these places best and can more quickly identify important details during a recovery, such as the location of vulnerable populations.



## Informed and Financially Secure Homeowners

### Needs

In the face of a rapidly changing landscape of flood insurance policies and Federal Emergency Management Agency (FEMA) maps, homeowners need better access to information. Canarsie was hit by consecutive disasters affecting homeowners: the foreclosure crisis in 2008 and Superstorm Sandy in 2012. The effects of the storm exacerbated and magnified the foreclosure crisis since homeowners were saddled with additional financial burdens. Homeowners who were dependent on rental income from basement units or who rented to undocumented residents were not eligible for aid from FEMA or other Federal, State, or City sources. All of these changes and challenges present a need for more information to help homeowners better understand the physical and financial risks they face and the potential programs they can access to mitigate those risks.

### Opportunities

- Many Citywide non-profits are working with local community-based organizations to provide training and individual assistance on housing recovery and resiliency



A damaged basement in Canarsie following Superstorm Sandy. *Courtesy of Canarsie Courier.*

issues. The Canarsie Community seeks greater access to these and other related services that focus on helping homeowners assess the physical and financial risk they face. There may be an opportunity to tap into existing resources and institutional knowledge from organizations running current programs in and near the Planning Area to ensure that those in need

of information and professional assistance receive adequate support.



## Increased Economic Vibrancy and Recreational Amenities

### Needs

Canarsie has a number of commercial corridors, but desires a stronger and more vibrant local economy. Retail is an important element in disaster recovery—it gives residents access to services, restores jobs, and is a signal that the neighborhood is returning to a state of working order and vitality. To help support the overall health of retail businesses and spur growth, improvements to the street infrastructure can highlight the areas' strengths. These range from improving the quality of lighting to adding street furniture and pedestrian plazas, and planting new trees and flower beds. In order to strengthen individual businesses, education is needed about how to make businesses more resilient. This will ensure they are able to play a role in Canarsie's recovery.

### Opportunities

- The Community currently has a big-box store that serves as destination retail (BJ's Wholesale Club) and has the potential to attract visitors and new retail to other commercial areas in Canarsie.
- A stronger retail base can stem from investments in better programmed and activated public spaces. In particular, the Pier and shoreline areas represent significant opportunities, especially as they are the terminus of the retail corridor along Rockaway Parkway. Residents have expressed a variety of ideas related to Canarsie Pier, from short-term solutions that bring more commercial activity to longer-term visions that would improve access to the beach side.
- The Canarsie Merchants Association could be a major asset that helps to coordinate pooled resources to promote a commercially friendly atmosphere.
- With the influx of resiliency projects in the neighborhood, there is an opportunity to ensure that jobs stay within the neighborhood (including electricians to certify power, EMTs, and construction workers). This will help build the local capacity of the Community to respond to their own disasters, as well as provide a source of stable and necessary employment. A similar program, the Conservation Corps, has been underway through the NYC DPR and provides local residents with environmental training and job experience.

# **III. Reconstruction and Resiliency Strategies**



# Reconstruction and Resiliency Strategies

The Canarsie NY Rising Community Reconstruction (NYRCR) Planning Committee (Committee) identified critical issues, needs, and opportunities to inform strategies for enhancing the physical, environmental, social, and economic resiliency of the Canarsie NYRCR Community (Community). Refined through a dialogue with the Community at two of the Public Engagement Events, these strategies address how the Community intends to prepare for the next severe weather or other emergency event, and recover from the impacts of Superstorm Sandy.

The Committee is committed to the NYRCR process and is strongly engaged in addressing the issues that were exacerbated by the storm. Hundreds of residents have provided their feedback, assisting the Committee in shaping these strategies to secure a resilient future alongside Jamaica Bay for generations to come.

The strategies described below outline a comprehensive approach for resilient planning initiatives through the NYRCR Program as well as other ongoing programs and funding sources. These strategies provide the framework for the key Proposed Projects to be funded under the NYRCR Plan, as well as the Featured Projects and Additional Resiliency Recommendations developed by the Community.

Canarsie’s strategies are:

- Reduce vulnerability to coastal flooding and sea-level rise;
- Activate and enhance access along the shoreline ;
- Improve wastewater and stormwater management;
- Build and coordinate local capacity for emergency response ;
- Make homes more physically and financially resilient; and
- Strengthen economic resiliency.

Together, the strategies reflect the Community’s long-term, holistic vision for bolstering and expanding the health, vitality and sustainability of its neighborhood.

## Proposed and Featured Projects

Proposed Projects are projects proposed for funding through a NYRCR Planning Area’s allotment of CDBG-DR funding.

Featured Projects are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program.

Additional Resiliency Recommendations are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

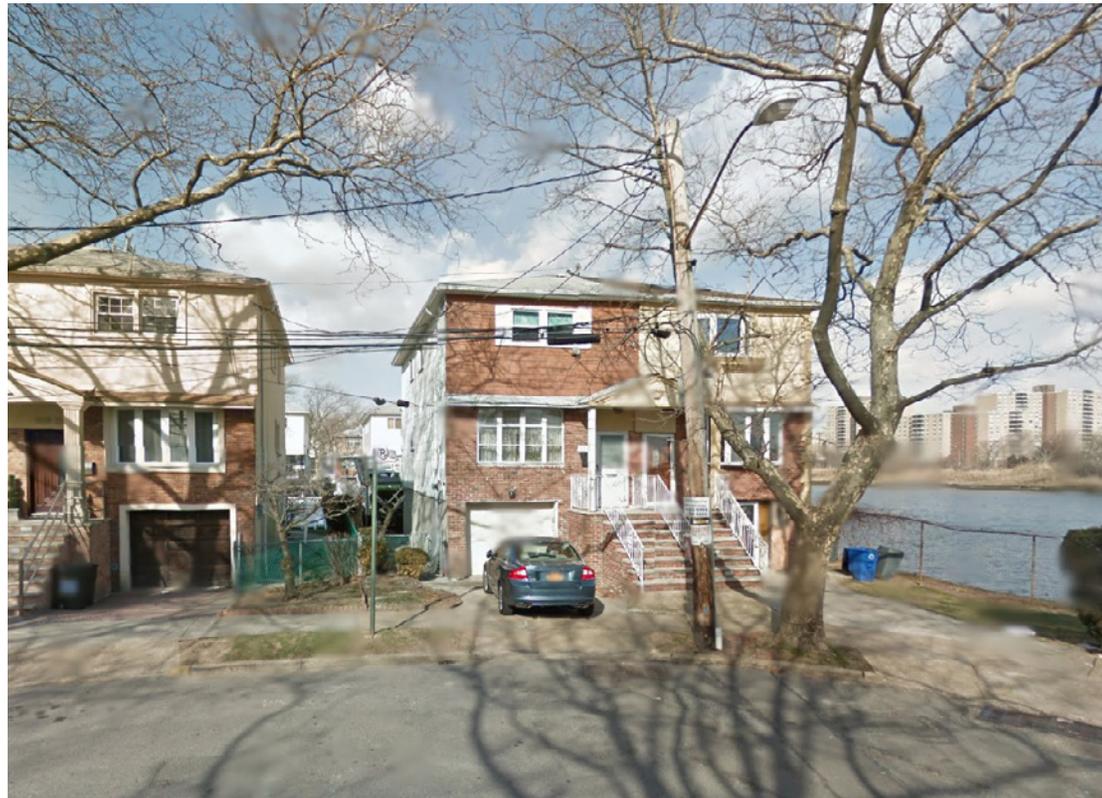


### Reduce Vulnerability to Coastal Flooding and Sea Level Rise

During Superstorm Sandy, inundation from Paerdegat Basin, Fresh Creek, and Jamaica Bay, revealed Canarsie’s exposure to coastal flooding. This low-lying peninsula is projected to experience more frequent and intense flooding from future storm events and gradual ecological hazards such as shoreline erosion caused by sea-level rise. With such risks in mind, the Committee seeks comprehensive, resilient, and sustainable protection from coastal flooding.

Long-term, comprehensive flood resiliency for the Canarsie Community can entail hard infrastructure, to protect the vulnerable areas along the coastline, as well as natural systems, and leverage ongoing efforts to restore habitats and enhance the water quality of Jamaica Bay. Reducing the Community’s vulnerability also requires interventions at different scales. The Committee proposes the following approaches:

- Larger regional approaches that would provide storm-surge protection for communities across Jamaica Bay, including the consideration of a storm-surge barrier across Rockaway Inlet, as recommended in New York City’s A Stronger, More Resilient New York comprehensive plan.



A low-lying area prone to flooding near Fresh Creek.

- More localized, smaller-scale approaches that would provide flood-risk reduction to the Canarsie peninsula. These could include wetland restoration measures such as living shorelines along the Fresh Creek and Canarsie Beach shoreline that

provide protection from 10-year storms, sea-level rise, and erosion.

The Committee recognizes coastal protection efforts are complicated and will take time and significant funding to implement. Further,

**Table III-1: Strategy Table**

<b>STRATEGY: Reduce Vulnerability to Coastal Flooding and Sea Level Rise</b>				
<b>Project Name</b>	<b>Short Description</b>	<b>Project Category</b>	<b>Estimated Cost</b>	<b>Regional (Y/N)</b>
Fresh Creek Coastal Protection	This project would fund a flood wall and adjoining bioswales to capture storm surge and rising waters at the most vulnerable areas along Fresh Creek.	Proposed Project	\$7.7 million	N

because rising waters do not follow community or political boundaries, coastal protection strategies require cooperation and coordination with surrounding neighborhoods and various public and private entities. The Committee recommends focusing on nearer-term localized strategies and leveraging measures that build off of existing assets, while taking advantage of ongoing plans and studies.

The Committee seeks measures that can be enacted in the short-term to address flooding from less-intense storm events and protect the most at-risk areas and vulnerable assets. These measures include green infrastructure projects, particularly measures that provide co-benefits such as habitat creation, water quality improvements, and recreational benefits. For example, Fresh Creek and Canarsie Beach are being studied by the U.S. Army Corps of Engineers for their potential to provide coastal storm damage

reduction benefits as well as ecosystem restoration benefits. Further, Paerdegat Basin, Fresh Creek, and Canarsie Beach were all identified as ecosystem restoration opportunities as part of the Hudson Raritan Estuary Comprehensive Restoration Plan (HRE-CRP). One such project, the Paerdegat Basin Combined Sewer Overflow (CSO) facility, was completed in 2011.



### Activate and Enhance Access Along the Shoreline

The Planning Committee proposes a strategy for redefining the Community’s relationship to the water by activating the shoreline and enhancing its resiliency. This strategy would leverage existing New York City Department of Parks and Recreation (NYC DPR) and National Park Service (NPS) plans to develop projects

that result in a more active and accessible Canarsie shoreline. The areas from Canarsie Pier and Canarsie Beach to Canarsie Park, serve as a natural buffer between Jamaica Bay and the Community. These unique public spaces are an integral part of the neighborhood’s identity and provide access to Jamaica Bay, views of the Canarsie Pol migratory bird habitat, and a respite from the urban environment of the upland Community. Activating and

enhancing access to Canarsie Pier and the shorelines is critical to cultivating a healthy, vibrant, and resilient community and provide visitors with access to nearby businesses.

To this end, the Committee seeks additional programming in the short-term and capital improvements in the long-term to enhance existing conditions of Canarsie Pier. The Pier is an important gathering space for the Community and can be improved through a series of low-cost interventions. Recreational programming can be broadened to reflect the NPS’s General Management Plan (GMP) and seasonal commercial or community uses can be expanded to make the Pier a more desirable meeting place.

The Community identified restoration and access improvements that would capitalize on existing plans and tie into their long-term goals. These plans can be combined with urban design strategies and resiliency considerations for the shoreline, ensuring that Canarsie Pier and adjacent shorelines are resilient to future storms and are safely accessible. Relevant plans include:

- The HRE-CRP’s identification for wetland restoration along Canarsie Beach;
- The NYC DPR’s preliminary plans to create bicycle and pedestrian access between



The underutilized walking path along Fresh Creek warrants activation and enhancement.

**Table III-2: Strategy Table**

<b>STRATEGY: Activate and Enhance Access Along the Shoreline</b>				
<b>Project Name</b>	<b>Short Description</b>	<b>Project Category</b>	<b>Estimated Cost</b>	<b>Regional (Y/N)</b>
Canarsie Pier Access Improvements	This project would fund safety improvements to the Belt Parkway underpass and roundabout to improve and encourage pedestrian and cyclist access between Canarsie Pier and the Canarsie Community.	Proposed Project	\$2 million	N
Canarsie Youth Environmental Education Program	This project would fund the development of an environmental education program for youth in Canarsie to learn about Jamaica Bay and adjacent waterways.	Proposed Project	\$100,000	N
Fresh Creek Long-Term Restoration & Resiliency	This project proposes a comprehensive plan for the length of Fresh Creek incorporating green infrastructure, improved access, and public amenities.	Featured Project	\$52 million	N
Canarsie Pier and Beach Community Enhancements	This project would upgrade the facilities at Canarsie Pier to create a waterfront destination that better serves visitors and local residents.	Featured Project	\$32.7 million	N

Canarsie Park and the Community’s shorelines; and

- The NPS’s recommended GMP, which emphasizes Canarsie Pier as an orientation portal to Jamaica Bay with improved recreational areas and access along the Jamaica Bay Greenway.

In addition to leveraging existing plans for shoreline access, the Committee has proposed other accessibility improvements along Fresh Creek and Paerdegat Basin. Already, Paerdegat Basin is home to the frequently used Sebago Canoe Club, which is considered a successful use of the Canarsie waterfront. Similar programming and community access will create new

educational opportunities, allowing residents to interact with the natural assets around them. In addition, the Community would like to improve the condition of the waterfront by removing dead trees and replacing them with salt-water resistant species that are less likely to interfere with storm and wastewater infrastructure.



### Improve Wastewater and Stormwater Management

To reduce physical and financial vulnerabilities caused by frequent flooding, Canarsie could greatly benefit from improving the infrastructure systems that manage wastewater and stormwater within the Planning Area. Canarsie's water management systems are interconnected and highly dependent on larger gray

and green infrastructure throughout Brooklyn and Queens. Large-scale strategies to address the entire system are complex, unlikely to happen at the full neighborhood scale, and require significant support from the City of New York. As such, the Community proposes prioritizing short-term strategies that would mitigate flooding in the most at-risk areas, as well as actively coordinating with the City to improve these systems over the long-term.

Appropriate government entities could strategically study and evaluate the issues across Canarsie and generate a wide-ranging strategy to significantly reduce the Community's recurring flooding issues. To complement the City's larger strategy, the Planning Committee prioritizes targeted measures to address specific areas within the Planning Area that are most vulnerable to sewer backup and street flooding



Bioswales, an effective green infrastructure solution, would increase stormwater capture. *alabaster crow photographic*<sup>1</sup>

**Table III–3: Strategy Table**

<b>STRATEGY: Improve Wastewater and Stormwater Management</b>				
<b>Project Name</b>	<b>Short Description</b>	<b>Project Category</b>	<b>Estimated Cost</b>	<b>Regional (Y/N)</b>
Canarsie and Southeast Brooklyn Waterfront Stormwater Study and Pilot Projects	This two-phase project would fund a study to examine the feasibility, costs, and benefits of various stormwater capture and retention projects in the NYRCR Canarsie and Southeast Brooklyn Waterfront NYRCR Planning Areas. The Proposed Project would also implement recommended scalable pilot projects within both Planning Areas.	Proposed Project	\$650,000	Y

while also providing relief to an overburdened sewer system wherever possible.

The Community seeks to:

- Increase stormwater capture (detention or retention) before it enters the sewer system to reduce the volume of water entering the storm sewer system and reduce the volume of stormwater that may be infiltrating the wastewater sewer system during flood events;
- Decrease or prevent the backflow of sewer water into homes; and
- Prevent street flooding and other runoff from entering buildings.

Targeted improvements, such as the installation of check valves in residences to regulate water flow, could address storm- and wastewater sewer backup into homes and onto streets. Measures to reduce stormwater flooding and backup include diverting and capturing stormwater before it enters the sewer or flows to low points in the Planning Area. Other, more localized stormwater management measures (e.g., rain barrels, permeable paving, and storage tanks) and green infrastructure (e.g., bioswales and wetlands) can be installed in public open spaces and on individual properties to capture stormwater before it enters the system. In addition, ongoing New York City Department of Environmental Protection (NYC DEP) green infrastructure programs and projects can be leveraged to supplement NY Rising funding.



### Build and Coordinate Local Capacity for Emergency Response

Emergency response initiatives that are specific to Canarsie have the capacity to provide the Community with a more targeted recovery after a storm event. This approach makes the Community less dependent on outside help. While the strategy would benefit all of Canarsie, it has important implications for vulnerable populations, such as those who are low-income, physically or mentally impaired, or otherwise limited in their ability to quickly act in a disaster, such as seniors.

In the short-term, the Committee proposes leveraging existing assets, both physical (such as a recreational center or other large space that could be used as a gathering space) and social, (such as the growing number of block associations). These assets would provide a readily accessible network that can serve important day-to-day functions and can be called upon to aid during an emergency. This may require retrofitting or constructing a new physical space, where educational programming and training could take place.

Safety is critical during emergency response operations. In order for residents and volunteers to freely cooperate during relief efforts,



Food and supplies being distributed to residents of Canarsie.

they must feel secure. The Committee has proposed several strategies that would enhance the sense of security after an emergency. For example, an increase in block associations can strengthen community networks and improve safety, helping to provide additional eyes on the street and act as a deterrent to crime. Also, increased lighting, including resilient street lights powered by solar energy, would improve

safety, with the added benefit of being able to function during recovery efforts.

Power outages experienced in Canarsie during Superstorm Sandy varied in duration and location, disrupting residents' access to basic resources, key facilities, communication systems, and hindering overall recovery efforts. This proposed strategy expresses the

**Table III-4: Strategy Table**

<b>STRATEGY: Build and Coordinate Local Capacity for Emergency Response</b>				
<b>Project Name</b>	<b>Short Description</b>	<b>Project Category</b>	<b>Estimated Cost</b>	<b>Regional (Y/N)</b>
Recovery Community Center	This project would establish a Recovery Community Center with resilient lighting and power, the ability to distribute supplies, coordinate efforts with government agencies, and host trainings and capacity building initiatives.	Proposed Project	\$1 million	N
Critical Facility Upgrades Program	This project would fund resilient retrofits for health and social service providers in Canarsie to ensure continuity of critical services. The organizations would also be required to commit to providing assistance with recovery efforts after an emergency event.	Proposed Project	\$500,000	N
Canarsie Corps Program	This project would establish a Canarsie Corps summer youth employment program to support resiliency and other community projects in Canarsie.	Proposed Project	\$150,000	N

need for diversified power infrastructure in the Community for key facilities, and highlights the need for alternative sources of energy to ensure a redundant and resilient power supply during emergencies.

The majority of power outages in the Planning Area were caused by high winds and downed trees damaging overhead wires. To protect

against this in the long-term requires greater protection of overhead service lines through tree maintenance, and other methods of hardening and reinforcing power lines.

In the short-term, strengthening individual building equipment and creating opportunities for backup and alternative forms of energy can benefit the Community. Measures to protect

individual systems could include raising electrical equipment above the base flood elevation and hardening equipment to withstand flooding. Permanent standby generators located on key Community assets (for instance, gas stations) would provide a source of power that allows the facility to continue operations in the event of a larger grid failure. Alternative forms of energy generation, including solar and wind,



Engine Company 257 is centrally located in Canarsie.

could feed into the existing grid, yet could also function independently if the larger grid is compromised. Solar panels, for example, may be installed on the roofs of critical buildings or atop streetlights to ensure these key resources can remain functional during emergency events. By incorporating power strategies into multiple projects, the Community ensures a greater diversity of energy that creates redundancy and resiliency of the power system.

In addition, the Committee seeks to increase the availability of mental health services in the Community in order to aid residents who experienced trauma from past events and have trepidation about future emergencies. While the New York City Department of Mental Health and Hygiene runs a City-wide outreach program through local agencies, Project Hope, many Canarsie residents did not take advantage of the program.



Hebrew Educational Society aided with recovery efforts post-Superstorm Sandy. *Courtesy of Canarsie Courier.*



### **Make Homes More Physically and Financially Resilient**

In order to address the wide range of issues confronting homeowners in Canarsie, a number of short-term initiatives have been proposed by the Committee. Topics include education and guidance on flood insurance, how building damage is assessed, and individual housing level flood mitigations, such as the installation of check valves. Canarsie residents have continually underscored the need for a one-stop shop for information and services. The Committee recognizes the current work being undertaken by non-profit organizations, such as CAMBA, Neighborhood Housing Services, and the Bridge Street Development Corporation, throughout Central Brooklyn that could provide a good model for a similar program for homeowners in the floodplain. An expansion of existing outreach efforts will help to improve utilization of these programs, as Canarsie residents feel that not all targeted populations are currently being reached.

Prior to the reassessment of New York City's flood insurance rate maps (FIRMs), Canarsie was almost entirely out of the floodplain, a condition that is likely to change in the final FIRMs released by the Federal Emergency Management Agency expected in 2016. This



Although most homes in Canarsie are brick attached, detached clapboard homes are also present and require unique interventions.

underscores the importance of housing programs that address flood insurance regulations. Homeowner education is essential to helping residents understand how they can reduce their exposure to financial and physical risks.

**Table III-5: Strategy Table**

<b>STRATEGY: Make Homes More Physically and Financially Resilient</b>				
<b>Project Name</b>	<b>Short Description</b>	<b>Project Category</b>	<b>Estimated Cost</b>	<b>Regional (Y/N)</b>
Homeowner Audit and Grant Program	This project would provide technical assistance and financial tools to low and moderate income single- and multi-family homeowners who want to retrofit their homes so they can mitigate future flood risk.	Proposed Project	\$1.5 million	N



Images depicting both multi-family and single family homes.



## Strengthen Economic Resiliency

The resiliency of businesses in Canarsie is important to the Committee, and this plan includes both short and long-term approaches that would strengthen the local economy. This strategy comprises a mix of short and long-term approaches, from the more immediate programs that will train and put to work Canarsie's youth, to a longer-term vision of restoring the retail corridors to the center of social life and commerce within the Community.

In the short-term, the Community can undertake a series of initiatives that will help support individual job growth and promote a greater entrepreneurial spirit within the Community. The public and Committee members emphasized the need for youth access to jobs in Canarsie. It is important that the investment made through the NYRCR program leads to the creation of jobs for the residents of Canarsie.

In the long-term, the Committee has a vision of fostering vibrant retail corridors along Rockaway Parkway, Avenue L, and Flatlands Avenue. These corridors already have the benefit of being located outside the floodplain, allowing them to play a greater role in recovery efforts following an emergency. These commercial centers have a long history of serving as



Strengthening commercial corridors in Canarsie, including Avenue L, is central to Canarsie's long-term vision.

the vital social core of Canarsie and in recent decades have deteriorated.

Commercial streets, such as Avenue L have been a center for small retail for well over half a century, transforming from movie houses and soda shops to Caribbean bakeries and restaurants. These streets can be activated once again by increasing the presence of local businesses. Healthy centers of small,

neighborhood commerce have been shown to have greater effects on the local economy than car-oriented big-box retail.<sup>2</sup> The Committee has proposed initiatives that will help to analyze and understand the dynamics of the local market, in an effort to improve the overall conditions of Canarsie's economy, with the goal of filling in gaps along retail corridors to restore these thoroughfares as the heart of Canarsie. This will encompass developing ways the Community

**Table III–6: Strategy Table**

STRATEGY: Strengthen Economic Resiliency				
Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Resiliency Workforce Development	A Resiliency Workforce Development project would train and connect local residents with sustainable job opportunities while simultaneously building a Community that can more effectively recover from future events.	Proposed Project	\$1 million	N
Resilient Streetscaping	This project would fund capital improvements along Avenue L and Rockaway Parkway that help to strengthen the economic viability of local businesses and provide support to residents during and after future disasters.	Proposed Project	\$3 million	N

can better capture the broader base of consumers who shop in the region, ensuring sufficient access and parking.

Finally, over the long-term, the Community seeks to provide better connections between residents and the economic resources in the area, including job opportunities and commercial corridors. Over 10% of Canarsie’s residents work in Downtown Brooklyn, a commute by public transportation that takes close to an hour each way. Within the neighborhood, there are limited public transit options that allow for access to local businesses. For example, a bus line does not currently run along Avenue L, one

of Canarsie’s most active shopping districts. Improving connections at borough-wide and neighborhood-wide scales will lead to a more readily accessible neighborhood, and a stronger local economy making it easier for its residents to enjoy its greatest assets.



Residents and visitors can buy an assortment of seasonal goods at the Brooklyn Terminal Market.

# **IV. Implementation—Project Profiles**



## Projects Overview

This section describes the Proposed and Featured projects identified by the Canarsie NYRCR Planning Committee with input from the Canarsie NYRCR Community. Each project description includes a summary of the potential costs and benefits that would result from each project if funded. In addition to preliminary cost estimates, the Project Profiles discuss the projects' potential benefits:

- Health and social benefits;
- Economic benefits, including potential job creation;
- Environmental benefits; and
- Ability to reduce future risk.

Finally, the descriptions include relevant implementation factors, including the likely timeline and the governmental jurisdiction for implementation of each project.



A path within the Fresh Creek Nature Preserve.

# Project List

**IV-4**  
Fresh Creek Coastal Protection



**IV-10**  
Fresh Creek Long-Term Restoration & Resiliency



**IV-16**  
Canarsie Pier Access Improvements



**IV-22**  
Canarsie Pier and Beach Community Enhancements



**IV-28**  
Canarsie Youth and Environmental Education Program



**IV-32**  
Canarsie and Southeast Brooklyn Waterfront Stormwater Study and Pilot Projects



**IV-38**  
Recovery Community Center



**IV-44**  
Critical Facility Upgrades Program



**IV-48**  
Canarsie Corps Program



**IV-52**  
Homeowner Audit and Grant Program



**IV-56**  
Resiliency Workforce Development



**IV-60**  
Resilient Streetscaping



# Fresh Creek Coastal Protection

## Proposed Project

### STRATEGY

**Reduce Vulnerability to Coastal Flooding and Sea Level Rise**

### Recovery Support Functions



Infrastructure



Natural & Cultural Resources

### Cost

**\$7.7 MILLION**

### Timeline (in years)



**This project would fund a flood wall and adjoining bioswales to capture storm surge and rising waters at the most vulnerable areas along Fresh Creek.**

## Project Description

The shoreline along Fresh Creek (the Creek) is vulnerable to flooding from events like Superstorm Sandy, more frequent storm events, and in some locations, tidal flooding and permanent inundation from sea-level rise. It has also long been a priority for ecosystem restoration and water quality enhancement for New York State and the City of New York. This project would address the most at-risk sections of the Creek’s shoreline by proposing strategic flood protection measures to reduce flood risk from sea-level rise and 10-year storm events,<sup>1</sup> while remaining compatible with ongoing and long-term ecosystem restoration and recreational plans for the Creek. Many of these low-lying areas also experience frequent flooding from heavy rain events, which are anticipated to increase in intensity and frequency with climate change.

Proposed measures include shoreline stabilization and edge elevation paired with stormwater management measures (such as bioswales or rain gardens) that are compatible

with long-term plans for ecosystem restoration and enhanced community access along the Creek. Identified critical locations and interventions would include:

- Elevated Edge at Shore Gardens (near Avenue J): Protection measures at this section would include an elevated edge—a low wall (approximately 2.5 feet high)—to prevent flooding. Flood protection would be more effective if coupled with an ecologically enhanced revetment or living shoreline, as proposed in the Fresh Creek Long-Term Restoration & Resiliency Featured Project, to address erosion and enhance habitat along this currently degraded shoreline edge.
- Elevated Edge and Rain Gardens at Avenue K and Avenue L: Protection measures at this section would include a low wall (approximately 18 inches) to prevent coastal flooding accompanied by a bioswale or rain garden along 108th Street to capture stormwater from heavy rain events.

**Figure IV-1: Area and Levels of Protection**



NY Rising Community Reconstruction Program  
Canarsie Planning Area

 Planning Area

**Surge Protection**

 Flood Wall

**Level of Protection**

 Approx. 7 ft storm surge  
(approx. 10 year storm, SLR)

 Approx. Area of Protection  
(approx. 10 year storm event, SLR)

- Elevated Edge at Shoreline Gardens (near Avenues M and N): Protection measures at this section would include a raised edge to prevent inland flooding of low-lying yards. The design of this section would be more effective if coupled with a living shoreline to reduce erosion as proposed in the Fresh Creek Long-Term Restoration & Resiliency Featured Project.

Though some of these sections include drainage considerations in their initial design, all three sections would require a thorough stormwater management analysis to ensure that coastal protection measures do not exacerbate drainage concerns.

While this project focuses on the reduction of tidal and stormwater flood risk, it is compatible with future potential phases detailed in the Fresh Creek Long-Term Restoration & Resiliency Featured Project, which would include tidal marsh and upland habitat restoration, public access with recreational and educational programs, and bicycle/pedestrian access improvements. This project would also be compatible with ongoing and planned projects by New York City agencies, including New York City Department of Parks and Recreation (NYC DPR), the New York City Department of Environmental Protection (NYC



A low-lying area at risk of flooding from Fresh Creek.

DEP), and the New York City Department of Transportation (NYC DOT). It is anticipated that Federal, State, and City agencies may oversee implementation of future phases of the project through other resiliency, restoration, and recreation efforts in Jamaica Bay.

### **Cost Estimate \$7.7 MILLION**

The anticipated capital construction costs for the project components described are as follows:

- Shore Gardens: \$1.2 million
- Avenue K and Avenue L: \$4.6 million
- Shoreline Gardens: \$1.9 million

This is a conceptual level cost estimate based on a preliminary design of the features described. Potential cost increases may result if any fill being moved is contaminated or if drainage improvements required to channel water to the stormwater capture area are more extensive than anticipated. Additional consideration should be given to ongoing maintenance costs of this project upon implementation.

### **Benefit/Co-Benefits**

#### **Environmental Benefits**

The drainage components of this project, such as rain gardens, would increase water quality in Fresh Creek by capturing and filtering stormwater runoff and its associated pollutants from the adjacent roadway before it travels into the Creek. Rain gardens would provide some habitat benefits as well, particularly if planted with native plantings.

#### **Health and Social Benefits**

This coastal protection project would benefit the mental health and safety of those residents who reside along the Fresh Creek shoreline.

Many community members have expressed concern over the visibly rising waters along 108th Street, which in turn cause degradation of the shoreline. By mitigating against sea-level rise, this project would ease these concerns and benefit the social fabric of the Creek's residential community, some of whom have questioned whether the Creek's upland area is sustainable as a residential land use.

#### **Economic Benefits**

The flood wall and bioswales will protect adjacent homes from flooding leading to preservation of property values and overall beautification of the neighborhood. It is estimated that this project would create 11 full-time equivalent construction jobs over the course of the project.<sup>2</sup>

#### **Cost-Benefit Analysis**

The proposed interventions would prevent permanent tidal inundation of approximately 17.5 acres of land, including 300 buildings and more than 3,000 linear feet of city streets if designed to the appropriate height. The anticipated flooding would not occur over a finite timeframe but through regular tidal inundation due to sea-level rise, resulting in a total loss of these assets or the need for physical elevation of both the buildings and roadway. Additionally, the construction of a rain garden could offset

or delay the need for other drainage improvements, including the potential replacement of sewer pipes to increase stormwater capacity, reducing the need for additional capital investments or maintenance costs for the sewer system.

The water-quality benefits provided by rain gardens are also a priority for New York State and the City of New York. The current waterbody and watershed plan for Jamaica Bay and its tributaries includes \$31 million worth of improvements within the Creek's watershed, enhancing water quality. While not directly included in the project cost, this project could be implemented in conjunction with bike and pedestrian improvements already being proposed for 108th Street by NYC DOT, potentially enhancing the aesthetic quality of these improvements and expediting their implementation. Although not all costs and benefits of the project are quantifiable at this phase, benefits are anticipated to be valued well beyond the \$7.7 million investment proposed for this project.

#### **Anticipated Risk Reduction**

Coastal protection would provide significant long-term flood risk reduction by reducing the area's exposure to flooding from high tides and heavy rain events. This project is designed to prevent coastal flooding to an elevation of



An example of the eroded, unprotected edge along Fresh Creek.

approximately 7 feet, which coincides with at least a 10-year storm event today or 32 inches of sea-level rise (the New York Panel on Climate Change’s current conservative estimate for sea-level rise by 2050). Without these interventions, 17.5 acres of land, including 300 buildings and more than 3,000 linear feet of city streets are at risk of inundation at high tide by 2050 or during a 10-year storm event. The coastal protection this project provides would reduce the risk score for four highly valued community assets, including the Lakeside/Parkshore Adult Health Care Center, a gas station on 108th Street, the

Fresh Creek nature preserve, and the homes within the high risk area along the Fresh Creek shoreline. While the cheek wall would reduce the risk of flooding from a 10-year storm event and sea-level rise, residual risk remains. For example, buildings along the shoreline would still be at risk from flooding during a 100- or 500-year storm event despite the inclusion of a flood wall. This project is not meant to entirely eliminate risk from coastal flooding, but rather to reduce risk of flooding from more frequent storm events.

In addition, while the area and number of properties affected by stormwater flooding after heavy rain events cannot be as accurately calculated, the Canarsie NYRCR Community (Community) has reported regular flooding at the intersections of Avenues K and L. The rain gardens proposed within this project would mitigate risk of streetflooding along 108th Street, although risk of flooding west of 108th Street would remain unchanged.

### **Timeframe**

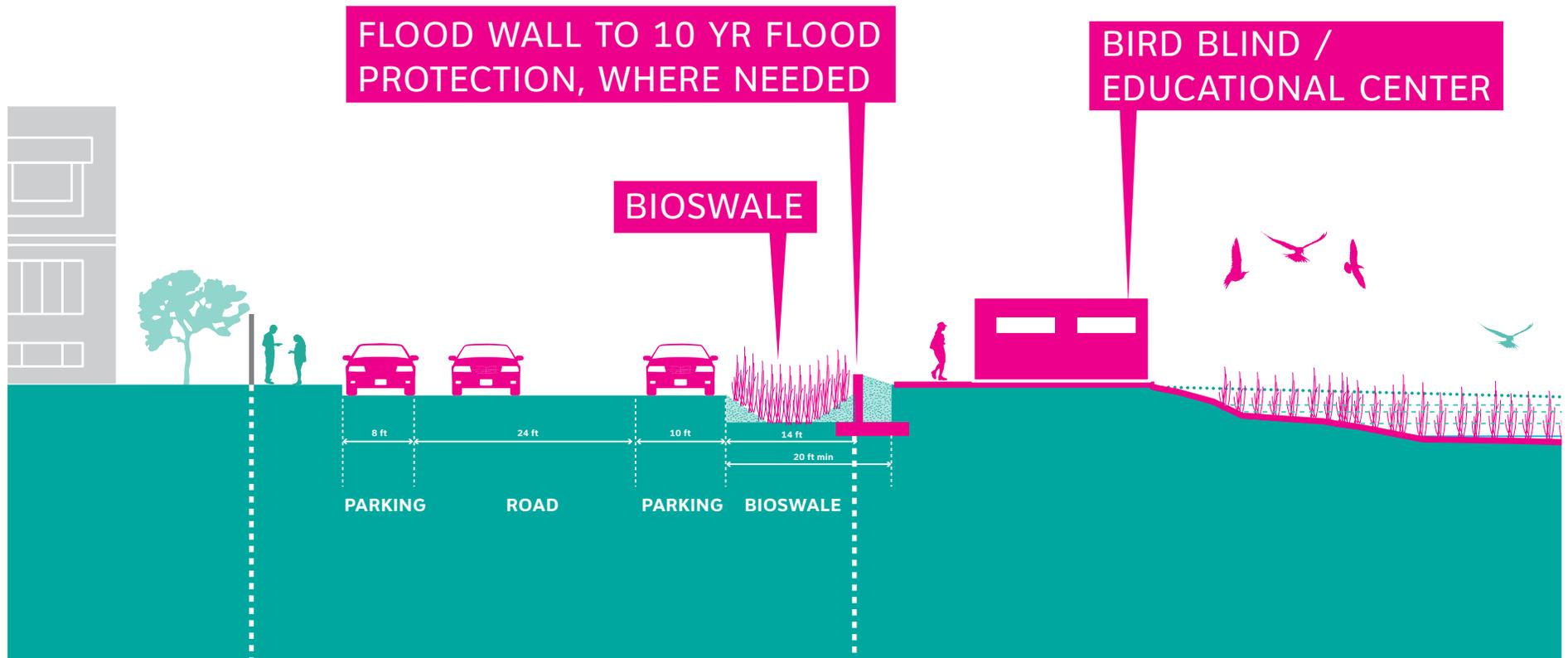
Once an implementing agency is identified, the initial study and plan of this project is anticipated to take 1 year to complete. Phases constructed thereafter are anticipated to take 1 to 2 years to build. In total, it is anticipated that this project would take 2 to 3 years to complete.

### **Regulatory Requirements**

This project would require the full support of NYC DPR. The implementing agency would follow regulatory guidelines as required by various Federal and New York State and City agencies, including the NY State Department of Environmental Conservation and the National Park Service.

### **Jurisdiction**

The identified project falls within the jurisdiction of New York City.



Proposed location of the flood wall and bioswale along the length of Fresh Creek.

# Fresh Creek Long-Term Restoration & Resiliency

## Featured Project

### STRATEGY

**Activate and Enhance Access Along the Shoreline**

### Recovery Support Functions



Infrastructure

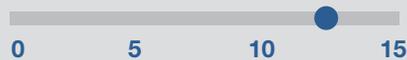


Natural & Cultural Resources

### Cost

**\$52 MILLION**

### Timeline (in years)



**This project proposes a comprehensive plan for the length of Fresh Creek, incorporating green infrastructure, improved access, and public amenities.**

## Project Description

Fresh Creek (the Creek) served as an entry point for floodwaters during Superstorm Sandy and remains at risk from sea-level rise, while also suffering from erosion, degraded habitats, and inaccessibility to the public. This project seeks to strengthen not only the resiliency of the Creek, but its long-term sustainability as well. Building upon the flood-risk reduction measures proposed by the Canarsie NYRCR Planning Committee (Committee), as well as opportunities for habitat ecosystem restoration identified by the U.S. Army Corps of Engineers (USACE) and the New York City Department of Parks and Recreation (NYC DPR), the Creek presents a powerful opportunity to combine habitat enhancement, flood-risk reduction, and waterfront access. The Committee has identified a series of planning efforts surrounding the Creek that, if coordinated and comprehensively developed, would contribute not only to flood-risk reduction but to the quality of ecosystems and the Canarsie NYRCR Community's (Community) quality of life.

This project proposes a comprehensive community resiliency and restoration plan for Fresh Creek, comprising a series of projects currently under consideration by USACE, such as the Hudson Raritan Estuary Comprehensive Restoration Plan (HRE-CRP) and Jamaica Bay Feasibility Study, both of which identify the Creek as a potential ecological restoration opportunity. The Committee wishes to provide input and guidance to ensure that these efforts achieve flood-risk reduction, resilience, restoration, and community access goals for the Creek.

Elements for a comprehensive community resilience plan for Fresh Creek would include the following, with sections described for the Creek's overall shoreline:

- **North Access:** This section would include public-access improvements and wetland restoration and reforestation of the Creek from Flatlands Avenue to the shoreline. Recommended improvements would include waterfront access, a pier, picnic



Proposed improvements to Fresh Creek would protect nearby homes and make the Nature Preserve more accessible.

areas, and other amenities. Restoration recommendations would include the creation of a coastal and maritime forest as well as the construction and/or restoration of high- and low-marsh habitats.

- Shore Gardens Living Shoreline (near Avenue J): This section would include the build out of a living shoreline, which would complement the low wall proposed in the Fresh Creek Coastal Protection Project to ensure fully realized opportunities for ecosystem enhancement.
- Avenue K and Avenue L Living Shoreline and Rain Gardens: This section would build on the low wall and rain garden proposed in the Fresh Creek Coastal Protection Project and include tidal marsh and upland habitat restoration, as well as enhanced public access with recreational and educational programs, overlooks, and public space amenities.
- Shoreline Gardens Living Shorelines and Street Ends (near Avenues N and M): Adding to the elevated shorelines proposed in the Fresh Creek Comprehensive Coastal Protection Project, this section would further enhance the shoreline to include living shorelines to reduce erosion

and create new habitats. This section would also include enhancements to street ends to improve the Community’s visual and physical access to the waterfront.

- Seaview Pier Access and Improvements: This section would include improved access and amenities, including an overlook and picnic area as well as restoration of coastal and maritime forest.
- Bicycle and Pedestrian Access and Safety Improvements: All of the above sections would include the design and construction of a mixed-use trail or two-way bike path and pedestrian path along 108th Street similar to those envisioned by New York City Department of Transportation (NYC DOT), wherever appropriate.

### **Cost Estimate**

#### **\$52 MILLION**

The anticipated capital construction costs for the project components described are as follows:

- North Access: \$29.4 million;
- Shore Gardens: \$2.4 million;
- Avenues K and L: \$16.3 million;

- Shoreline Gardens: \$3 million; and
- Seaview Pier: \$300,000.

This is a conceptual-level cost estimate based on a preliminary design of the features described. They will likely vary as the project is further developed and refined. As the design may alter, this estimate does not consider all design aspects of this project.

### **Benefit/Co-Benefits**

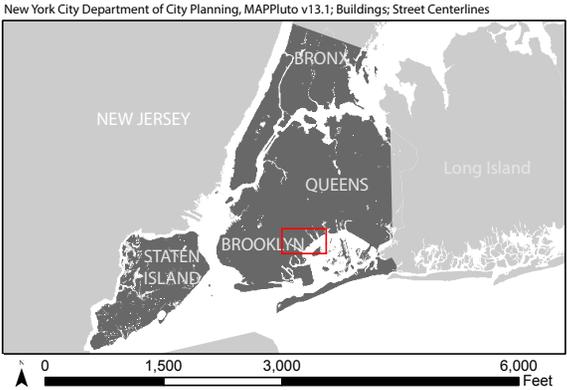
#### **Environmental Benefits**

The Creek and its shorelines are part of NYC DPR’s Fresh Creek Preserve, a “Forever Wild” site proposed for restoration as part of the HRE-CRP Jamaica Bay Feasibility Study. Most of the Preserve is open water and much of the Creek’s shoreline is lined with marshland. Ecological problems identified in past studies include poor marine habitats, fill deposited on historic wetlands, extensive areas of non-native invasive plant species, and poor water quality at the head of the Creek. By coupling shoreline stabilization with marsh and other habitat restoration, the project would improve habitats and enhance ecosystem services, addressing many of the ecological and environmental challenges the Creek faces.

Figure IV-2: Diagram Showing Public Access Points and Enhancements



- NYC Department of Parks and Recreation
- National Parks Service
- NYC Housing Authority
- Existing wetlands
- Shoreline access opportunities
- Ecologically enhanced revetment
- Wetland restoration opportunities
- Enhance park
- Street end gardens
- Greenway expansion





Current conditions along Fresh Creek do not allow for safe pedestrian access.

### **Health and Social Benefits**

This project would provide the Community with access, amenities, and activity along the most inaccessible of the three shorelines in Canarsie. Opportunities for waterfront access along the Creek are limited and in some cases even dangerous. By enhancing and activating the Creek's shoreline, this project would revive

a critical natural asset, restoring it as a source of community pride and adding to the value of the properties along its banks.

### **Cost-Benefit Analysis**

While this is a potentially high-cost project, it would provide wide-ranging benefits for the Community. This project would take advantage

of plans in-progress for the Creek and adjacent areas. Given that the HRE-CRP assesses coastal restoration along the Creek to cost an estimated \$31 million, the added benefit of augmenting that restoration to include community access and activation enhancements on an underdeveloped and underutilized natural asset may justify the added cost.

### **Anticipated Risk Reduction**

While the Creek was a major entry point for floodwaters during Superstorm Sandy, it is also a source of inundation during more frequent storm events. With sea-level rise, segments of the shoreline may be at risk from future flooding during high tides. Stabilizing the water's edge through the construction of living shorelines and wetlands, combined with the addition of flood walls, bulkheads and/or berms where needed, would reduce the risk of habitual and storm-related flooding. Similar to the Fresh Creek Coastal Protection Project, the measures proposed in this project would reduce the risk score for four highly valued community assets (the Lakeside/Parkshore Adult Health Care Center, a gas station on 108th Street, the Fresh Creek nature preserve, and the homes within the high risk area along the Fresh Creek shoreline) while also reducing the risk of erosion and promoting the health of the Creek's shoreline. Residual risk remains from coastal flooding for

more infrequent (100- and 500-year) storms, as well as the continued risk of erosion along the Creek's shoreline should its general health and stability not be maintained in the future.

### **Timeframe**

Once an implementing agency is identified, the initial study and full implementation of this project is anticipated to take more than 10 years to complete and is dependent on partner agencies.

### **Regulatory Requirements**

This project would require the full support of NYC DPR. The implementing agency would follow regulatory guidelines as required by various Federal and New York State and City agencies.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Canarsie Pier Access Improvements

## Proposed Project

### STRATEGY

**Activate and Enhance Access Along the Shoreline**

### Recovery Support Functions



Infrastructure



Economic Development

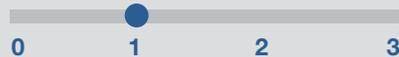


Natural & Cultural Resources

### Cost

**\$2 MILLION**

### Timeline (in years)



**This project would fund safety improvements to the Belt Parkway underpass and roundabout to improve and encourage pedestrian and cyclist access between Canarsie Pier and the Canarsie Community.**

## Project Description

Superstorm Sandy damaged many roadways in Canarsie and the ensuing power loss caused safety concerns for residents crossing unlit streets.

Canarsie Pier is an important social hub within the Canarsie NYRCR Community (Community). Residents spend much of their free time enjoying this beautiful community asset, whether fishing, picnicking or socializing with friends and family. While serviced by bus, access to Canarsie Pier remains car-based with unsafe pedestrian, cyclist, and driver conditions, especially along the Belt Parkway underpass and roundabout. A primary route for accessing a key asset of Canarsie, three collision-related injuries occurred along the roundabout in September 2014 alone.<sup>3</sup> This project would redesign this section of Rockaway Parkway to improve safety for all users while also providing upgraded pedestrian and cyclist amenities.

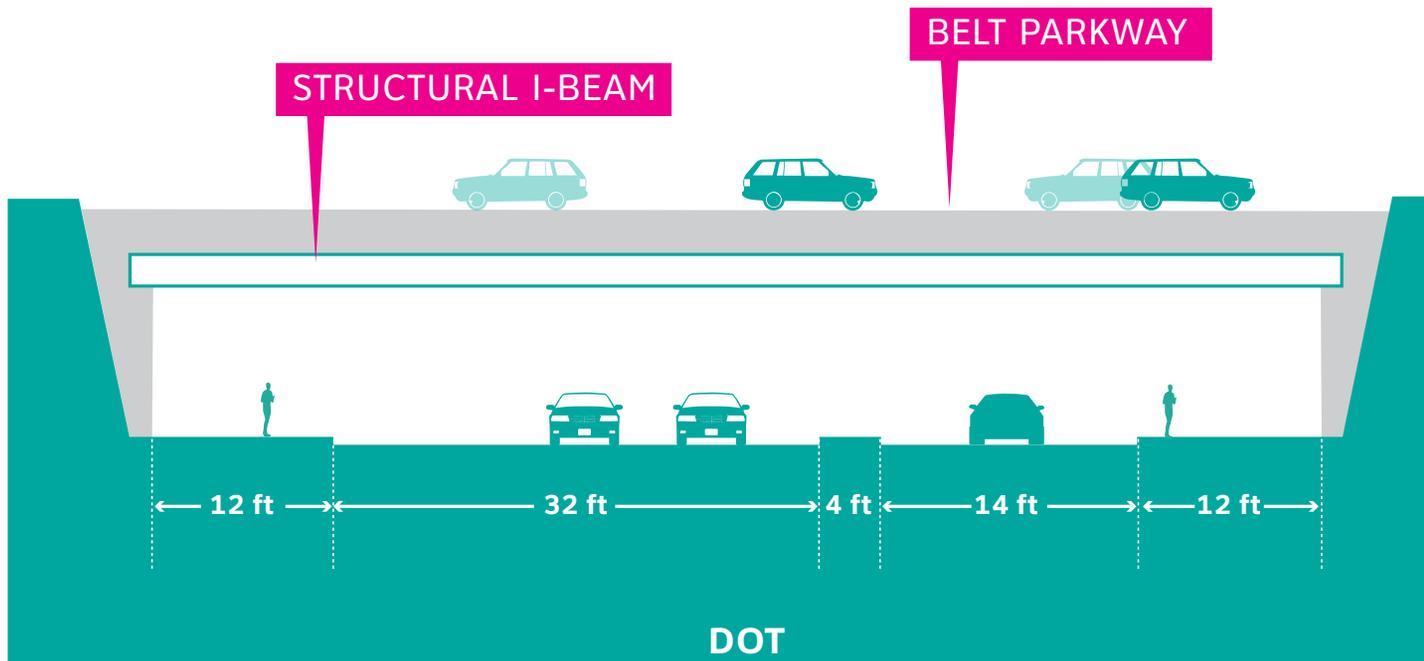
Improvements would include the following:

- Lighting in the Belt Parkway underpass;
- Sidewalk bump outs;
- Well-lit pedestrian crossings and walking signals; and
- A rain garden in place of the underutilized grassy inner circle of the roundabout.

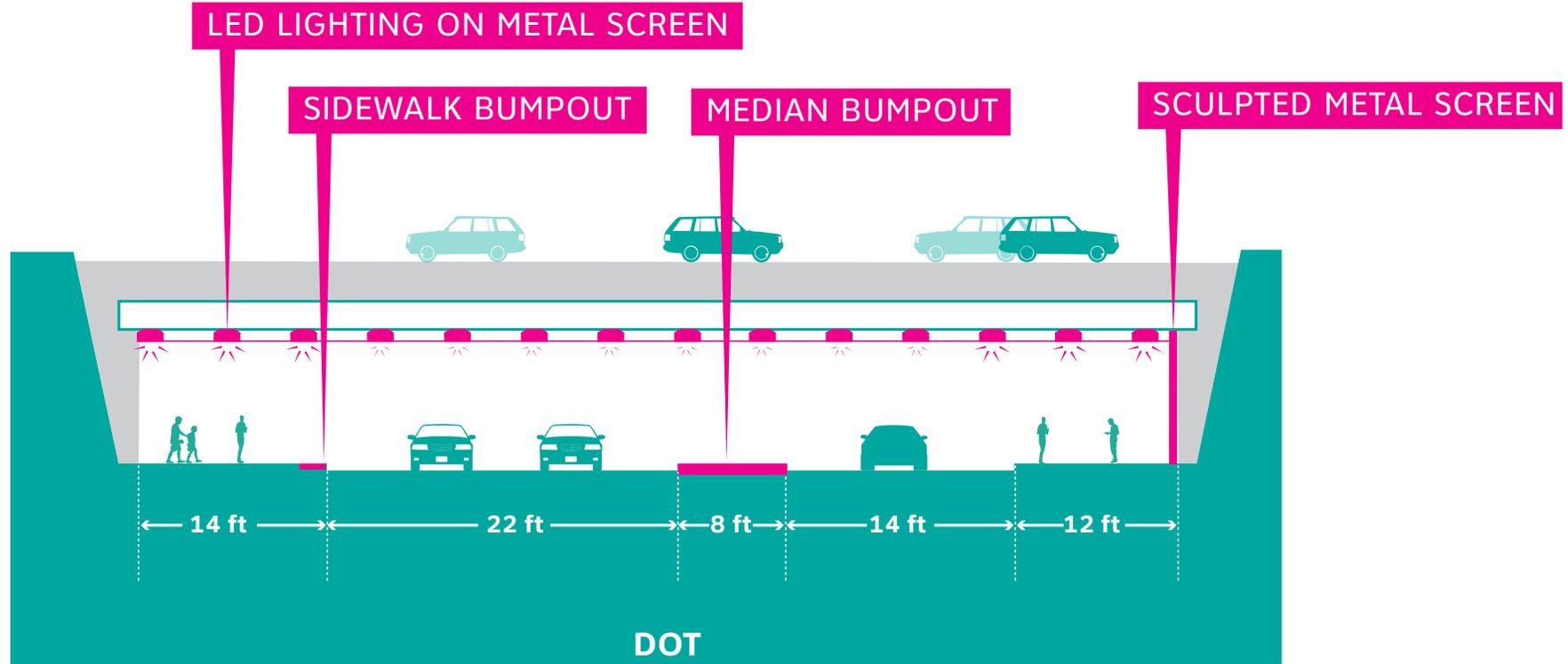
Traffic improvements, such as sidewalk bump outs, expand pedestrian and cyclist space, while physically narrowing the roadway to calm traffic and reduce vehicular speeds. Enhanced lighting at pedestrian crossings with walking signals improves a driver’s awareness of pedestrians and cyclists and enhances overall safety. The roundabout rain garden would bolster the aesthetic appeal of the area, while also capturing stormwater runoff from the roadway and encouraging pedestrians to cross using appropriate paths.



The approach to Canarsie Pier underneath the Belt Parkway currently does not allow for safe pedestrian or bicycle crossings.



Current conditions along Rockaway Parkway and Belt Parkway underpass in Canarsie.



Proposed conditions along Rockaway Parkway and Belt Parkway underpass in Canarsie.

Already a community resource, this project would provide greater and safer access to Canarsie Pier and its surrounding beaches and parks, as well as manage increased traffic flow that may stem from proposed phases of improvement at the Pier. Future phases could include the restoration of North and South Beaches, activation of the pier, and enhancement of the upland park area, as detailed in the Canarsie Pier and Beach Community Enhancements Project.

Additionally, the New York City Department of Transportation (NYC DOT) has plans for a transportation study within the Canarsie NYRCR Planning Area (Planning Area). This provides an opportunity for collaboration between New York State and City on pedestrian safety improvements along Rockaway Parkway.

### **Cost Estimate**

#### **\$2 MILLION**

This cost includes pedestrian and cyclist safety and access improvements, including sidewalk bump outs, lighting, crosswalks with walking signals, and the excavation and landscaping costs for the rain garden.

This estimate includes demolition, construction, and design and construction contingencies, but could be modified should the scope

of improvements change. This conceptual-level cost estimate is based on similar projects within New York City, and would likely vary as the project is further developed and refined.

### **Benefit/Co-Benefits**

#### **Environmental Benefits**

Safety improvements to the Belt Parkway underpass and roundabout could increase pedestrian and cyclist ridership and reduce automobile use to Canarsie Pier. The potential reduction of automobile use would reduce greenhouse gas emissions and other air pollutants, and would increase the environmental sustainability of Canarsie and the surrounding communities.

#### **Health and Social Benefits**

The access improvements would result in improved conditions for biking and walking in Canarsie, address existing safety concerns and increase the use of alternative modes of transportation. Enhanced access to the Canarsie Pier and along the existing waterfront would provide expanded opportunities for recreation and active living for residents. Together, these safety and access improvements would contribute to the overall physical and mental health of the Community.

### **Economic Benefits**

Improving access to Canarsie Pier may attract new visitors to the Pier as well as to the larger Community, which could contribute to the local economy. In its current state, the Belt Parkway is a barrier preventing Canarsie Pier visitors from crossing into the commercial areas of Canarsie. Additionally it is estimated that this project would create 9 full-time equivalent construction jobs.<sup>4</sup>

### **Cost-Benefit Analysis**

Pedestrian and cyclist improvements to the Belt Parkway underpass and along Rockaway Parkway would enable safe access to Canarsie Pier, a significant community destination. Between August 2011 and February 2014, on the portion of Rockaway Parkway between Seaview Avenue and Canarsie Pier, there were 226 vehicular collisions resulting in 45 injuries, 11 of which were pedestrians.<sup>5</sup> This project would redesign Rockaway Parkway to encourage motorists to travel at slower speeds while also providing improved crosswalks, sidewalks, and lighting to enhance pedestrian and cyclist safety.

Additionally, street safety remains a priority of New York City and its Vision Zero initiative. Since this is a priority for the City of New York and its multiple City agency partners, support

already exists for safety and access improvements in Canarsie, which could expedite implementation of the project.

Between 2009 and 2014, there were 22 fatalities caused by vehicular collisions within the Planning Area, an average of 4.4 fatalities per year.<sup>6</sup> These numbers represent the larger safety issues facing the Community. With the intent to mitigate collisions, this project would put funding towards increasing safety and improving conditions of a portion of the Canarsie street network that currently handles a high-traffic volume. While the safety and economic benefits provided by this project would outweigh the cost, the potential to avoid loss of life alone would justify the expenditure.

The roundabout would serve as an opportunity for stormwater management since the construction of a rain garden could help collect and store stormwater runoff, preventing flooding to the roadway and surrounding areas. The rain garden could be designed to capture approximately 40,000 gallons of stormwater, which is enough to capture a 100-year rainfall. The rain garden would also provide an aesthetic amenity to the area while discouraging pedestrians from dangerously crossing through the center of the roundabout.

NYC DOT, aware of the safety and access issues within Canarsie, has plans for both a transportation study for the Planning Area as well as improved pedestrian and cyclist access between Canarsie Pier and the upland neighborhood. Although this is already a priority of NYC DOT, the Committee's allotment towards this otherwise unfunded project could lead to expedited implementation. This project may set a precedent and lead to similar projects at other unsafe or inaccessible intersections throughout the Planning Area.

### **Anticipated Risk Reduction**

The safety improvements would not decrease the amount of risk faced by the Community against future storm events or sea-level rise. However, these enhancements would significantly reduce the risk of injury or death to pedestrians, cyclists, and motorists traveling to Canarsie Pier, while not completely eliminating it.

### **Timeframe**

Once a implementing entity is identified, the project is anticipated to take 1 year to complete.

### **Regulatory Requirements**

This project would require the full support and coordination of NYC DOT. The implementing agency would follow regulatory guidelines as

required by various Federal and New York State agencies.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Canarsie Pier and Beach Community Enhancements

## Featured Project

### STRATEGY

**Activate and Enhance Access Along the Shoreline**

#### Recovery Support Functions



Community Planning

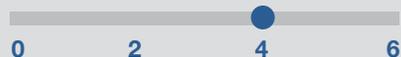


Natural & Cultural Resources

#### Cost

**\$32.7 MILLION**

#### Timeline (in years)



**This project would upgrade the facilities at Canarsie Pier to create a waterfront destination that better serves visitors and local residents.**

### Project Description

While Canarsie Pier and its adjacent beaches experienced surge over 9 feet high during Superstorm Sandy, these uninhabited natural areas served as a buffer between Jamaica Bay and upland residential areas along Seaview Avenue. This project seeks to strengthen the resiliency and sustainability of Canarsie Pier and beaches while also activating the shoreline. Canarsie Pier is an important social hub for the Community, where residents are able to fish, picnic or relax and enjoy breathtaking views of Jamaica Bay. The Canarsie NYRCR Planning Committee (Committee) would like to build upon the recommendations for activating and improving Canarsie’s Jamaica Bay waterfront proposed in the National Park Service (NPS) General Management Plan (GMP). The GMP calls for recreational opportunities at various locations throughout the larger Jamaica Bay Gateway National Recreation Area. For Canarsie Pier and beaches specifically, the GMP recommends activities and amenities to improve the health, safety, and social resiliency of the Canarsie NYRCR Community

(Community). This project would expand on the recommendations made in the GMP to turn Canarsie Pier and beaches into “a vibrant destination for community-oriented events as well as water-related recreational activities.”

These enhancements would fund the development of Canarsie Pier and adjacent beaches, with programming and improvements based on the GMP as well as Committee and Community input.

The Committee has identified the following four locations and associated improvements:

1. Canarsie Pier: Activation of the Pier could include the following programming and amenities:

- Welcome grove with bike parking;
- Restrooms and NPS offices or visitor center;
- Diversity of seating options;

**Figure IV-3: Conceptual Plan of Design Improvements at Canarsie Pier**



- Bump out playground area;
- Flexible space for parking/events;
- Food trucks;
- Permeable paving;
- Removable movie screen; and
- Trees for added shade.

2. Canarsie Pier Upland Park: Enhancement of Canarsie Pier’s upland park area could include the following amenities as well as educational and restoration opportunities:

- Expanded picnic and barbecue area;
- A clearly defined bus stop;
- Enhanced playground area;
- Fishing area with cutting tables;
- Coastal maritime forest;
- Hammock grove;
- Flexible event space;

- Educational overlook and outdoor classroom; and
- Eco-dock for oyster farming.

3. North Beach: Restoration and increased access could include:

- Coastal meadows restoration; and
- Kayak rental and launch.

4. South Beach: Restoration and increased access could include:

- Wetland restoration; and
- Boardwalk access to wetlands.

The Committee requests maintaining the amount of parking on and around Canarsie Pier and adding parking spaces as new programming is introduced. Once fully developed and coordinated with the NPS, these specific enhancements could be implemented. In the hopes of jump starting this project, the Committee has decided to fund the Canarsie Pier Access Improvements Project to improve pedestrian and cyclist access to this beautiful amenity.

### **Cost Estimate**

#### **\$32.7 MILLION**

This amount represents the following itemized costs of enhancing each individual area:

- \$5.5 million to activate Canarsie Pier;
- \$16.5 million to enhance the Canarsie Pier upland park area;
- \$3.5 million to restore South Beach; and
- \$7.1 million to restore North Beach.

This conceptual-level cost estimate is based on square-footage costs of similar park projects within New York City. This cost does not include structural improvements to Canarsie Pier.

While further analysis and engineering would be required to determine the feasibility, effectiveness, and final design of this project, the enhancements described above illustrate the potential type and scale of improvements that might be employed.

### **Benefit/Co-Benefits**

#### **Environmental Benefits**

The Canarsie Pier project would stabilize and strengthen a key environmental asset. Canarsie Pier and adjacent beaches serve as



Components of potential design improvements to Canarsie Pier.



Current conditions at Canarsie Pier.

the Community’s link to Jamaica Bay. This project would enhance this link by making it more accessible, activating the shoreline, and ensuring its long-term sustainability through ecosystem restoration.

#### **Health and Social Benefits**

The plan and related project components would incorporate community amenities, access

improvements, and ecosystem enhancements, all of which would contribute to the overall physical and mental health of the Community.

#### **Economic Benefits**

The programming of Canarsie Pier would allow space for food vendors and other approved small businesses to serve a new consumer base. This would lead to the creation of new

jobs and the potential expansion of small businesses. In addition, the entertainment and recreational components of the proposed programming could attract new visitors to the area that could contribute to the local economy.

#### **Cost-Benefit Analysis**

The open area of Canarsie Pier and the beaches served as a buffer between the upland residential areas and the Jamaica Bay surge during Superstorm Sandy. This project may reduce the risk of flooding in future storms by strengthening the long-term sustainability of the beaches and coastline. Enhancing Canarsie Pier and the surrounding beaches and parkland would also create an amenity for the entire Community while serving as a larger draw for those in surrounding neighborhoods.

Enhancement and activation of the Pier and park area would create a community gathering space and provide expanded access to the waterfront. New programming, amenities, and events at Canarsie Pier would create new economic opportunities and attract visitors to the area. Currently, there is rarely more than one food vendor servicing what is otherwise a popular place to enjoy a meal. This example illustrates the high opportunity cost of an underutilized area and the economic and community benefits left unrealized.

Additionally, the activation, restoration, and safety benefits provided by these projects are already priorities of the Federal government. The restoration of the south beach would capitalize and build upon the existing ecosystem restoration opportunity at this location identified as part of the U.S. Army Corps of Engineer’s Hudson-Raritan Estuary Comprehensive Restoration Plan. The project as a whole would build on recommendations put forth in the GMP and may serve as a mechanism for implementing the proposed or similar improvements.

### Anticipated Risk Reduction

While ecosystem restoration along the Jamaica Bay shoreline would reduce the risk of erosion and sea level rise affecting NPS and NYC DOT property, this risk reduction would not apply to any other property owners. This restoration would, however, reduce the risk score of two highly valued community assets—Canarsie Pier and the Jamaica Bay Greenway—by reducing their vulnerability to potential damage caused by coastal flooding. Generally speaking, a healthy and stabilized Jamaica Bay shoreline leads to a reduced risk of surge waters reaching the upland residential areas. Depending on the strength of future storms, risk of flooding in this area remains despite the improvements proposed in this project, particularly during a 500-year storm event. Additionally, erosion

along the Jamaica Bay shoreline may still occur over time should the beaches not be properly maintained in the long-term.

### Timeframe

Once an implementing entity is identified, the initial study of this project is anticipated to take 1 year to complete. Enhancements constructed thereafter are anticipated to take 1 to 3 years to build. In total, it is anticipated that this project would take 3 to 4 years to complete.

### Regulatory Requirements

This project would require the full support of NPS. The implementing agency would follow regulatory guidelines as required by various Federal, and New York State and City agencies, such as the New York State Department of Environmental Conservation.

### Jurisdiction

The identified project area falls within the jurisdiction of New York City.



Entrance at Canarsie Pier.

# Canarsie Youth Environmental Education Program

## Proposed Project

**STRATEGY**  
**Activate and Enhance Access  
 Along the Shoreline**

Recovery Support Functions

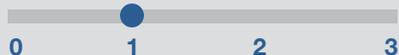


Community  
 Planning

Cost

**\$100,000**

Timeline (in years)



**This project would fund the development of an environmental education program for youth in Canarsie to learn about Jamaica Bay and adjacent waterways.**

### Project Description

Superstorm Sandy damaged the coastline along the basins. This edge provides an important layer of protection for the Canarsie NYRCR Community (Community). A number of the NYRCR projects in Canarsie aim to restore and augment this edge through a mix of green and grey infrastructure. It is important to help the Community, especially the youth, understand the value of these natural protective measures so that they are able to advocate for their ongoing maintenance. This project would fund the development of a curriculum and supportive signage for a Canarsie Youth Environmental Education Program that focuses on harbor-scale ecosystem dynamics, critical bay habitats and species, risk and resilience, anthropogenic landscapes, and water quality. A curriculum would be developed around these themes and tailored for different age groups and learning levels to help connect young residents to the natural environment.

Environmental education stations layered into existing or proposed waterfront facilities would serve multiple audiences. Schools and summer programs would use the stations on public lands to enable hands-on learning at the water’s edge (e.g., through oyster-garden monitoring or water quality sampling). Stations would also be designed to facilitate passive environmental education, providing educational signage and spatial information for park and community users.

This curriculum could be developed in partnership with local schools, universities, and scientists already working in Jamaica Bay. Formal school curriculums, such as the Billion Oyster Project curriculum, could be combined with hands-on learning at points located along the Canarsie waterfront, building incrementally over time into a community-scale environmental education circuit. Once this curriculum is developed, it would be provided to local



Students learning about local ecology. *Charlotte Murtishaw/U.S. Fish and Wildlife Service Northeast Region.*<sup>7</sup>

schools throughout the region and incorporated into area signage and infrastructure.

Potential sites for these stations could include areas along Fresh Creek and at Canarsie Pier. Future phases could include the installation of additional infrastructure, ranging from bird blinds and overlooks to oyster-gardening stations and wetlands walks.

### **Cost Estimate**

#### **\$100,000**

The total project costs are \$100,000 for the development of a curriculum and informational signage. Curriculum costs would be developed for a flat fee of \$30,000–\$40,000 and would include public school outreach, teacher training, and programming at sites. Signage costs include design, materials, and installation and would cost approximately \$2,000–\$4,000 each. At this cost, approximately 24–28 signs could be installed throughout Canarsie Pier and Fresh Creek.

### **Benefit/Co-Benefits**

#### **Health and Social Benefits**

This project would foster a stronger connection between Canarsie residents and the surrounding water bodies, promoting a better understanding of sustainability and the dynamics that shape environments. These programs would

most directly impact the youth who are served by the development of this curriculum, including students from local elementary, intermediate, and high schools and those who attend after-school clubs and programs, and summer camps. In conjunction with the Canarsie Corps project, this program will work to better connect the youth in the Community.

### **Cost-Benefit Analysis**

All of these elements could potentially be implemented as an expansion of existing curriculum, such as the Billion Oyster Project. This project would directly serve the 9,500 K–12 students in Canarsie as well as the 37,000 students who attend school in adjacent neighborhoods. These students would become better informed about the rich ecosystems of their neighborhood. As this project complements the Fresh Creek Restoration and Resiliency Featured Project and the Canarsie Pier and Beach Community Enhancements Featured Project as well as the Community’s goals to improve youth resources, the considerable benefits of this project justify its modest cost.

### **Anticipated Risk Reduction**

While risk reduction associated with this project would be very limited, community members who are more educated about the life cycles of the adjacent waterways would better understand

the causes of high-tide and periodic flooding. In doing so, residents and future generations would be better equipped to live next to these water bodies.

### **Timeframe**

The timeframe for implementation could occur fairly rapidly, with a curriculum developed within 6 months and the installation of signage on New York City Department of Parks and Recreation (NYC DPR) or National Park Service (NPS) land implemented within 6 months to 1 year.

### **Regulatory Requirements**

This project would require coordination with NYC DPR and the NPS.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.



Students learning about coastal ecology. Charlotte Murtishaw/U.S. Fish and Wildlife Service Northeast Region.<sup>8</sup>

# Canarsie and Southeast Brooklyn Waterfront Stormwater Study and Pilot Projects

## Proposed Project

**STRATEGY:**  
Improve Wastewater and Stormwater Management

Recovery Support Functions

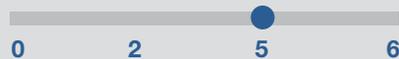


Infrastructure

Cost

**\$650,000**

Timeline (in years)



This two-phase project would fund a study to examine the feasibility, costs, and benefits of various stormwater capture and retention projects in the Canarsie and Southeast Brooklyn Waterfront NYRCR Planning Areas. The Proposed Project would also provide funding for the implementation of recommended scalable pilot projects within both Planning Areas.

### Project Description

Superstorm Sandy exacerbated many of the drainage problems that exist in the neighborhood, leading to basement flooding and other home damage.

#### Phase 1: Stormwater management and mitigation study

Phase 1 of this project would include a study of existing stormwater and groundwater concerns facing both Canarsie and Southeast Brooklyn Waterfront, as well as potential stormwater capture and retention strategies to be applied within the Canarsie NYRCR Planning Area. This would include identifying areas of greatest need such as at the intersection of Avenue K and 108th Street. The study would examine feasibility, costs, benefits, and impacts of potential stormwater capture measures; develop proposals for governmental interventions to

incentivize stormwater capture and retention; and suggest pilot projects.

The partnership of the Canarsie and Southeast Brooklyn Waterfront NYRCR Planning Committees on this Proposed Project emphasizes the need for such a study and associated pilot projects in order to address stormwater management issues that equally affect both Planning Areas.

#### Phase 2: Stormwater mitigation pilot projects

Phase 2 would implement targeted pilot projects that are identified in Phase 1 as having the highest feasibility and impact. This may include the following:

- Measures such as bioswales—landscaped elements to reduce gutter flow

**Figure IV-4: 311 Complaints July 2013-14**



NY Rising Community Reconstruction Program  
Canarsie Planning Area

Planning Area

**311 Complaints in the Previous Year  
(07/01/13-07/01/14, 505 complaints)**

Sewer Back-up (256 complaints)

- Sewer Backup Complaint

- Low volume
- High volume

Street Flooding (24 complaints)

- Street Flooding Complaint

- Low volume
- High volume

Catch Basin Clogged/Flooding (140 complaints)

- Catch Basin Clogged/Flooding Complaint

- Low volume
- High volume

NYC 311 Complaints  
New York City Department of City Planning, MAPPluto v13.1; Buildings; Street Centerlines



and manage water surface ponding—and permeable paving/surface treatments in areas with poor drainage and nonporous surfaces; and

- Improvements in and around public and open spaces to enhance area stormwater capture capacity and to strengthen the resiliency of community assets.

This phase would review existing information and studies about the groundwater table undertaken by Federal and New York State and City agencies and would conduct borings on key vulnerable locations to assess groundwater levels and site conditions wherever information is unavailable.

### **Cost Estimate**

#### **\$650,000**

The Phase 1 study cost is estimated at approximately \$300,000, based on prior studies similar in scope and intent. Since this project would be jointly pursued by both the Canarsie and Southeast Brooklyn Waterfront NYRCR Communities, half of this cost—\$150,000—would be covered by Canarsie’s allotment. The study would determine if, how, and where stormwater capture and retention strategies may be applied within the Planning Areas. For Phase 2, the implementation of pilot projects,



Street ponding is a recurring issue in Canarsie. Flickr user *alabaster crow* photographic.<sup>9</sup>

a scalable cost of a typical green infrastructure stormwater capture measure is valued at approximately \$25,000. The Canarsie Planning Committee envisions approximately 20 of these measures—or larger interventions valued

at similar cost—implemented within at-risk areas. Based on these considerations, a preliminary cost estimate for Phase 2 pilot projects is \$500,000, bringing the total project cost to approximately \$650,000.

This cost estimate is based on engineering experience with projects of similar scope and scale, and would likely vary as the project is further developed and refined.

### **Benefit/Co-Benefits**

#### **Environmental Benefits**

While this project is expected to have modest environmental benefits in the short-term, it could pave the way for a more comprehensive strategy to address Canarsie’s stormwater flooding issues, resulting in better water quality in Jamaica Bay and its tributaries. A long-term stormwater management strategy – particularly one that leverages existing open park space and natural areas – would enhance and protect the Planning Area’s natural environment.

The majority of Canarsie and Southeast Brooklyn Waterfront Planning Areas are served by separated sewer systems. Rather than being piped to wastewater treatment plants, untreated stormwater is generally discharged through storm sewers to surrounding waterbodies. To date, the focus of New York City’s use of green infrastructure for stormwater management has been targeted at reducing runoff into combined sewer systems and reducing combined sewer overflow (CSO) events. In areas with separated sewers, runoff from roads and other impervious surfaces carry with it

many potential water pollutants. By capturing and infiltrating or filtering runoff before it enters the stormwater system, green infrastructure can improve the quality of the water entering surrounding waterbodies, thereby enhancing the local ecology. The use of native plants in green infrastructure projects can also provide urban habitats for birds and insects.

#### **Health and Social Benefits**

This project would benefit residents, employees, and business owners who currently have to use their funds and resources to address direct stormwater runoff from the streets into their properties. Stormwater management practices may also mitigate wastewater backup concerns by reducing stormwater infiltration into wastewater sewers, creating an important health benefit for those who experience wastewater backup into the basements of their homes and businesses during heavy rains. Depending on the design of the stormwater retention system, this project also has the potential to increase biodiversity by introducing new target ecosystems.

#### **Economic Benefits**

This project is expected to produce modest economic benefits, mostly related to construction, operation, and maintenance jobs associated with the implementation of stormwater capture

measures in Phase 2. The implementation of green infrastructure projects along commercial corridors also has the potential to improve the economic resiliency of local businesses by enhancing the conditions of adjacent street beds. Additionally, this project is estimated to create 1 full-time equivalent construction job over its projected timeframe.<sup>10</sup>

#### **Cost-Benefit Analysis**

The proposed stormwater capture pilot projects are a strategy to address stormwater flooding of multiple at-risk locations throughout Canarsie. The immediate costs of stormwater flooding, particularly on streets, includes disruptions in traffic flow, potential flooding and damage to adjacent private properties, as well as additional time and maintenance required by New York City agencies to respond to the problem and address damage. Over time these create serious interruptions in basic community activities for residents, business owners, and employees.

From 2012 through 2013, 318 of the sewer overflow claims filed against the City of New York, came from Brooklyn’s Community District 18, which includes the NYRCR Planning Areas of Canarsie, Mill Basin, and Bergen Beach. These accounted for 28% of the 1,168 mappable claims, more than any other Community District

in the city. While most claims do not have dollar values assigned to them, available values typically ranged between \$250 and \$5,000, which represents a cost to both the City of New York and to property owners. As an approximation, if each claim is valued at \$5,000, this represents \$1.6 million in damages caused by sewer overflow to properties within Community District 18.

In addition to the primary intended benefits of the project, to reduce street flooding and sewer backup, the potential water quality benefits derived from diverting direct runoff into surrounding waterbodies is important to consider. New York State and City are currently investing over \$100 million through 2020 in long-term control plans to improve water quality in Jamaica Bay. These interventions may offset or delay costs of other water quality investments by diverting direct runoff and enhancing the water quality of Jamaica Bay and its tributaries. The reasonably small investment recommended for this project in relation to those made by New York City to address water quality, storm-water flooding, and sewer backup suggests this project would be a beneficial and cost-effective investment.

### **Anticipated Risk Reduction**

Pilot projects implemented through Phase 2 are anticipated to provide a reduction in risk



Bioswales like the one depicted above may be able to reduce street flooding. *Steven Vance*<sup>11</sup>

of flooding from heavy rain events within the localized area where they are implemented. The degree to which these measures mitigate localized flooding would depend largely on the size of the catchment area, quantity of rainfall, and, in the case of bioswales, the depth to groundwater and soil types. The magnitude of the drainage issue and thus potential for

risk reduction can be conveyed by gathering information over the course of the study. This would include analyzing the specific locations identified by the Canarsie Community where reoccurring flooding is a problem. Preliminary data shows that over the course of 2013, there were 24 complaints to 311 regarding street flooding.

Should the pilot projects prove effective, this project could pave the way for a large-scale stormwater strategy in Canarsie, lessening the risk of street flooding to at-risk areas of the overall Community.

**Timeframe**

Once an implementing organization has been determined, Phase 1 of this project could begin within 6 months, while Phase 2 would take anywhere from 3 to 5 years, depending on the scope of the projects identified in Phase 1 and the identification of appropriate partners.

**Regulatory Requirements**

While the Phase 1 study would not have any regulatory requirements, the stormwater capture and retention projects identified for implementation during Phase 2 would require review and approval of agencies such as the New York City Department of Environmental Protection (NYC DEP), New York City Department of Transportation (NYC DOT) and New York City Department of Parks and Recreation (NYC DPR).

**Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Recovery Community Center

## Proposed Project

### STRATEGY

**Build and Coordinate Local Capacity for Emergency Response**

### Recovery Support Functions



Community Planning

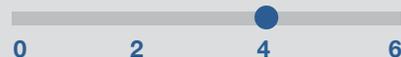


Health & Social Services

### Cost

**\$1 MILLION**

### Timeline (in years)



**This project would establish a Recovery Community Center with resilient lighting and power, the ability to distribute supplies, coordinate efforts with government agencies, and host trainings and capacity building initiatives.**

## Project Description

In the wake of Superstorm Sandy, residents were unable to quickly locate resources and information. The Canarsie NYRCR Planning Committee (Committee) has budgeted \$1 million towards the partial funding of a retrofit to an existing building or space to become a Recovery Community Center. This Center would coordinate local relief services and supplies following a disaster.

It would also fund the salary of a Community Coordinator for a 2-year period. The Community Coordinator would develop and manage an emergency communications plan, which includes enhancing the local network of block associations and building the capacity of local community based organizations that can assist with recovery after an emergency. Expanding this community network would create mechanisms to efficiently and effectively extend information and supplies before, during, and after a disaster. The Coordinator would ensure

that community contact information is accurate and up-to-date, and would hold trainings at the Community Center for block associations and local organizations to help them improve communication, outreach, and emergency preparedness.

The array of services to be provided at the Recovery Community Center would include:

- Access to food, water, power, and basic supplies post disaster;
- Information about Federal, New York State and City, and local emergency response activities and efforts year-round;
- Non-urgent medical services including first aid post disaster, and ongoing mental health services year-round;
- Special services for seniors or other vulnerable populations year-round;



Supplies being distributed to Canarsie residents.

- Resiliency workforce training and development programs year-round; and
- Homeowner audits for retrofitting homes to decrease flood risk year-round.

The Recovery Community Center would be occupied and programmed by a not-for-profit organization, and staffed by the newly created and funded Community Coordinator. This organization would have a local presence that could take ownership of the day-to-day operations and maintenance of a building. To quickly serve the Canarsie NYRCR Community (Community) in an emergency, a number of physical requirements would be necessary in addition to those required by New York State and City regulations. These requirements include:

- Location outside of the floodplain or in a flood-proof structure;
- Reliable source of power and heating/cooling;
- Proximity to an evacuation route;
- Proximity to vulnerable populations and commercial centers;
- Reinforced building structure;

- Potable water system;
- Restrooms (ideally with showers);
- Parking lot or other large outdoor assembly area;
- Large space on ground floor; and
- American with Disabilities Act (ADA) accessibility.

To ensure rapid response and effective coordination during an emergency, the Community Coordinator would liaise with local organizations as well as Federal and New York State and City agencies. The Community Coordinator would manage disaster preparedness-related programming, which could include trainings and practice drills, “know your neighbor” events, and outreach to vulnerable populations. The Center could also host Community Emergency Response Team (CERT) or Ready New York trainings. This Center would position the Community to be a good candidate for a smaller scale version of the Emergency Management School currently operated by the New York City Department of Education to train youth in disaster recovery.

Site and organization selection would occur

through a competitive process based on the analysis of existing efforts in the Community, organizational capacity, facility capacity, proposed services, and potential to coordinate across the organizations operating after a disaster. Prior to securing a permanent building or space for the Recovery Community Center, the Canarsie NYRCR Planning Committee (Committee) would like the Community Coordinator to be located in an existing facility until the capital component of this project is complete.

### **Cost Estimate \$1 MILLION**

To retrofit an existing building or to build out space in a building to establish the Recovery Community Center would cost approximately \$2.2 million.

The Committee has budgeted a portion of the funds required for this project at \$1 million. It is requested that the additional funds required for full implementation of this Recovery Community Center be secured through other funding sources.

The Community Center would require funding to cover two types of expenses:

- Capital funding: Capital costs associated

with this project would include the purchase of a building or leasing space in a building, resilient retrofitting, a fixed back-up generator, solar power, back-up hardened communications equipment, locker rooms and showers, meeting rooms, office space and community meeting space.

- The market value of a small commercial building along a commercial corridor in Central Brooklyn is estimated at around \$1.5 million. Office upgrades on average cost around \$70 per square foot, but this does not include resilient energy and power, ADA-accessibility, or locker rooms and showers. Overall, it is expected that the purchasing of a building along with the necessary renovation would cost around \$2 million.
- Operational funding: Funding would be used to support a full-time Community Coordinator to provide year-round emergency programming and capacity building for 2 years. It is estimated that the salary of one mid-level employee at a social service organization for 2 years would cost around \$200,000 including benefits and incidentals.



Residents supporting relief efforts after Superstorm Sandy. *Courtesy of Canarsie Courier.*

While the costs required for capital improvements would depend upon the final design, the condition of the building or space, and the size of the facility, retrofitting and build out of a relief center with 1,700 square feet of usable space could cost approximately \$2 million in capital expenses. The annual cost of the Community Coordinator and emergency preparedness programming (including overhead) could range from \$70,000 to \$90,000 annually, in addition to

\$10,000 to \$15,000 for materials used for outreach, coordination, and additional expenses. Therefore, the total operational cost would be nearly \$200,000 over the course of 2 years.

After 2 years, the identified non-profit would be responsible for the modest costs of emergency preparedness programming, maintenance of the building on an ongoing basis, and emergency supplies and equipment.

## **Benefit/Co-Benefits**

### **Health and Social Benefits**

Establishing a Recovery Community Center for the entire community would reduce the health and safety risks associated with a disaster or storm event. Specifically, the Center would reduce the risk of:

- Inaction or misdirected action due to confusion or lack of information across the Community;
- Sickness or discomfort related to lack of access to basic medical supplies, food, water, heat, and other necessities;
- Emotional or psychological distress;
- Displacement of children, relatives, and friends who might need to relocate to receive services.

Vulnerable populations stand to benefit the most, especially through building the capacity of the block associations. These populations are most likely to need assistance, yet less likely to have reliable and convenient access to critical supplies and services. Canarsie's vulnerable populations include low-income residents, populations with special needs, non-native English speakers, and seniors.

Building a stronger network of block associations will improve the day-to-day function and social cohesiveness of the Community, particularly critical in times of emergency to create successful flows of information.

### **Economic Benefits**

The Recovery Community Center is likely to support a full-time employee based within an existing not-for-profit organization to plan and build organizational capacity at the Center over the course of 2 years. Capital expenses associated with building retrofit would also create a small number of temporary jobs for construction. These jobs should be sourced locally to ensure investment and to develop local knowledge and expertise in the Community around resiliency issues.

More formally, by including training and workforce development programs at the Recovery Community Center, the Community's capacity to respond to emergency events would improve. Residents who take part in the workforce development programs would also have increased access to jobs in resiliency-related fields.

### **Cost-Benefit Analysis**

The Committee's vision expresses a desire for the Community to become "self-reliant" and "a model of sustainability and resilience." As a

community at-risk from future flooding events and other shocks, this project aligns well with this vision, enhancing the resiliency of Canarsie and ensuring a smoother recovery for its 88,800 residents.

It also would increase access to supplies for vulnerable populations, or groups that might not have convenient access otherwise. This includes the approximately 3,770 residents over the age of 75 (4% of the population) and the approximately 21,590 residents under the age of 18 (25% of the population).

The project would also bolster the financial and professional capacity of host non-profits to meet community needs. For host organizations that may have informally provided relief services out of their own operations budget in the aftermath of Superstorm Sandy, this project would now provide support for offering related services and programming.<sup>12</sup>

### **Anticipated Risk Reduction**

A Recovery Community Center would reduce risk to Canarsie residents by providing a centralized source for information during an emergency and following a disaster. The Center would provide social and support services, guarantee publicly accessible backup power, and more reliable and robust recovery services.

Further, investment in a Recovery Community Center would reduce the vulnerability of the organizations that participate in the program by providing ongoing training and a stronger community network.

### **Timeframe**

Once the project has been formally initiated, it would take approximately 2 to 4 years to implement.

Once participating organizations are identified, the programming would need to be tailored to Canarsie residents and capital improvements would need to be designed, engineered and constructed. Depending on the scope of the work, and taking into account the seasonality of construction, the construction phase could take 6 to 36 months. Programming can be implemented in a shorter time, ideally 3 to 6 months after the Community Coordinator is on board.

The key issues that could most affect the timeframe are the length and format of the selection process and the construction challenges that may emerge with retrofitting an existing building: installing backup power, flood proofing, or other capital improvements.

### **Regulatory Requirements**

It is anticipated that no regulatory review

would be needed for the execution of this project, though all capital investments would be required to meet building codes, including modifications to construction in a flood zone.

It would be beneficial for the local not-for-profit organization to consult with the New York City Office of Emergency Management (NYC OEM) as they launch the program and to seek ongoing communications and coordination with NYC OEM on Citywide emergency preparedness efforts. Local organizations would also benefit from coordinating with other City agencies and other local programs to bolster information and programming over time.

Review and/or permitting by City agencies is anticipated for this project. Project implementation would require permits from and/or coordination with the New York City Department of Transportation and New York City Department of Buildings.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Critical Facility Upgrades Program

## Proposed Project

### STRATEGY

**Build and Coordinate Local Capacity for Emergency Response**

### Recovery Support Functions

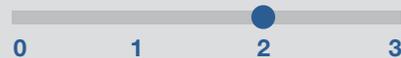


Health & Social Service

### Cost

**\$500,000**

### Timeline (in years)



**This project would fund resilient retrofits for health and social service providers in Canarsie to ensure continuity of critical services. The organizations would also be required to provide assistance with recovery efforts after an emergency event.**

### Project Description

Superstorm Sandy affected the operations of a number of critical facilities in Canarsie. There are two adult-care centers and two providers that support residents with developmental disabilities located in the floodplain. Many of these providers were flooded and/or lost power during the storm. This Critical Facility Upgrades program would provide partial funding for backup power, and on-site capital improvements to organizations that provide support services year-round to vulnerable populations. The selected organizations would also be required to assist with recovery efforts after future storms. Potential capital improvements may include:

- Backup power, including hybrid/solar-powered generators; and
- Floodproofing, such as elevating mechanicals and applying waterproof coatings to

basement and ground floor, among other measures.

The Canarsie NYRCR Planning Committee (Committee) recommends a power source or backup power source that utilizes alternative energy, such as solar power, since it would minimize the carbon footprint and reduce dependency on fuel distribution systems that could be interrupted during an emergency.

Floodproofing, if needed, would likewise ensure that the organizations would be able to perform following a storm or flooding event without diminished quality of services.

This program could supplement the services provided to vulnerable populations at the Recovery Community Center post-disaster, employing a coordinated effort for a robust and comprehensive recovery. An eligible site and participating organization that provides

# Back-up Generator

## What generator is needed?

Generator sizing is based on a combination of factors including building size, building type, and existing electrical systems. Ultimately, determining generator sizing rests on which building activities and systems will be in use during an emergency.

<b>Generator Size (kW):</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>200</b>	<b>250</b>
<b>Approx. Building Size (sf):</b>	5000	10,000	12,000		
<b>Fuel Storage: (gallons) 4 days, 14 hrs</b>	420	775	1270	1730	2135
<b>Fuel Storage: (gallons) 8 days, 14 hrs</b>	840	1550	2540	3460	4270

## Generator Location

### Considerations:

Generators must be placed above flood elevation. Generators can be placed on raised concrete mounts or on structurally sound rooftops. For diesel generators mounted to rooftops, fuel tanks will be placed on ground level with fuel pumped to the generator



**What can this power?**

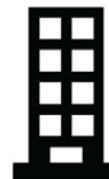
Lighting



Cooling Systems



Building Systems



Food Preparation



Miscellaneous



Guidelines for generator sizing and fuel storage need to be considered.

year-round support services would be selected through a competitive bidding process. This process would prioritize an organization with a past history of serving vulnerable populations in the Canarsie NYRCR Planning Area (Planning Area), and with sufficient organizational and facility capacity.

Possible sites that could utilize this program include:

- Medical service providers;
- Libraries;
- Providers that serve residents with developmental disabilities;
- Schools
- Day cares; and
- Adult care facilities.

To receive funding for the purchase and installation of an alternative power source or floodproofing measures, organizations would need to make a formal commitment to provide recovery support in the future.

### **Cost Estimate**

#### **\$500,000**

This cost includes partial grants for purchasing and installing 100-kilowatt generators for buildings assumed to be approximately 10,000 square feet in area, as well as provides additional capital funding for floodproofing measures. This estimate is based on engineering expertise and involvement with projects of similar scope and scale. The cost is based on the assumption that existing building systems are conducive to a generator hookup, and that there is available space in the facility for the installation of the equipment.

Additional considerations and potential infrastructure needs that could increase the cost include:

- Inclusion of solar-powered backup (would vary by site);
- Extensive hardening or elevating of the generator;
- Environmental testing and abatement for asbestos and other materials;
- Demolishing existing equipment;
- Altering existing building structures; and

- Removing walls, windows, or doorways.

### **Benefit/Co-Benefits**

#### **Environmental Benefits**

This project would result in environmental benefits if a hybrid/solar generator system is designed and installed. While solar power is renewable and pollution free, these benefits would be realized only while the generator is in operation. A traditional generator that runs using petroleum gasoline would not be as environmentally beneficial.

#### **Economic Benefits**

This program would reduce economic loss after a disaster by allowing a health and social service provider to continue operations. Sustained operations would allow an organization to continue to serve the Canarsie NYRCR Community (Community) during and after a storm. Additionally, this project is estimated to create one full-time equivalent construction job over its projected timeframe.<sup>13</sup>

#### **Health and Social Benefits**

As previously mentioned, a major benefit of this project is ensuring that vulnerable populations are able to secure services during and after emergencies. Services provided at each facility could include basic physical and/or mental

healthcare, access to food and water, or a reliable power supply.

### **Cost-Benefit Analysis**

Strengthening at-risk buildings with floodproofing and backup power aligns with the Committee’s vision to become a self-sufficient community. This project could help Canarsie achieve this vision and would provide the neighborhood, as well as New York City at-large, with an example of the kind of adaptability that is needed in these coastal communities.

While this project is currently scaled to serve only approximately 2 of the 20 community-based organizations in the Planning Area, its positive effects will be experienced by the many residents who utilize these services.

### **Anticipated Risk Reduction**

This project would decrease the risk of power loss in the buildings that are awarded funds. The project’s main goal is to support vulnerable populations by providing access to power and services during and after an emergency, thereby reducing adverse health impacts and facilitating a quick recovery. This project would make up to two health and social service providers more resilient, and would protect vulnerable populations, including children and seniors. By awarding partial grants, two of the

four critical facilities in the floodplain could be supported with capital upgrades.

### **Timeframe**

Once the project has been formally initiated, it would take approximately 1 to 2 years for capital improvements to be completed. The key issues that could most impact the timeframe are the length and format of the selection process and the physical challenges that may emerge with the installation of alternative power sources and floodproofing measures.

### **Regulatory Requirements**

It is anticipated that no additional regulatory review would be needed for the execution of this project, although it will need to abide by all local laws and the New York City Building Code. The New York City Office of Emergency Management may be engaged to facilitate coordination with Citywide emergency preparedness efforts.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Canarsie Corps Program

## Proposed Project

### STRATEGY

**Build and Coordinate Local Capacity for Emergency Response**

### Recovery Support Functions



Community Planning

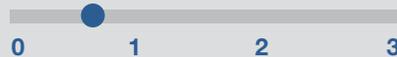


Economic Development

### Cost

**\$150,000**

### Timeline (in years)



**This project would establish a Canarsie Corps summer youth employment program to support resiliency and other community projects in Canarsie.**

## Project Description

Residents who lived through Superstorm Sandy agree that a coordinated effort is necessary to expedite recovery after future storms. Immediately following the storm, there were a number of young adults who were available but were unsure how to help. This project would develop a Canarsie Corps program that identifies and creates paid summer jobs for youth to assist with resiliency and community-based projects.

The Canarsie Corps would fund 100 positions for local youth aged 14–21 to be stationed out of the Recovery Community Center. These positions would work in conjunction with the Community Coordinator and the network of local block associations to take on resiliency and other projects in Canarsie, such as planting community gardens and maintaining access trails along Fresh Creek and within Canarsie Park. In the event of an emergency, the Canarsie Corps would provide a direct role in recovery, working under the direction of the Community Coordinator supporting vulnerable populations.

Participants will work up to 25 hours a week for six weeks in the summer. An open application and pre-determined approval process would be instituted to ensure diverse participation. A number of participants may choose to re-enroll after serving for one year, supporting the development of youth leaders within the program and in the broader Community.

In the Superstorm Sandy-affected regions, multiple organizations have provided youth employment programs with the backing of foundation, private, and government partners. Through a competitive selection process, one of these programs could be extended to administer a program tailored to Canarsie youth.

## Cost Estimate

**\$150,000**

The cost of this program would fund 50–100 positions annually for 2 years including overhead expenses (20%). This estimate assumes that positions will be paid at the New York State minimum wage of \$8 per hour.



Youth working to beautify their community. Creston National Fish Hatchery/USFWS Mountain-Prairie.<sup>14</sup>



AmeriCorps Team assisting post-disaster. *George Armstrong/FEMA.*<sup>15</sup>

### **Benefit/Co-Benefits** **Health and Social Benefits**

This program would provide youth-oriented programming, aligning with the Community’s short-term goal of “increasing resources for youth.” The Canarsie Corps would employ

young residents in positions that provide job experience and create opportunities for youth to work alongside organizations that are strengthening the neighborhood. This would give these young leaders direct experience with community organizing.

This program would also provide a robust education for participants as they would learn about the vegetation and ecosystem that is a part of their Community. Other skills taught through this program could include emergency response techniques and best practices, and basic training about resilient infrastructure.

### **Economic Benefits**

The Canarsie Corps positions would support a total of 100 part-time jobs for youth, providing them with the opportunity to learn money-management skills and how to handle employment responsibilities. Canarsie Corps may also help to shape future career paths. This program would allow Canarsie’s youth to gain hands-on experience in resiliency-related jobs, deepening their investment in the future of the Canarsie Community.

### **Cost-Benefit Analysis**

Demand for summer youth employment programs far exceeds the number of positions that are available, forcing the City of New York to operate a lottery-based system to select participants. Many have voiced the need to expand this program since it provides youth with a background in many important life skills. Operating a locally based version of this program for Canarsie would create 50–100 jobs for youth, allowing them to reap the benefits

of this program while building the resiliency of Canarsie through capacity building, education about coastal ecosystems and habitats, and improved social cohesion.

Youth unemployment is a major problem in New York City. The unemployment rate for youth, at 19.5%, is more than double the rate for all NYC residents as a whole.<sup>16</sup> This program would provide an opportunity for the approximately 2,730 youth who are unemployed and seeking work in Canarsie.<sup>17</sup>

This project may provide some cost-savings for the government since these positions are a cost-effective means of providing emergency response, support, and clean-up.

### **Anticipated Risk Reduction**

The Canarsie Corps Project would provide risk reduction by building the capacity within the Community to respond to emergency events. If this project were to identify a funding source that would allow it to continue beyond the two-year period, this could, over time, create hundreds of trained youth familiar with emergency response and recovery, helping to build a self-reliant community.

### **Timeframe**

Once the administering organization has been determined, the Canarsie Corps program could be launched within 6 to 8 months. If this program operates in conjunction with the Recovery Community Center and Community Coordinator, the timeframe could be extended by 2–4 years.

### **Regulatory Requirements**

It is anticipated that no regulatory review requirements would be needed for the execution of this project, though the program would need to abide by Federal, and New York State and City youth labor laws.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Homeowner Audit and Grant Program

## Proposed Project

### STRATEGY

**Make More Homes Physically and Financially Resilient**

### Recovery Support Functions

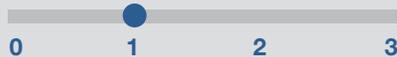


Housing

### Cost

**\$1.5 MILLION**

### Timeline (in years)



**This project would provide technical assistance and financial tools to low and moderate income single- and multi-family homeowners who want to retrofit their homes so they can mitigate future flood risk.**

### Project Description

During Superstorm Sandy, homeowners were ill-prepared to handle the flooding that severely damaged their homes. By making small capital upgrades, residents can ensure their homes are better protected from future storms and recurrent flooding. The project entails two components: individualized technical assistance and audits; and financial assistance. The program aims to help property owners in the 100-year floodplain make more informed decisions about resiliency investments and provide some financial support to make these investments.

Many homeowners in Canarsie were counseled to take out U.S. Small Business Administration loans to cover the cost of damage after Superstorm Sandy and are now facing financial uncertainty because of the additional debt they incurred. Furthermore, because of the expiration of the City of New York’s tax relief program, reduced property values, and

expected increases in flood insurance rates, homeowners are not able to afford the necessary upgrades needed to protect their homes from future disasters.

The technical assistance program would be offered to high-need homeowners at greatest risk of increases in flood insurance premiums and financial hardship. For example, this project could serve homeowners with property in the Federal Emergency Management Agency (FEMA)-designated Flood Insurance Rate Map (FIRM) Special Flood Hazard Area (SFHA), with a low-to-moderate household income. Qualified auditors would perform technical assistance, while counselors would help homeowners understand the repairs recommended by the auditor, weigh their options and connect them to financial assistance.

Technical assistance could include:

- Accurately assessing storm damage to



Homes such as these are difficult to elevate, but could utilize different strategies for protection.



Adjustments to the homes of Canarsie will protect them from future storms. *Courtesy of Canarsie Courier.*

residential properties; and

- Identifying potential retrofits to mitigate against future storm damage and potentially lower insurance premiums, such as elevation, as well as protection of mechanical systems, installation of sewer check valve(s), and floodproofing of basement spaces.

A financial assistance program would offer grants to building owners and ownership entities to implement select building resiliency measures (or percentage thereof).

Financial assistance could include:

- Full grants for low-cost measures (e.g., installing check valves); and
- Partial grants for high-cost measures (e.g., elevating mechanicals).

The Canarsie NYRCR Planning Committee (Committee) has requested that individual grants be capped at a reasonable amount to allow for as many households as possible to benefit from this program given the limited budget.

A Community Development Financial Institution (CDFI) could administer the grant pool and oversee the audit program, contracting with engineers and/or building inspectors who would be hired to perform resiliency audits on individual properties. Once the CDFI verified grantee eligibility, staff of the CDFI would work with the grantee to schedule an on-site physical assessment of existing issues and future risk to the property. Audits would result in a list of recommended retrofits to mitigate against future storm damage. The owner could then pursue financing through the CDFI to perform some or all of the recommended scope. The CDFI could also provide additional technical assistance, such as resiliency best practices information, to help owners evaluate cost benefits or upgrades.

The CDFIs are appropriate partners because they serve middle- and low-income markets and communities underserved by traditional financial institutions, typically providing both financial tools and support services to recipients. There may also be other potential local partners with capacity in grant administration suitable to administer this program.

### **Cost Estimate**

#### **\$1.5 MILLION**

An estimate of \$1.5 million includes a \$670,000 estimate for the audit component and \$670,000 for financial assistance. Assuming that audits may cost \$1,000 to \$5,000 per home, \$670,000 would support 134 to 670 audits. If the grant program is capped at an amount between \$2,000 and \$3,000 per household, between 223 and 335 households could be served by this program.

The estimate is based on typical improvements and similar CDFI-administered programs. Operating costs to administer the program through an existing organization would be approximately \$100,000 to \$200,000, including costs for a full-time program officer to do outreach, collect and triage applications, schedule building audits, catalog audit reports, and provide counseling to borrowers.

## **Benefit/Co-Benefits**

### **Economic Benefits**

An audit program would increase resiliency of homes in the Canarsie NYRCR Planning Area (Planning Area) by giving low- to moderate-income residents access to knowledge and capital to make resiliency improvements. Greater protection of homes, a critical economic asset for individuals in Canarsie, would allow the Planning Area to recover more quickly following a storm event. Additionally, certain types of improvements may reduce insurance premiums and save owners money over time.

### **Health And Social Benefits**

This program would target assistance to low and moderate income residents who may lack adequate resources to make repairs and recover from disasters. A comprehensive audit of risk coupled with access to financial resources would increase financial stability, thus contributing to the well-being of residents and overall neighborhood health, particularly for vulnerable low-income families.

### **Cost-Benefit Analysis**

This project would provide customized guidance for up to 670 of the 5,400 residential buildings in the high or extreme risk area. While this constitutes only 12% of the homes at risk, it is presumed that not all homeowners would

participate in the program and that additional funding sources could be leveraged to expand this project.

With the institution of a cap on each grant award, 268 homes in the floodplain could benefit (about 5%). According to a post-storm survey sent out by New York City Councilman Alan Maisel's office to residents of New York City Council District 46 (which includes Canarsie, Bergen Beach, Mill Island, Mill Basin, Georgetown, Marine Park, and portions of Flatlands), the average damages from Superstorm Sandy to homeowners in this region was estimated at \$30,000. Should a similar event strike Canarsie, this project could provide some savings from the net \$8 million in damages to those homeowners receiving the grant. This would translate to savings for the government, requiring less resources and aid that would need to be deployed.

Together, this program aims to tackle the most pressing issue facing the Community—adaptation in the face of increasing risk. As such, the benefits of this project outweigh its costs.

### **Anticipated Risk Reduction**

This project would reduce risk by enabling homeowners to floodproof buildings. Resiliency improvements would decrease the chance of

damage to residential assets, making these buildings safer and less costly to the people who occupy them.

### **Timeframe**

Once an administering organization has been selected, the proposed audit program could be launched within 6 months. Funds associated with recommended improvements could be distributed to eligible participants over the course of 1 year. The program would need to leverage additional funding to extend the time frame if grants are the preferred financing tool.

### **Regulatory Requirements**

Audits and financial assistance administered through an existing organization would face minimal regulations. Changes to FIRMs and insurance programs would impact eligibility for the program, but the administering entity would be responsible for maintaining current and accurate materials as regulations and information changes. Matching funds or additional outside funding could trigger additional oversight and regulation.

### **Jurisdiction**

This project would fall under the jurisdiction of the City of New York.

# Resiliency Workforce Development

## Proposed Project

### STRATEGY

Strengthen Economic Resiliency

#### Recovery Support Functions



Community Planning

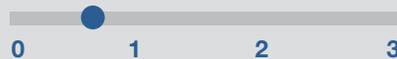


Economic Development

#### Cost

**\$1 MILLION**

#### Timeline (in years)



**A Resiliency Workforce Development project would train and connect local residents with sustainable job opportunities while simultaneously building a Community that can more effectively recover from future events.**

### Project Description

Canarsie residents felt as though they did not have the resources to effectively recover from Superstorm Sandy. By funding a Resiliency Workforce Development program, residents will be trained and employed in sustainable jobs, and a local labor force will be bolstered to help with future recovery needs.

The Proposed Project would expand workforce training and connect Canarsie residents to employment opportunities in a range of resiliency-related industries. It would simultaneously build the capacity of the Canarsie NYRCR Community (Community) to make physical resiliency improvements as well as improve their capacity to respond and recover from disasters—an expressed need in a neighborhood with areas of high unemployment. This project would fund training in areas such as:

- Building audits to determine the most cost-effective ways to improve the

resiliency of individual homes;

- Construction of resilient infrastructure, building improvements, and electrician certification;
- Installation and maintenance of solar and other building-scale renewable energy;
- Training for emergency medical technician and home health aides; and
- General Educational Development (GED) test preparation.

The program would be administered by an existing workforce training provider that currently serves Canarsie. In Canarsie, there are organizations that provide local workforce training, borough-wide and Citywide, and a Citywide program that connects a skilled workforce to resiliency-related jobs. Through a competitive selection process, one of these



Green City Force Corps Members receive training in home reconstruction in Canarsie during Superstorm Sandy. *Courtesy of Rebuilding Together NYC.*

providers could be selected to administer a program tailored to the needs of Canarsie residents.

Recruitment of applicants, provision of appropriate and high quality instruction, establishing relationships with apprenticeship programs, and guaranteeing job placement are some of the most challenging and critical functions the program administrator would need to ensure. The workforce training program would target resiliency construction and green jobs in Canarsie. Training opportunities may also exist in coordination with the Section 3 mandate that requires any project assisted by the U.S. Department of Housing and Urban Development (HUD) aim for 30% of new hires to be low-income individuals and/or residents of public housing.<sup>18</sup> While building on existing programs where appropriate and feasible, this program would provide a curriculum tailored to the specific skills required for upcoming publicly funded projects. Instruction would be administered through both classroom and hands-on training. The program would teach the technical skills needed for planned resiliency projects or for residential building resiliency retrofits, such as filling in basements and moving habitable floors above the base flood elevation.

It is critical for this training to connect residents to jobs that are in demand as a result of Citywide

resiliency efforts. By providing training in construction and teaching the intricacies of bolstering buildings for sea-level rise and flooding events, Canarsie residents would gain access to important work that would be especially needed in these urban coastal communities.

### **Cost Estimate**

#### **\$1 MILLION**

\$1 million would fund a workforce development program for approximately 100 residents over 2 years. The exact number of residents reached through the Proposed Project would depend on a number of factors including:

- Type of training provided (e.g., training for construction of coastal infrastructure versus training for resilient building trades);
- Length and depth of training provided;
- Amount of wrap-around support services provided such as pre-program counseling, job placement support, and other services to support participants in the development of soft skills; and
- Availability of matching funds by partnering organization or private foundation.

Analysis of existing workforce training programs reveals the range of services and costs different types of workforce programs may entail. Below are two illustrative high- and low-cost construction training program alternatives. The proposed workforce program would likely be closer to the moderate cost program, but options for a more intensive program exist and could be pursued, especially as labor requirements surrounding resiliency projects becomes clearer.

High-cost, intensive workforce program:

- For over \$20,000 per enrollee, full-time training for 18 weeks in building trades can be provided. Such a program would provide high-quality instruction, extensive laboratory/hands-on training, small class sizes (less than 30 enrollees), enrollee outreach/ recruitment, as well as wrap-around counseling services for pre- and post-training support and job placement.

Moderate-cost, moderate-intensity workforce program:

- For \$4,000–\$7,000 per enrollee, from 4 to 12 weeks, basic construction training would be provided. A program of this scale would provide basic training in a wide range of construction trades through classroom

and laboratory training. In addition to cost per student, some overhead cost may be required to manage the program.

### **Benefit/Co-Benefits**

#### **Economic Benefits**

As identified in the New York State Regional Economic Development Council’s New York City Regional Economic Development Plan, “helping small businesses access capital, hire and train workers, and develop business plans is an investment in sustainable economic growth.” As impacts from storms disproportionately affect economically vulnerable populations, connecting Canarsie to employment opportunities in these sectors would directly and indirectly increase the resiliency of the Community by lowering unemployment.

#### **Health and Social Benefits**

Connecting Canarsie to employment opportunities in resiliency sectors would build the internal capacity of the Community to deal with emergency events, aligning with the Planning Committee’s vision to create a self-reliant community.

#### **Cost-Benefit Analysis**

The workforce development program would train approximately 100 individuals for

resiliency-related work. This will directly benefit a portion of the 14,000 individuals living below the poverty level and the 8,750 residents above the age of 25 without a high school diploma. At 7.7%, Canarsie’s unemployment rate is slightly lower than New York City as a whole, but in portions of the Community, unemployment is nearing, or exceeding, 20%. The potential to solidify capacity within the Community to respond to events makes this a worthwhile investment that justifies its costs.

#### **Anticipated Risk Reduction**

The project would provide reduction of risk to physical community assets by training workers to implement improvements that strengthen the physical structures of the neighborhood as well as improve its ability to effectively respond to emergency events.

A workforce training program also reduces risk to participating individuals and their immediate neighborhood by increasing the employment rate. Canarsie residents who can secure new income by participating in this program would be better positioned to access the goods and services they need in a crisis.

#### **Timeframe**

Once the administering organization has been determined, the workforce development pro-

gram could be launched within 6 to 8 months.

#### **Regulatory Requirements**

Depending on the type of training and certification required, the resiliency construction workforce training program may be required to follow certain certification requirements. Should a workforce program seek to tie into certain Federal low-income population hiring requirements, additional regulations may apply.

#### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# Resilient Streetscaping

## Proposed Project

**STRATEGY**  
Strengthen Economic Resiliency

### Recovery Support Functions



Economic Development

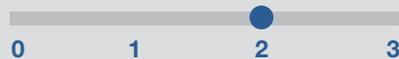


Infrastructure

### Cost

**\$3 MILLION**

### Timeline (in years)



This project would fund capital improvements along Avenue L and Rockaway Parkway that help to strengthen the economic viability of local businesses and provide support to residents during and after future disasters.

## Project Description

Canarsie residents did not feel prepared to handle the impacts of Superstorm Sandy. Many did not know where to obtain food, water, and social services. Businesses also remained closed after the flood waters receded, limiting the options of where residents could purchase goods. A Resilient Streetscaping project could help to strengthen key retail corridors, by attracting new businesses and providing power and information to residents during future storms.

This Proposed Project would undertake street-scaping that incorporates the best-practices in street design for resiliency. The re-designed Avenue L between Rockaway Parkway and East 94th Streets, and Rockaway Parkway between Glenwood Road and the intersection of Flatlands Avenue would operate as demonstration projects for the larger application of these design elements throughout Canarsie and New York City. The components of the streetscaping project would include:

- A small public plaza with seating, shade, and bike racks;
- Solar LED pedestrian lighting;
- Solar mobile-phone charging stations and a solar-powered information board;
- Planted curb bioswales; and
- Bike lanes and parking with permeable paving.

These elements would combine to create an active street life, improve drainage after both common and extreme storm events, and provide a non-grid backup power supply that provides lighting, cellphone charging, and real-time information during an emergency. The project would also create an opportunity for residents to learn about resiliency initiatives and to advocate for the project's expansion within their community. These educational elements



Existing conditions along Avenue L.

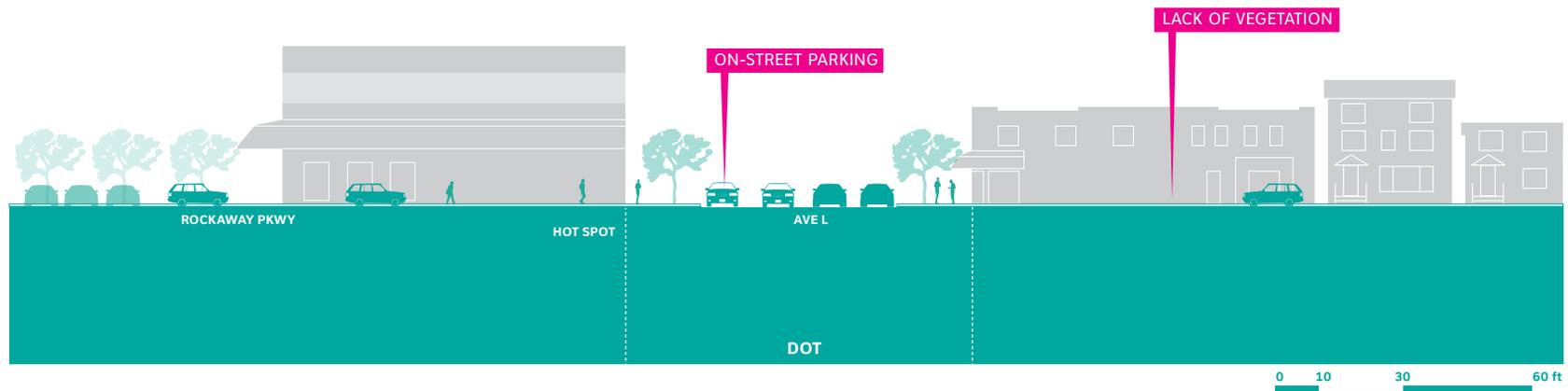
could provide information about solar power, including live data feeds about how much energy is being captured by the station, and how much could be captured if these projects were more widely adopted and implemented.

In an every day capacity, these streetscape elements would combine to serve as a quality public space, similar to the plazas created by the New York City Department of Transportation (NYC DOT) that have proliferated throughout

the city in recent years. The focus of this program has been on re-organizing the uses of the street to make them safer and more habitable for pedestrians. The Avenue L and Rockaway Parkway Resilient Streetscaping project takes this idea a step further, by redesigning the street bed to not just serve a broader base of users, but to be able to provide more uses through multifunctional infrastructure that can support and inform residents during and after a disaster.

### Cost Estimate \$3 MILLION

The funds for this project would be split between both locations and as programmed will cost \$3 million, or approximately \$600,000 per block, inclusive of demolition (\$150,000), construction (\$1.1 million), design engineering (\$433,000), street elements such as solar lighting (\$336,000), solar mobile-phone charging station (\$5,000), and solar-powered info board (\$10,000).



Current conditions along Avenue L and Rockaway Parkway in Canarsie.

**Benefit/Co-Benefits**

**Environmental Benefits**

This project is expected to have modest environmental benefits in the short-term, while serving as a potential model that can lead to more wide-spread adoption. The bioswales would have a local impact when employed in conjunction with a more comprehensive strategy addressing Canarsie’s stormwater flooding issues.

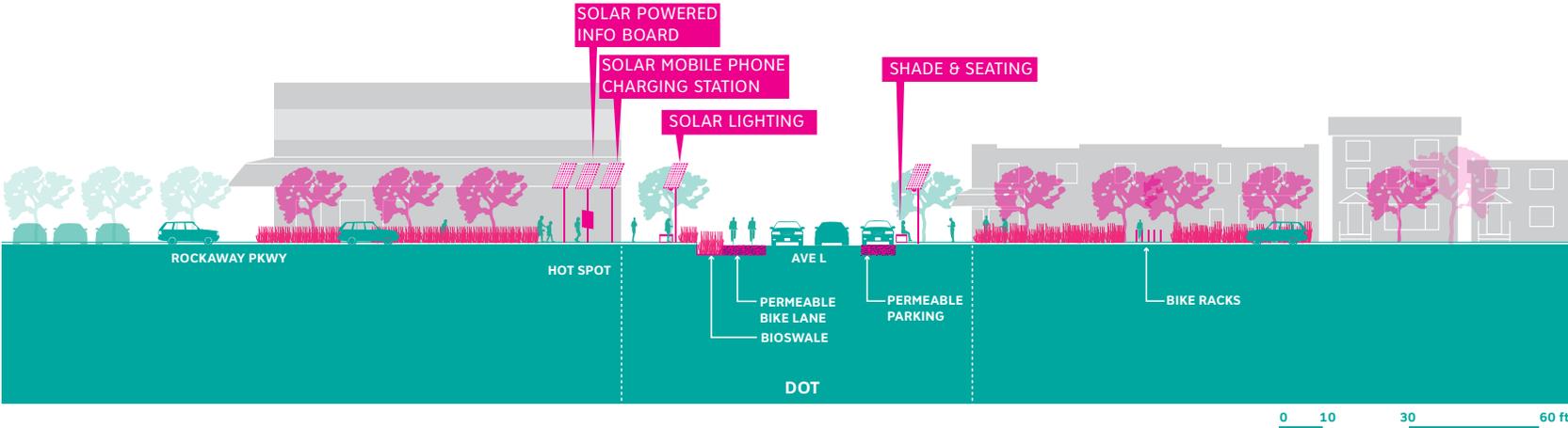
**Economic Benefits**

These streetscaping improvements would provide amenities that positively contribute to the character of the area by increasing the foot traffic along the commercial corridors and creating a respite for consumers. A 2012 NYC DOT study, The Economic Benefits of Sustainable Streets, showed that commercial areas with these kinds of pedestrian improvements considerably outperformed sites without these improvements, even when parking is removed.<sup>19</sup> Finally, this

project would create 6–13 temporary construction jobs over the course of the project.<sup>20</sup>

**Cost-Benefit Analysis**

The retail areas along Avenue L and Rockaway Parkway are key economic corridors in Canarsie. They are in close proximity to public transit options, and are outside of the floodplain. This project will directly benefit the 89 businesses along Avenue L and Rockaway Parkway, and the visitors, employees, and residents who



Proposed conditions along Avenue L and Rockaway Parkway in Canarsie.

shop and work there.<sup>21</sup> These improvements will lead to an improved street experience that may aid in business attraction, helping to fill the vacant storefronts and improve the quality of retail.

Pedestrian street lighting utilizing alternative energy along Avenue L would provide benefits beyond the reduction in energy costs. The implementation of solar power lighting may reduce the amount of time that the NYC DOT would have to spend in the area on street-light repairs. These efficiencies would translate to modest savings for government agencies during emergency events, as generator-powered lights would not have to be deployed in these areas.

### **Anticipated Risk Reduction**

This streetscaping project would not dramatically decrease the amount of risk faced by the Canarsie NYRCR Community (Community), but would demonstrate the various ways that infrastructure can be adapted to provide environmental and economic co-benefits that bolster the broader resiliency of Canarsie. The Community would be able to recover from events more quickly with the establishment of a centrally located, easily identifiable place that provides information (through the use of the solar-powered information board) and services. These strategies could be pursued on a

broader scale and adopted by New York State and City agencies as a result of these demonstration projects.

This project would reduce the risk score for Avenue L and Rockaway Parkway—two of Canarsie’s three commercial corridors—by enhancing their resiliency and in turn reducing their vulnerability to damage during or after a severe storm event. This reduced risk would affect four highly valued community assets located along Avenue L and Rockaway Parkway. These assets include the Gateway Dialysis Center, the Canarsie-Rockaway Parkway Station, the Holy Family Roman Catholic Church, and the New York City Fire Department’s Engine 257, Ladder 170—the only New York City Fire Department facility within the Canarsie NYRCR Planning Area.

### **Timeframe**

Once approved, and assuming a straightforward permitting process, this short-term project would require approximately 1 to 2 years to design, review, permit, and construct.

### **Regulatory Requirements**

Review and/or permitting by Federal and New York State and City agencies is anticipated for this project. Environmental review is prescribed by the New York State Quality Review Act

and the New York City Environmental Quality Review process. Project implementation may require permits from and/or coordination with NYC DOT.

### **Jurisdiction**

The identified project area falls within the jurisdiction of New York City.

# **V. Additional Materials**



EXIT

### Strategies

What should NY Rising in Canarsie focus on? Vote for your three most important strategies

A. Address existing and future vulnerabilities from coastal flooding, using nature systems when possible



F. Integrate alternative power sources and harden existing power sources



G. Engage youth in building a more resilient community

H. Improve access to comprehensive health services

I. Increase economic connectivity

J. Increase access between natural and economic and natural resources

K. Make homes more physically and financially resilient

Community Reconstruction Plan



## Table V-1: Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Cost Estimate	Regional (Y/N)
Reduce vulnerability to coastal flooding and sea level rise	USACE Coastal Protection Recommendation	The Committee recommends that existing coastal protection plans for Jamaica Bay include measures to enhance coastal protection in the Planning Area, while favoring natural and living strategies.	N/A	Y
Reduce vulnerability to coastal flooding and sea level rise	Paerdegat Coastal Protection	The Committee recommends the study and design of a system of protective measures by the USACE along Paerdegat Basin and the western corner of Canarsie Park to reduce the risk to areas of the Canarsie neighborhood that are subject to flooding from Paerdegat Basin during future coastal storm events.	>\$10 million	Y
Improve wastewater and stormwater management	Assessment of Area's Sewer System	The Committee recommends that the NYC Department of Environmental Protection (NYC DEP) examine vulnerabilities of the Planning Area's sewer system and determine improvements to enhance the resiliency of the system.	\$3–10 million	N
Build and coordinate local capacity for emergency response	ConEd Recommendation	The Committee recommends that Con Edison protects vulnerable substations within the Planning Area, as well as hardens all overhead power lines.	N/A	N
Build and coordinate local capacity for emergency response	Repair Sinkholes	The Committee recommends that NYC Department of Transportation (NYC DOT) examines sinkhole issues and make rapid repairs.	\$3–10 million	N
Build and coordinate local capacity for emergency response	Tree Maintenance	The Committee recommends that trees on public lands are well maintained and that a plan is in place to replace dead trees and plants with salt-water tolerant species.	\$3–10 million	N
Build and coordinate local capacity for emergency response	Street Lighting Improvements	The Committee recommends that NYC DOT install street lighting where needed to better illuminate dark areas.	\$3–10 million	N

Strategy	Project Name	Short Description	Cost Estimate	Regional (Y/N)
Make homes more physically and financially resilient	Home Resiliency Improvement Grant	The Committee recommends the creation of a broader home resiliency grant program, as identified in SIRR.	>\$10 million	Y
Make homes more physically and financially resilient	Building-Level Resiliency Education	The Committee recommends the NYC Housing Recovery Office create a program that would provide oversight, up-to-date information, training, access to subject matter experts, and funding to local community-based organizations (CBOs). Qualified counselors and auditors within the CBOs would provide education and technical assistance to the Community.	\$3–10 million	Y
Strengthen economic resiliency	Select Bus Service Extension	The Committee recommends that the Metropolitan Transit Authority (MTA)/DOT institute a Select Bus Service route from east-to west along Flatlands Avenue, as identified in the 2010 NYC DOT bus rapid transit phase 2 study.	>\$10 million	Y
Strengthen economic resiliency	Transportation and Parking Study	The Committee recommends the NYC DOT complete a transportation study for the Canarsie Planning Area. This study would emphasize defining transportation initiatives that improve pedestrian, cycling, and vehicular safety along Canarsie's streets, that enhance and encourage access to key commercial corridors, and that provide parking solutions that cater to the needs of the Community.	<\$500,000	Y
Strengthen economic resiliency	Capacity Building of Merchants along Avenue L	The Committee recommends the capacity building of merchants along Avenue L, including the development of a marketing plan for the corridor.	<\$500,000	N
Strengthen economic resiliency	Market Study Analysis	The Committee recommends a local business advocacy organization undertake a comprehensive update to previous business studies to create strategies that can improve market conditions.	<\$500,000	N

**Table V-2: Master Table of Projects**

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Reduce vulnerability to coastal flooding and sea level rise	Fresh Creek Coastal Protection	This project would fund a cheek wall and adjoining bioswales to capture storm surge and rising waters at the most vulnerable areas along Fresh Creek.	Proposed Project	\$7.7 million	N
Reduce vulnerability to coastal flooding and sea level rise	USACE Coastal Protection Recommendation	The Committee recommends that existing coastal protection plans for Jamaica Bay include measures to enhance coastal protection in the Planning Area, while favoring natural and living strategies.	Additional Resiliency Recommendation	N/A	Y
Reduce vulnerability to coastal flooding and sea level rise	Paerdegat Coastal Protection	The Committee recommends the study and design of a system of protective measures by the USACE along Paerdegat Basin and the western corner of Canarsie Park to reduce the risk to areas of the Canarsie neighborhood that are subject to flooding from Paerdegat Basin during future coastal storm events.	Additional Resiliency Recommendation	>\$10 million	Y
Activate and enhance access along the shoreline	Fresh Creek Long-Term Restoration & Resiliency	This project proposes a comprehensive plan for the length of Fresh Creek incorporating green infrastructure, improved access, and public amenities.	Featured Project	\$52 million	N
Activate and enhance access along the shoreline	Canarsie Pier Access Improvements	This project would fund safety improvements to the Belt Parkway Underpass and Roundabout to improve and encourage pedestrian and cyclist access between Canarsie Pier and the Canarsie Community (Community).	Proposed Project	\$2 million	N

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Activate and enhance access along the shoreline	Canarsie Pier and Beach Community Enhancements	This project would upgrade the facilities at Canarsie Pier to create a waterfront destination that better serves visitors and local residents.	Featured Project	\$32.7 million	N
Activate and enhance access along the shoreline	Canarsie Youth Environmental Education Program	This project would fund the development of an environmental education program for youth in Canarsie to learn about Jamaica Bay and adjacent waterways.	Proposed Project	\$100,000	N
Improve wastewater and stormwater management	Canarsie and Southeast Brooklyn Waterfront Stormwater Study and Pilot Projects	This two-phase project would fund a study to examine the feasibility, costs, and benefits of various stormwater capture and retention projects in the NYRCR Canarsie and Southeast Brooklyn Waterfront Planning Areas. The Proposed project would also implement recommended scalable pilot projects within both Planning Areas	Proposed Project	\$650,000	Y
Improve wastewater and stormwater management	Assessment of Area's Sewer System	The Committee recommends that the NYC Department of Environmental Protection (NYC DEP) examine vulnerabilities of the Planning Area's sewer system and determine improvements to enhance the resiliency of the system.	Additional Resiliency Recommendation	\$3–10 million	N
Build and coordinate local capacity for emergency response	Recovery Community Center	This project would establish a Recovery Community Center with resilient lighting and power, the ability to distribute supplies, coordinate efforts with government agencies, and host trainings and capacity building initiatives.	Proposed Project	\$1 million	N
Build and coordinate local capacity for emergency response	Critical Facility Upgrades Program	This project would fund resilient retrofits for a community-based organization in Canarsie to ensure continuity of critical services. The organization would also be required to commit to providing assistance with recovery efforts after an emergency event.	Proposed Project	\$500,000	N

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Build and coordinate local capacity for emergency response	Canarsie Corps Program	This project would establish a Canarsie Corps summer youth employment program to support resiliency and other community projects in Canarsie.	Proposed Project	\$150,000	N
Build and coordinate local capacity for emergency response	ConEd Recommendation	The Committee recommends that Con Edison protects vulnerable substations within the Planning Area, as well as hardens all overhead power lines.	Additional Resiliency Recommendation	N/A	N
Build and coordinate local capacity for emergency response	Repair Sinkholes	The Committee recommends that NYC Department of Transportation (NYC DOT) examines sinkhole issues and make rapid repairs.	Additional Resiliency Recommendation	\$3–10 million	N
Build and coordinate local capacity for emergency response	Tree Maintenance	The Committee recommends that trees on public lands are well maintained and that a plan is in place to replace dead trees and plants with salt-water tolerant species.	Additional Resiliency Recommendation	\$3–10 million	N
Build and coordinate local capacity for emergency response	Street Lighting Improvements	The Committee recommends that NYC DOT install street lighting where needed to better illuminate dark areas.	Additional Resiliency Recommendation	\$3–10 million	N
Make homes more physically and financially resilient	Homeowner Audit and Grant Program	This project would provide technical assistance and financial tools to low and moderate income single- and multi- family homeowners who want to retrofit their homes so they can mitigate future flood risk.	Proposed Project	\$1.5 million	N

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Make homes more physically and financially resilient	Home Resiliency Improvement Grant	The Committee recommends the creation of a broader home resiliency grant program, as identified in SIRR.	Additional Resiliency Recommendation	>\$10 million	Y
Make homes more physically and financially resilient	Building-Level Resiliency Education	The Committee recommends the NYC Housing Recovery Office create a program that would provide oversight, up-to-date information, training, access to subject matter experts, and funding to local community-based organizations (CBOs). Qualified counselors and auditors within the CBOs would provide education and technical assistance to the Community.	Additional Resiliency Recommendation	\$3–10 million	Y
Strengthen economic resiliency	Resiliency Workforce Development	A Resiliency Workforce Development project would train and connect local residents with sustainable job opportunities while simultaneously building a Community that can more effectively recover from future events.	Proposed Project	\$1 million	N
Strengthen economic resiliency	Resilient Streetscaping	This project would fund capital improvements along Avenue L and Rockaway Parkway that help to strengthen the economic viability of local businesses and provide support to residents during and after future disasters.	Proposed Project	\$3 million	N
Strengthen economic resiliency	Select Bus Service Extension	The Committee recommends that the Metropolitan Transit Authority (MTA)/DOT institute a Select Bus Service route from east-to west along Flatlands Avenue, as identified in the 2010 NYC DOT bus rapid transit phase 2 study.	Additional Resiliency Recommendation	>\$10 million	Y

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strengthen economic resiliency	Transportation and Parking Study	The Committee recommends the NYC DOT complete a transportation study for the Canarsie Planning Area. This study would emphasize defining transportation initiatives that improve pedestrian, cycling, and vehicular safety along Canarsie's streets, that enhance and encourage access to key commercial corridors, and that provide parking solutions that cater to the needs of the Community.	Additional Resiliency Recommendation	<\$500,000	Y
Strengthen economic resiliency	Capacity Building of Merchants along Avenue L	The Committee recommends the capacity building of merchants along Avenue L, including the development of a marketing plan for the corridor.	Additional Resiliency Recommendation	<\$500,000	N
Strengthen economic resiliency	Market Study Analysis	The Committee recommends a local business advocacy organization undertake a comprehensive update to previous business studies to create strategies that can improve market conditions.	Additional Resiliency Recommendation	<\$500,000	N

## Public Engagement

As a community-driven planning process, public engagement has been central to the iterative development of the Canarsie NY Rising Community Reconstruction (NYRCR) Plan. Over the course of six months, more than 300 residents, elected officials, and professionals participated in Canarsie NYRCR events including three Public Engagement Events and over 10 Committee Meetings. Public input guided each step in the reconstruction process, including the identification of assets, risks, needs, strategies, and ultimately the formulation of projects that are proposed for funding in the NYRCR Plan. Extensive public engagement has ensured that the NYRCR Plan reflects the Canarsie NYRCR Community's (Community) priorities for rebuilding and resiliency.

### Planning Committee

The Canarsie NYRCR Planning Committee (Committee) is comprised of 7 volunteer Committee Members and two volunteer Co-Chairs who represent various constituencies within the Planning Area including but not limited to, homeowners, civic leaders, and business owners. Committee Members serve as ambassadors of the NYRCR process and are responsible for ensuring Community voices were heard throughout the process. The Committee spearheaded community outreach, identifying avenues for outreach and



Canarsie residents stayed informed and provided feedback at the Public Engagement Events.

developing a strategy for effectively soliciting public feedback.

Planning Committee Meetings were the central venue for Committee discussion and decision-making. Specific tasks and discussions held at the meetings included: identification of community assets, assessment of critical

issues, needs and opportunities, formalization of reconstruction and resiliency strategies, refinement of projects, and finalization of Proposed and Featured Projects. Planning Committee Meetings were held at the Hebrew Educational Society and were open to the public. The NYRCR website <http://stormrecovery.ny.gov/nyr-cr/community/canarsie> served as the

official portal of information for the Committee meetings, including both meeting time and location, and post-meeting summaries.

### Public Engagement Process

Public Engagement Events were designed to be highly interactive and maximize community feedback on the priorities and needs of the community. Three Public Engagement Events were held prior to the submission of the NYRCR Plan. The events were similarly held at the Hebrew Educational Society, a local community center easily-accessible to members of the Community. At the three Public Engagement Events, the Committee offered general information about the NYRCR process, presented outcomes and information gathered to date and solicited feedback through dynamic discussions and interactive displays. The fourth Public Engagement Event will present the finalized Proposed and Featured Projects to the public. A translator was on hand at all events to accommodate Haitian Creole speakers. Following each Public Engagement Event, community feedback was aggregated and analyzed in order to guide discussion during subsequent Planning Committee meetings.

### Public Engagement Event Outreach

Extensive outreach was undertaken in advance of each Public Engagement Event. Committee

members leveraged community distribution channels and relationships with local CBOs to distribute printed flyers and storefront posters in English and Haitian Creole, specifically targeting vulnerable populations, such as seniors, individuals with developmental disabilities, and the linguistically isolated. Flyers were distributed at a number of local schools and given to students to bring home to their parents. Committee members also visited English and Creole churches and asked that flyers be inserted in church bulletins on Sunday.

The Committee handed out flyers along key commercial corridors, including at the L train Station. Email blasts in both English and Haitian Creole were sent to community centers, local not-for-profits, schools, religious institutions, elected officials, local businesses, and residents. Online and print advertisement campaigns were launched through two local media outlets, the Canarsie Courier and Caribbean Life.

### Online Engagement and Social Media Outreach

The NYRCR website, located at [www.storm-recovery.ny.gov/nyrcr](http://www.storm-recovery.ny.gov/nyrcr), served as a valuable public resource. The aforementioned Canarsie NYRCR page featured announcements, meeting dates and locations, and materials produced

by the Planning Committee throughout the process. The NYRCR website also directed visitors to the NYRCR Facebook page (located at <https://www.facebook.com/NYStormRecovery>) and Twitter account (@NYStormRecovery). Communities were also able to submit comments through the NYRCR website and by emailing [info@stormrecovery.ny.gov](mailto:info@stormrecovery.ny.gov).

### Public Engagement Event #1 (July 2014)

#### Program Scope; Goals and Timeline; Community feedback on Community Vision, Critical Issues, Needs and Opportunities, Geographic Scope and Community Assets

The first Public Engagement Event showcased the NYRCR program scope and presented the Planning Committee's preliminary community vision, assessment of community assets, critical issues, and needs and opportunities. The Public Engagement Event began with a formal presentation to the Community that introduced the NYRCR Program and its objectives. Following the presentation, an open house style event was held and Committee Members facilitated group discussion and invited input on the community vision, community assets, critical issues, and needs and opportunities as featured on the display boards. While the public engaged in conversation around the display boards, they were also invited to write their feedback directly

on the boards. The event ended with a wrap-up, including reports from each display station and a general question and answer session. Over 125 members of the Community attended the event and contributed valuable feedback that guided subsequent Committee discussions.

### **Public Engagement Event #2 (September 2014)**

#### **Summarized feedback from Public Engagement Event #1; Presentation of and gathering community feedback on list of strategies**

The second Public Engagement Event solicited public responses to the resiliency strategies presented by the Committee and the public. The event followed a similar format to the previous Public Engagement Event and featured an introductory presentation, an open house with display boards and feedback mechanisms, and a wrap-up. Members of the community not only engaged with Committee members staffing the display boards, but were additionally encouraged to vote for three of their preferred resiliency strategies. Once again, the Canarsie Community was avidly engaged at the event, with over 100 residents in attendance, and contributed valuable feedback on the strategies that helped shape the Committee conversation during the formulation of Proposed and Featured Projects.

### **Public Engagement Event #3 (November 2014)**

#### **Presentation of and Community feedback on Proposed and Featured Projects, and additional resiliency recommendations**

The third Public Engagement Event provided a critical opportunity to share the Proposed and Featured Projects with the Community and obtain feedback on these projects. The event featured an open house with educational boards on the Proposed and Featured Projects staffed by Committee members. A central component of the open house was the projects voting board which provided a space for the public to indicate their support for up to three Proposed and Featured Projects. By the end of the night, over 60 members of the public participated in the voting which provided a range of feedback on the projects.

### **Public Engagement Event #4 (January 2015)**

#### **Presentation of NYRCCR Plan**

Public Engagement Event #4 will take place in January of 2015 and conclude the Public Engagement Event series. At this event the Planning Committee will present the Proposed and Featured Projects as well as the full NYRCCR Plan to the public.



Lively debate flourished at stations categorized around strategies.

**Table V-3: Community Asset Inventory**

**Meaning of Risk Scores**



Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
AVENUE L COMMERCIAL CORRIDOR	Moderate	Economic	Employment Hub	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
FLATLANDS AVENUE COMMERCIAL CORRIDOR	Moderate	Economic	Employment Hub	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
ROCKAWAY PARKWAY COMMERCIAL CORRIDOR	Moderate	Economic	Employment Hub	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
EVELYN DOUGLIN CTR SERV. PEOPLE IN NEED	High	Health_and_Social_Services	Healthcare Facilities	Yes	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
EIHAB HUMAN SERVICES	High	Housing	Supportive Housing	Yes	No	High	No	No	Yes	No	Yes	No	1	3	2.00	2	12
GAN JEWISH DAY CARE CENTER & HEBREW EDUCATIONAL SOCIETY	High	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
LITTLE PRINCETON NURSERY AND DAY CARE CENTER LLC	High	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
BIG APPLE DAY CARE INC.	High	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	No	Yes	No	1	3	2.00	2	12
PACPLEX SPORTS RECREATION AND EDUCATION COMPLEX	High	Health_and_Social_Services	Schools	No	No	High	No	0	Yes	Yes	Yes	Yes	2	3	3.00	2	18

**Meaning of Risk Scores**

- Severe (>70)
- High (24-53)
- Moderate (6-23)
- Residual (<6)

Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
EMS STATION 58	Extreme	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	3.50	2	21
FDNY ENG 257, LAD 170	Moderate	Health_and_Social_Services	Emergency Operations/Response	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
RIVER MANOR CARE CENTER	Extreme	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	3.50	2	21
FOUR SEASONS NURSING AND REHABILITATION CENTER	Moderate	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	Yes	Yes	Yes	2	3	2.50	2	15
FIRST MEDCARE PRIMARY CARE CENTER	Moderate	Health_and_Social_Services	Healthcare Facilities	Yes	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
SUNRISE/PARKSHORE ADULT DAY HEALTH CARE CENTER	Moderate	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
STATEN ISLAND UNIVERSITY HOSPITAL	Moderate	Health_and_Social_Services	Healthcare Facilities	Yes	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
SUSAN LEVIT MEDICAL ARTS CENTER	Moderate	Health_and_Social_Services	Healthcare Facilities	Yes	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12

**Meaning of Risk Scores**

Severe (>70)	
High (24-53)	
Moderate (6-23)	
Residual (<6)	

Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
GATEWAY DIALYSIS CENTER	Moderate	Health_and_Social_Services	Healthcare Facilities	Yes	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
LAKESIDE/PARKSHORE ADULT DAY HEALTH CARE CENTER	Moderate	Health_and_Social_Services	Daycare and Eldercare	Yes	Yes, FEMA	High	No	No	Yes	Yes	Yes	Yes	2	3	2.50	2	15
FAIRVIEW ADULT DAY CARE CENTER	High	Health_and_Social_Services	Daycare and Eldercare	Yes	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
VERSACARE HEALTH CENTER	Moderate	Health_and_Social_Services	Healthcare Facilities	Yes	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
NYPD 69 PRECINCT	Moderate	Health_and_Social_Services	Emergency Operations/Response	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
SCHOOL SAFETY BKLYN. SO. OFFICE (SOUTH SHORE H.S.)	Moderate	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
JOHN WILSON INTERMEDIATE SCHOOL 211	High	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
YESHIVA GEDOLAH OHR YISROEL	High	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
YESHIVA ATERES YISROEL	High	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	No	1	3	2.00	2	12
JASA SENIOR DAY CARE CENTER	High	Health_and_Social_Services	Daycare and Eldercare	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15

**Meaning of Risk Scores**



Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
BROOKLYN HEBREW SCHOOL	High	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
SOUTH SHORE EDUCATIONAL COMPLEX	Moderate	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
CANARSIE EDUCATIONAL COMPLEX	Moderate	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
HERMAN SCHREIBER PUBLIC SCHOOL 279	Moderate	Health_and_Social_Services	Schools	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
CANARSIE-ROCKAWAY PARKWAY STATION (L TRAIN AND BUS)	Moderate	Infrastructure_Systems	Transportation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
MTA FACILITY	Moderate	Infrastructure_Systems	Transportation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
GAS STATION (#1)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
GAS STATION (#2)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
GAS STATION (#3)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
GAS STATION (#4)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
GAS STATION (#5)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14

**Meaning of Risk Scores**

Severe (>70)	
High (24-53)	
Moderate (6-23)	
Residual (<6)	

Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
GAS STATION (#6)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
GAS STATION (#7)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
GAS STATION (#8)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
GAS STATION (#9)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	Yes	Yes	Yes	2	3	2.50	3	23
GAS STATION (#10)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18
GAS STATION (#11)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
GAS STATION (#12)	Moderate	Infrastructure_Systems	Liquid Fuels	No	Yes, FEMA	High	No	No	Yes	No	Yes	No	1	3	1.50	3	14
AVENUE M PUMPING STATION (NYCDEP)	Moderate	Infrastructure_Systems	Wastewater	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	4	24
PAERDEGAT PUMPING STATION (NYCDEP)	Moderate	Infrastructure_Systems	Wastewater	No	No	High	No	No	Yes	Yes	Yes	Yes	2	3	2.50	4	30
BELT PARKWAY	High	Infrastructure_Systems	Transportation	No	No	High	No	No	Yes	Yes	Yes	Yes	2	3	3.00	2	18
E 105 STREET STATION (L TRAIN)	Moderate	Infrastructure_Systems	Transportation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	3	18

**Meaning of Risk Scores**

- Severe (>70)
- High (24-53)
- Moderate (6-23)
- Residual (<6)

Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
CANARSIE PIER	High	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3.50	2	21
JAMAICA BAY GREENWAY	High	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3.50	2	21
WILSON PLAYGROUND	High	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	2	15
FRESH CREEK NATURE PRESERVE	High	Natural_and_Cultural_Resources	Natural Habitats	No	No	High	No	Yes	Yes	Yes	Yes	No	2	3	3.00	2	18
CANARSIE PARK	High	Natural_and_Cultural_Resources	Parks and Recreation	No	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3.50	2	21
PAERDEGAT BASIN	Extreme	Natural_and_Cultural_Resources	Water Bodies	No	No	High	No	Yes	Yes	Yes	Yes	No	2	3	4.00	1	12
FRESH CREEK	Extreme	Natural_and_Cultural_Resources	Water Bodies	No	No	High	No	Yes	Yes	Yes	Yes	No	2	3	4.00	1	12
HEBREW EDUCATIONAL SOCIETY	High	Natural_and_Cultural_Resources	Community Centers	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.50	3	23

**Meaning of Risk Scores**

Severe (>70)	
High (24-53)	
Moderate (6-23)	
Residual (<6)	

Asset Information							Landscape Attributes							Risk			
Asset	Risk Area	Asset Class	Asset Sub-category	Socially Vulnerable Populations	Critical Facility	Community Value	Erosion	Waterline	Shore defenses	Protective vegetation	Dunes	Barrier Island or Filled Wetland	Landscape Attribute Score ("Yes" = +0.5)	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
BAYVIEW COMMUNITY CENTER (NYCHA)	Moderate	Natural_and_Cultural_Resources	Community Centers	No	No	High	No	No	Yes	No	Yes	Yes	1.5	3	2.00	2	12
HOLY FAMILY ROMAN CATHOLIC CHURCH	Moderate	Natural_and_Cultural_Resources	Cultural or Religious Establishments	No	No	High	No	No	Yes	No	Yes	No	1	3	1.50	2	9
HOUSING IN HIGH RISK AREAS	High	Housing	Multi-Family Residence	No	No	High	No	Yes	Yes	No	Yes	Yes	2	3	3.00	3	27

# Endnotes

## Introduction

- 1 Licensed under Creative Commons BY-NC-ND 2.0
- 2 Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.
- 3 10-year storm protections are currently assessed at 7.7' North American Vertical Datum of 1988.

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- 9 Federal Emergency Management Agency. “Community Emergency Response Teams.” Federal Emergency Management Agency, May 2014. Web. 12 August 2014.

### Section III

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- 2 As an example, a 2011 study compared the economic impacts related to spending at a local stores and chain stores. The study found that every \$100 spent at a local store contributed an additional \$58 to the local economy, while every \$100 spent at a chain store contributed only \$33 to the local economy.  
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#### Canarsie Youth Environmental Education Program

- 7 Licensed under Creative Commons, BY-NC-SA 2.0 <http://flic.kr/p/oqMxTu>
- 8 Licensed under Creative Commons, BY-NC-SA 2.0 <https://flic.kr/p/n8X5yc>

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- 9 Licensed under Creative Commons, BY-NC-ND 2.0 <http://flic.kr/p/fATjH>
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# Glossary

## ACS

United States Census Bureau American Community Survey A continuous survey provided by the United States Census Bureau that provides demographic data between decennial censuses.

## ADA

(Americans with Disabilities Act) A United States law enacted by Congress prohibiting discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities.

## BFE

(Base Flood Elevation) The computed elevation resulting from floodwater that has a 1% chance of equaling or exceeding that level in a given year.

## BLS

(United States Bureau of Labor Statistics) The agency within the United States Department of Labor responsible for measuring and tracking employment rates and projections, workplace conditions, employee benefits and earnings, commodity prices, sector productivity, and other statistics concerning the United States labor market.

## BRT

(Bus Rapid Transit) A bus-based mass transit system that operates with a variety of dedicated lanes, busway alignment, off-board fare collection,

intersection treatment, and platform-level boarding to reduce delays of a typical bus transit system. Within New York City it is operated jointly by the New York City Department of Transportation NYC DOT and the Metropolitan Transportation Authority MTA.

## CBO

(Community-Based Organization) A not-for-profit organization that operates within a local community.

## CDBG-DR

(Community Development Block Grant-Disaster Recovery) Federal grants administered by the United States Department of Housing and Urban Development HUD and allotted to cities, counties, and states to facilitate rebuilding and recovery of disaster-impacted areas as designated by the President of the United States.

## CDFI

(Community Development Financial Institution) A community-based organization CBO tasked with administering grants, providing credit and capital loans, financing home improvements, and investing in economically underserved communities as mandated by the 1994 establishment of the CDFI Fund as a federal agency within the United States Department of Treasury.

## CEQR

(New York City Environmental Quality Review) The

New York State Environmental Quality Review SEQR Act-mandated process by which City agencies determine the environmental effect, if any, of the City's approval of a discretionary action.

## CERT

(Community Emergency Response Team) An organization composed of volunteers trained and tasked to provide supplementary emergency care during a major disaster.

## CRP

(Comprehensive Restoration Plan) A master plan developed among stakeholders to facilitate ecosystem restoration within a defined area.

## CSO

(Combined Sewer Overflow) Water pollution caused by large variations of flow in a sewer system that collects both sanitary sewage and stormwater runoff in a single pipe system.

## CUNY

(City University of New York) The public university system of New York City.

## EMT

(Emergency Management Technician) A professional trained to provide immediate medical care, life support, and specialized transportation in advance

of a patient's admission to a medical facility for a life-threatening injury or illness.

#### FDNY

(Fire Department of the City of New York) The New York City government agency responsible for providing first responders to fires, public safety and emergency situations, disasters, and acts of terrorism.

#### FEMA

(Federal Emergency Management Agency) An agency within the United States Department of Homeland Security responsible for the coordination of the response to a state-of-emergency-declared disaster.

#### FIRM

(Flood Insurance Rate Map) The official map of a community used by the Federal Emergency Management Agency FEMA to delineate a community's base flood elevations, flood zones, and floodplain boundaries.

#### GMP

(General Management Plan) A plan developed and implemented by the United States National Park Service NPS concerning the preservation, protection, and management of a national park.

#### HMP

(Hazard Mitigation Plan) A New York City plan, revised in 2014 by the Office of Emergency Manage-

ment NYC OEM and the Department of City Planning NYC DCP, that assesses the City's risk and provides city-wide mitigation strategies for natural disasters.

#### HRE

(Hudson Raritan Estuary) An estuary within the boundaries of New York State and New Jersey State that includes Jamaica Bay, Lower Bay, Arthur Kill, Kill Van Kull, Newark Bay, Hackensack River and Passaic River, Lower Hudson River, Harlem River, East River, Western Long Island Sound, and Upper Bay.

#### HRE CRP

(Hudson Raritan Estuary Comprehensive Restoration Plan) A plan developed in 2009 by the United States Army Corps of Engineers USACE and the Port Authority of New York/New Jersey that established a vision, master plan, and strategy for future ecosystem restoration in the New York/New Jersey Harbor.

#### HSE

(High School Equivalency) The educational level equal to that of a high school degree and granted by New York State's High School Equivalency Office within the State's Department of Education NYS ED through the administration of the Test Assessing Secondary Completion TASC, intended for students unable to achieve a high school diploma by the time they become 21 years of age.

#### HUD

(United States Department of Housing and Urban Development) The United States Federal government executive department responsible for executing federal policies concerning housing and metropolises.

#### HUD RBD

(HUD Rebuild by Design) A design competition launched in June 2013 by the United States Department of Housing and Urban Development HUD under Secretary Sean Donovan with the goals of addressing structural and environmental vulnerabilities exposed by Hurricane Sandy throughout the northeast and developing fundable solutions for protection against natural disasters in light of climate change.

#### JBRWG

(Jamaica Bay Regional Working Group) A collection of representatives from the NY Rising Community Reconstruction NYRCR communities closest to Jamaica Bay tasked with reviewing the NYRCR Final Plan.

#### LED

(Light-Emitting Diode) A semiconductor device through which a current passes through in one direction and upon doing so gives off light for practical usage as a light source in electronic equipment components. The type of light source emits less energy and is therefore more efficient than other light sources.

**MTA**

(Metropolitan Transportation Authority) A public benefit corporation responsible for providing public transportation in twelve counties in southeastern New York and two counties in southwestern Connecticut.

**NDRF**

(National Disaster Recovery Framework) A guide provided by Federal Emergency Management Agency FEMA that provides a flexible, recovery-support structure for disaster-impacted areas.

**NFIP**

(National Flood Insurance Program) A Federal Emergency Management Agency FEMA-run program that provides government-sponsored flood insurance to homeowners, renters, and business owners.

**NHS**

(Neighborhood Housing Services) A not-for-profit community-based organization CBO that provides financial and lending services and counseling for homeowners and engages in the preservation of affordable housing within the New York City metropolitan area with particular attention to five neighborhoods in Brooklyn, the Bronx, and Queens.

**NOAA**

(National Oceanic and Atmospheric Administration) A scientific agency within the United States Department of Commerce responsible for monitoring the condition of the environment, including the oceans and the atmosphere.

ment of Commerce responsible for monitoring the condition of the environment, including the oceans and the atmosphere.

**NPCC**

(New York City Panel on Climate Change) A cross-disciplinary task force—comprised of scientists, academics, and legal, insurance, and risk management professionals—established within the Mayor’s Office in August 2008 and supported by the Rockefeller Foundation in tandem with the PlaNYC initiative and the New York City Mayor’s Office of Long-Term Planning and Sustainability OLTPS efforts.

**NPS**

(United States National Park Service) The United States Federal government executive department responsible for the management of national parks and monuments, as well as historic properties.

**NYBDC**

(New York Business Development Corporation) An organization that promotes small business interests in New York State by providing loans through the Empire State Certified Development Corporation.

**NYC Business Solutions**

(New York City Business Solutions Centers) A network of hubs throughout the City, established in 2005 and under the auspices of the New York City

Department of Small Business Services SBS, offering a range of free services dedicated to business establishment, operation, and expansion.

**NYC DCAS**

(New York City Department of Citywide Administrative Services) The New York City government agency responsible for providing support to other agencies through recruiting, hiring, and training municipal employees and ensuring equal employment opportunities; managing facilities, utility accounts, real estate assets, and city-owned fleets; overseeing supplies and equipment; and promoting energy management and conservation.

**NYC Building Resiliency Task Force**

An extensive team of 200 volunteer professionals created by the Urban Green Council—the not-for-profit New York City chapter of the United States Green Building Council USGBC—tasked by the City with putting forth recommendations for resiliency initiatives, thirty-three of which were released in June 2013, in part through collaboration with the Special Initiative for Rebuilding and Resiliency SIRR.

**NYC DCP**

(New York City Department of City Planning) The New York City government agency responsible for the strategic development of the City’s physical and socioeconomic planning.

**NYC DEP**

(New York City Department of Environmental Protection) The New York City government agency responsible for providing the City’s water supply; managing the City’s wastewater system; and regulating the City’s environment, including air quality, hazardous waste, and quality of life issues.

**NYC DOB**

(New York City Department of Buildings) The New York City government agency responsible for the enforcement of building codes and zoning regulations, the issuance of building permits, and the inspection of new and existing buildings.

**NYC DOE**

(New York City Department of Education) The New York City government agency responsible for managing, maintaining, and funding public schools and educational programs, accounting for pre-kindergarten through twelfth grade; adult and continuing education; and career and technical instruction.

**NYC DOHMH**

(New York City Department of Health and Mental Hygiene) The New York City government agency responsible for enacting and administering policy for, and ensuring public awareness of, a range of health initiatives and services.

**NYC DOT**

(New York City Department of Transportation) The New York City government agency responsible for the management of the City’s transportation infrastructure.

**NYC DPR**

(New York City Department of Parks and Recreation) The New York City government agency responsible for the management of City parks, monuments, and historic house museums; the preservation of the City’s ecological diversity; and the provision of recreational and athletic facilities and programs.

**NYR HRO**

(New York City Mayor’s Office of Housing Recovery Operations) A New York City government agency founded in 2013 to assist municipal residents with hurricane recovery through such initiatives as the Build it Back Program.

**NYC OEM**

(New York City Office of Emergency Management) The New York City government agency responsible for preparation, coordination, and education concerning emergency response and recovery.

**NYC ORR**

(New York City Office of Recovery and Resiliency) The New York City government agency, established in March 2014, responsible for implementation of

citywide initiatives set forth in A Stronger, More Resilient New York SIRR Report, as well as assisting the New York City Mayor’s Office of Long-Term Planning and Sustainability OLTPS with enacting long-term goals established in 2007 by the PlaNYC initiative.

**NYC REDC**

(New York City Regional Economic Development Council) One of ten regional councils, created by Governor Andrew M. Cuomo, tasked with developing strategic plans over the long-term for economic growth in New York City.

**NYC SBS**

(New York City Department of Small Business Services) The New York City government agency responsible for promoting small businesses’ economic growth, providing technical assistance, and assisting businesses with employment.

**NYCHA**

(New York City Housing Authority) A public authority responsible for administering public housing for low- and moderate-income residents in New York City.

**NYPD**

(New York City Police Department) The New York City government agency responsible for the City’s law enforcement.

**NYRCR**

(NY Rising Community Reconstruction) A New York State program established by Governor Andrew M. Cuomo to provide additional rebuilding and revitalization assistance to communities damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee.

**NYS DEC**

(New York State Department of Environmental Conservation) The New York State government agency responsible for the conservation, improvement, and protection of natural resources; the management of State-owned lands; and the regulation of environmental laws and regulations.

**NYS DOS**

(New York State Department of State) The New York State government agency responsible for strategic investment in the revitalization and economic growth of regions.

**NYS ED**

(New York State Department of Education) The New York State government agency, under the auspices of the elected New York State Board of Regents and part of the University of the State of New York educational services system, responsible for carrying out the Board's education policy, including State curriculum and testing, and comprising offices overseeing pre-kindergarten through high school, higher

education, cultural education, and adult career and continuing education services.

**NYS REDC**

(New York State Regional Economic Development Council) The ten regional councils, created by Governor Andrew M. Cuomo, tasked with developing long-term strategic plans for economic growth in New York City.

**OLTPS**

(New York City Mayor's Office of Long-Term Planning and Sustainability) The New York City government agency, instituted within the Mayor's Office in 2008, responsible for enacting short-term strategies and approving long-term studies for enhancing quality of life, responding to climate change, and promoting sustainability, as well as for putting forth the PlaNYC initiative.

**PlaNYC**

A report published in 2007 and overseen jointly by the New York City Mayor's Office of Long-Term Planning and Sustainability OLTPS and the New York City Office of Recovery and Resiliency NYC ORR that seeks to increase the City's sustainability and resiliency in the face of climate change by proposing strategies to be accomplished by the year 2030. Progress will be reported annually and the plan will be revised every four years.

**ROW**

(Right-of-way) A strip of land granted or reserved for public purposes.

**SBA**

(United States Small Business Administration) The United States Federal agency, created in 1953, responsible for protecting the interests of small businesses by providing financial assistance, counseling, and training; promoting and guiding subcontractor procurement opportunities; advocating for legislation and fair treatment; conducting research; and supporting businesses of underserved subsets.

**SBS**

(Select Bus Service) The Bus Rapid Transit BRT system of New York City operated jointly by the New York City Department of Transportation NYC DOT and the Metropolitan Transportation Authority MTA.

**SEQR**

(New York State Environmental Quality Review) A State-mandated process by which the sponsoring or approving government body determines and mitigates the environmental effect, if any, of a government entity's approval of a discretionary action.

**SFHA**

(Special Flood Hazard Area) An area within the base floodplain designated by the National Flood Insurance Program NFIP and indicated on Federal Emer-

gency Management Agency’s FEMA Flood Insurance Rate Map FIRM.

**SIRR**

(Special Initiative for Rebuilding and Resiliency) A special task force convened by the City in December 2012 to assess damage in the wake of Superstorm Sandy and consider implications for climate change and sea level rise as they might affect the City moving forward.

**SIRR**

(Report A Stronger, More Resilient New York) A comprehensive citywide plan released in 2013 and commissioned by the City detailing actionable recommendations for rebuilding and increasing the resiliency of communities and infrastructure impacted by Superstorm Sandy.

**TASC**

(Test Assessing Secondary Completion) The New York State-approved achievement test, instituted January 1, 2014 and administered by the State’s High School Equivalency HSE Office within the State’s Department of Education NYS ED, assessing mastery of the educational level equivalent to a high school degree.

**USACE**

(United States Army Corps of Engineers) The United States Federal agency, under the Department of Defense, composed of civilian and military personnel and responsible for providing public and military engineering services.

**USDA**

(United States Department of Agriculture) The United States Federal government executive department responsible for monitoring and promoting the country’s agricultural economy; financially assisting rural communities; supporting conservation and restoration of natural resources; providing nutrition information; and promoting food safety.

**USGBC**

(United States Green Building Council) A national not-for-profit organization, comprised of chapters and collaborating extensively with numerous partner institutions, dedicated to promoting sustainability in building design and construction through advocacy and professional education opportunities.

**WWTP**

(Wastewater Treatment Plant) A facility designed to remove biological or chemical waste products.





