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NY RISING COMMUNITY RECONSTRUCTION PROGRAM

Gravesend & Bensonhurst

NY RISING COMMUNITY RECONSTRUCTION PLAN

DECEMBER 2014



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Gravesend and Bensonhurst

ACKNOWLEDGEMENTS

Gravesend and Bensonhurst NYRCR Planning Committee

Marnee Elias-Pavia, Co-Chair
Ligia Gualpa, Co-Chair
Dr. Scott L. Barkin
Rocco Brescia
Peter Consolo
Butch Moran (Non-voting member)
Mel Wolfson
Dr. Tim Law
Pamela Pettyjohn

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

The document was prepared by Perkins Eastman / BFJ Planning in association with the Louis Berger Group, and was based on the NYRCR planning process undertaken by a multidisciplinary team consisting of Perkins Eastman, BFJ Planning, Louis Berger Group, PACO Group, and 4Ward.

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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.¹

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/nycr),

¹ Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.

Gravesend and Bensonhurst

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 Gravesend and Bensonhurst 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 Gravesend and Bensonhurst NYRCR Planning Area has been allotted up to \$3 million in

NY Rising Community Reconstruction Plan

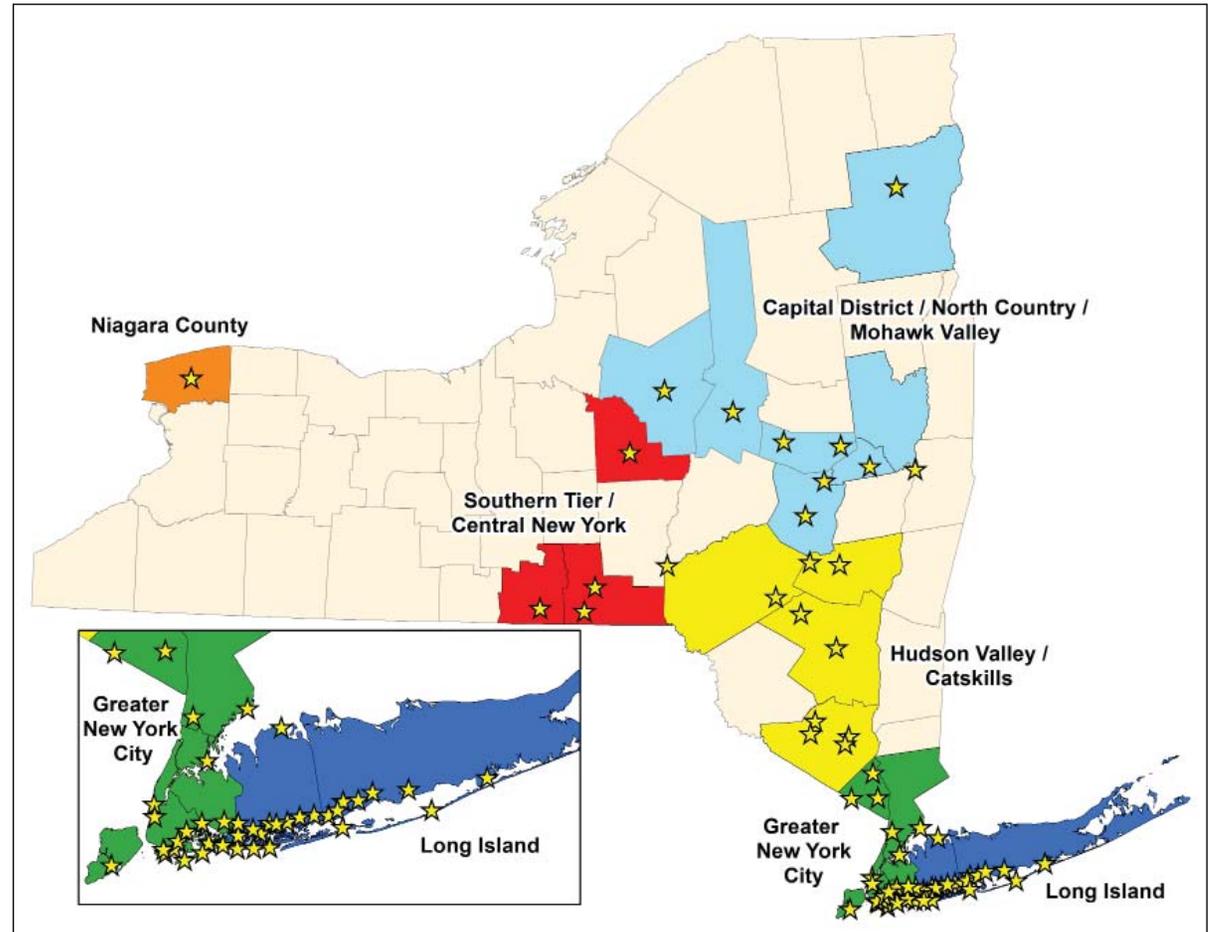
CDBG-DR funds for the implementation of eligible projects identified in this plan.

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

Note: 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.)

Find out more at: StormRecovery.ny.gov/Community-Reconstruction-Program

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Gravesend and Bensonhurst

EXECUTIVE SUMMARY

This NY Rising Community Reconstruction Plan (NYRCR Plan) was developed to help the Gravesend and Bensonhurst NYRCR Community (Community) rebuild from the damage caused by Superstorm Sandy and prepare for a more resilient future. The Governor's Office of Storm Recovery (GOSR) facilitated a planning process which was led by the Gravesend and Bensonhurst NYRCR Planning Committee, a group of nine residents and civic leaders. In July 2014, the Committee convened to begin the process of identifying the needs of the Community and the corresponding opportunities, while engaging the larger public in this process. Projects, programs, and actions to increase Gravesend and Bensonhurst's resilience to future climate-related events were then developed and refined. Since that time, the Committee has worked closely with a team of professional consultants, representatives of the New York State Governor's Office of Storm Recovery (GOSR), and New York City agencies to develop this NYRCR Plan. The State has allotted up to \$3 million in Federal Community Development Block Grant-Disaster Recovery (CDBG-DR) to implement eligible projects in this NYRCR Plan.

The Gravesend and Bensonhurst Community lies in southern Brooklyn, just north of Coney Island Creek and the Coney Island peninsula. Adjacent neighborhoods include Bath Beach to the west, Coney Island to the South, Sheepshead Bay and Homecrest to the east, and Midwood and Mapletown to the north. The Community is home to 96,166 residents in 37,927 households and is predominantly characterized



as a working and middle-class area. It features a large concentration of elderly residents, which is typical for many of the neighborhoods in Southern Brooklyn. The Gravesend and Bensonhurst Community is also very diverse ethnically, with a significant Chinese, Spanish, Arabic, and Russian speaking population.

The housing stock is diverse, with one-and two family wood frame houses, row houses, multi-family buildings, and apartment complexes. The major avenues have neighborhood scale retail stores and Shore Parkway features a regional commercial center with a number of big box stores. Regional transportation

infrastructure, such as the N and R subway lines and the Belt Parkway, built in the mid-1900s, resulted in wetland and marsh areas being filled in. Apartment buildings and row houses were built in these low lying areas. Almost all of the land west of Cropsey Avenue that currently exists today has been created with landfill. As seen during Superstorm Sandy as well as during more frequent storm events, these low lying areas remain at risk for flooding, both from tidal surge and rainwater.

On October 29, 2012, when Superstorm Sandy made landfall, flooding in Gravesend and Bensonhurst largely resulted from a tidal storm surge that overtopped bulkheads at Gravesend Bay and Coney Island Creek. The surge crossed over and under the Belt Parkway, flooding streets, homes, and businesses in the upland Community. Inundated segments of the Belt Parkway and other low-lying roadways were impassable, which disrupted vehicular travel and the delivery of emergency services. Although the primary cause of damage from Superstorm Sandy was flooding, the storm also resulted in downed trees which damaged power lines and roofs. The three subway lines in the Community (F, N, and D lines) were disabled due to the flooding of MTA's Coney Island Rail Yard and downed trees over the subway tracks.

In addition to significant weather events such as Superstorm Sandy and Hurricane Irene, the Community experiences flooding in low lying areas during smaller events. This flooding is magnified when there is a high volume of rain during a short period of time and when precipitation is accompanied by high tides. Flooding is also exacerbated by the high degree of impervious surface in the Community

Community Vision

Gravesend and Bensonhurst are culturally and generationally diverse communities, home to safe and stable residential neighborhoods with access to transportation, shopping, and the waterfront.

Our vision is to rebuild and plan for a more resilient future where the safety and well-being of our community is maintained in the face of future storm events. We will work in a unified fashion to develop solutions that foster strengthened infrastructure systems, economic vitality, a healthy environment, improved access to the water, and enhanced tools for communication and emergency planning.



(i.e., asphalt, concrete, buildings) as well as the inadequate capacity of the existing stormwater system.

Superstorm Sandy exposed several challenges within the Community that this NYRCR Plan addresses. The overarching critical issue was to prevent coastal and stormwater flooding. Addressing the needs of the Community's socially vulnerable populations was another

major theme. These, and other critical issues were identified throughout the NYRCR Process through data analysis, site visits, extensive meetings with the Committee, key stakeholders and government agencies, and through Public Engagement Events. These issues helped to guide the development of the NYRCR Plan and identify Proposed and Featured Projects to address problems faced by the Community.

Gravesend and Bensonhurst



Participants at Public Engagement Event #3

Community Driven Process

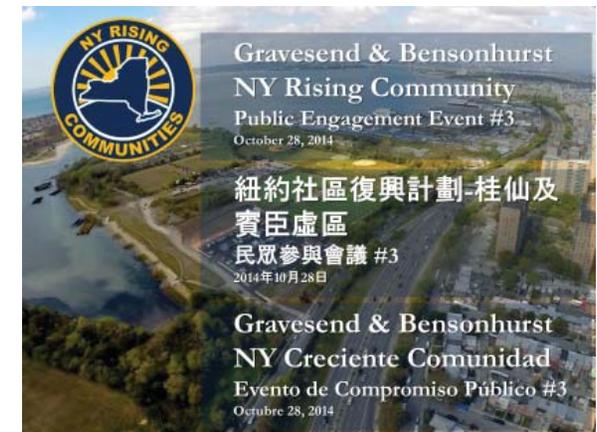
This NYRCR Plan is the product of a robust public engagement effort involving consensus-building among both residents and business owners. The public engagement plan for Gravesend and Bensonhurst was structured to provide multiple opportunities for input and to encourage broad community participation from the entire spectrum of residents in the Community. The Committee made every effort to include socially vulnerable populations in the planning process. Outreach materials were developed in Spanish, Chinese, and Russian and translators were available at public engagement events. Public Engagement Events were also located in different areas of the Community to ensure participation was geographically inclusive. An online web tool called the “NYRCR Mapping Gallery” was also developed to provide another venue for feedback. Additionally, the Committee utilized a survey to solicit information from residents and business owners on the impacts of Sandy.

The Committee was instrumental in providing input and information to shape the NYRCR Plan and in assisting with the broader Community Engagement Strategy through their constituent and social networks. To guide the NYRCR Plan, the Committee developed a vision statement that addresses the Community’s resiliency priorities:

With a fundamental focus on implementation, the NYRCR Program planning process incorporated extensive discussions with various City agencies to ensure that the NYRCR Plan is supportive and complimentary to New York City’s ongoing efforts, rather than duplicative or counterproductive. The Committee also maintained an ongoing dialogue with parallel resiliency efforts. This includes the New York City Economic Development Corporation’s (NYC EDC) feasibility study to evaluate improved coastal protection measures at Coney Island Creek.

Final Plan as Blueprint for Implementation

To address the critical issues identified in the planning process, the Committee developed five strategies which will have the greatest benefit in increasing Gravesend and Bensonhurst’s resilience to future climate related events. These strategies, described below, frame the NYRCR Plan’s approach to address the needs expressed by the Community especially the overarching theme of strong consideration for the area’s diverse and vulnerable population. The projects for each strategy are the specific short and long term measures needed to improve the resilience of the Community. Identified projects were analyzed by the Consultant Team and vetted by the public and the Committee. “Proposed Projects,” which are listed with each strategy below, are those projects proposed by the Committee for implementation through the Community’s allotment of CDBG-DR funding. The NYRCR Plan’s suite of projects includes many programs and actions that are interrelated to strategically leverage the Community’s allotment.



Flyers, posters, and presentation materials produced in multiple languages



Potential Redevelopment of the Bensonhurst Park Tennis Center Site Along Bay Parkway

Strategy A: Develop a comprehensive resiliency approach to the waterfront

This strategy directly addresses coastal surge and tidal impacts the Community experienced during prior storms as well as the potential risks posed by future storms. There is a significant opportunity to develop continuous coastline defense measures that would protect the Belt Parkway, a regional infrastructure asset, as well as the upland areas in the Community. The Committee recognizes that coastal protection improvements along the Belt Parkway can be leveraged to promote access to the waterfront’s

commercial and recreational areas, economic development, as well as other measures that would increase the overall resiliency of the Community.

Strategy A includes a Proposed Project to develop a Comprehensive Waterfront Master Plan to identify specific coastal measures that are linked with waterfront access, economic development, and recreation improvements. The Committee recognizes the potential to connect these coastal protections to a regional network potentially extending from Sheepshead Bay to Bensonhurst. The Master Plan would

coordinate with ongoing efforts to protect assets around Coney Island Creek by other agencies such as the NYC EDC and the Metropolitan Transit Authority (MTA). Additionally, the project is envisioned as a road map to help guide decisions and prioritize projects. New York City and the Community can use the plan to help leverage these investments to greater benefits. Another Proposed Project will provide funding that will incentivize the redevelopment of the Bensonhurst Park Tennis Center Site and adjacent areas along Bay Parkway in a way that will improve the resilience of the waterfront and serve the greater needs of the Community.

Gravesend and Bensonhurst

Strategy B: Protect the Community from flooding during significant rain events

The Community is vulnerable to flooding both from coastal surge events and from stormwater flooding. Areas of the Community, including segments of the Belt Parkway and Cropsey Avenue experience recurring flooding during smaller rain events. This strategy addresses three important needs: pinpoints necessary maintenance and repairs to reduce the risk from stormwater flooding; identifies stormwater infrastructure upgrades such as increasing the capacity of stormwater infrastructure or installing check valves or catch basins to alleviate flooding “hotspots”; and determines locations for upstream stormwater retention to reduce the amount of stormwater entering the system during significant rain events.

Strategy B includes a Proposed Project to perform a high-level analysis of the hydrologic and hydraulic (H&H) systems affecting drainage in the low-lying areas of the Community that experience recurring flooding. This study will help provide feasible alternatives to address the stormwater inadequacies, which will better inform storm water management projects. Another Proposed project will identify the specific drainage issues identified along areas of Cropsey Avenue along with a pilot project that implements recommendations from the study. A third Proposed Project will fund green infrastructure improvements on publicly owned property to strategically intercept stormwater before it reaches the combined sewer system.

Strategy C: Provide resiliency assistance and education for homeowners, renters, and business owners

Residents in the Community expressed the need to address anticipated increases in flood insurance premiums. The increase is due to recent reforms to the National Flood Insurance Program as well as expected changes to the Flood Insurance Rate Map (FIRM) which will significantly increase the portion of the Community required to purchase flood insurance. The 100-year floodplain on the updated FIRMs includes almost 10,000 new residential units. The Committee is concerned that the financial burden of insurance premiums for units affected as well as cost of flood protection measures will significantly impact property owners and renters, and will weaken the economic base of the Community. Strategy C identifies ways to strengthen the housing stock against future extreme weather events which will serve to protect residents from future storms and help to stabilize property values. Housing and residential neighborhoods are supported by projects that will provide residents with resources to help increase the resilience of homes and commercial properties. This includes a Proposed Project that provides technical assistance and education to property owners that need to retrofit their properties.

Strategy D: Develop a coordinated community response plan during times of extreme weather

The Committee recognizes that during and after Superstorm Sandy, there were gaps in access to municipal services and storm-related information. Superstorm Sandy revealed that there is a need to improve the capacity, communication



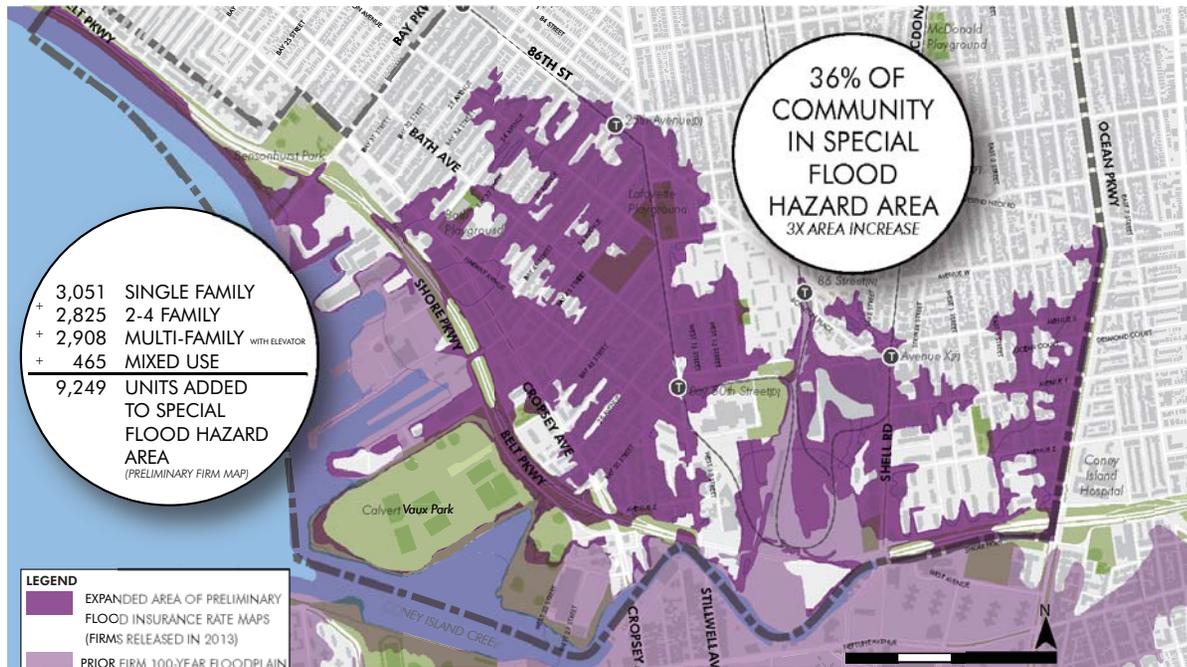
Flood Protection Measures Along the Belt Parkway

NY Rising Community Reconstruction Plan

Strategy E: Upgrade, maintain, and strengthen community infrastructure

As experienced during Superstorm Sandy as well as from other more frequent storm events, the Community's power supply and telecommunications network are vulnerable to disruptions. During Superstorm Sandy, in inundated areas, ground floors and basement spaces were flooded, disrupting power supply and destroying critical building systems such as lighting and elevator service. In some buildings, utility systems were off-line for weeks after the storm. Risks to vulnerable populations are amplified during power outages, especially amongst elderly residents that are less mobile or dependent on medical services. Strategy E helps to mitigate those risks by providing for more resilient communication and power supply systems.

Proposed Projects in Strategy E include the funding of backup generators at critical facilities. Funding is also proposed to expand the scope of a microgrid feasibility study in Coney Island to institutional facilities and large residential buildings such as Coney Island Hospital, Beach Haven Apartments and Marlboro Houses, and Lafayette High School in Gravesend. This study was initiated by the Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Committee. Another Proposed Project will provide a backup communication system in the form of a wireless mesh network made up of community-wide wi-fi access points connected to the Internet.



Areas to be added to FEMA's Updated Special Flood Hazard Area

ability, and coordination among emergency-response groups and the local community-based organizations in Gravesend and Bensonhurst. Strategy D seeks to improve communication networks so that the organizations will be better positioned to disseminate critical information, identify and assist vulnerable populations, assist in rapid recovery efforts, and distribute emergency supplies.

Projects under this strategy strengthen the support infrastructure for socially vulnerable populations to help prepare these groups in advance of a potential disaster. This includes a Proposed Project to provide disaster-recovery workshops for local workers which will provide them

with environmental and health safety (EHS) training and the skills needed to help the Community and surrounding areas rebuild and recover from storm events. Another Proposed Project supports the formation of a COAD (Community Organizations Active in Disaster) that can coordinate Community Based Organizations (CBOs) and develop Community-specific disaster preparedness plans.

The Committee supports greater coordination between CBOs in order to effectively communicate and provide services to all populations. This can be achieved through the formation of a COAD that can develop Community-specific disaster recovery plans and coordinate activities among groups.

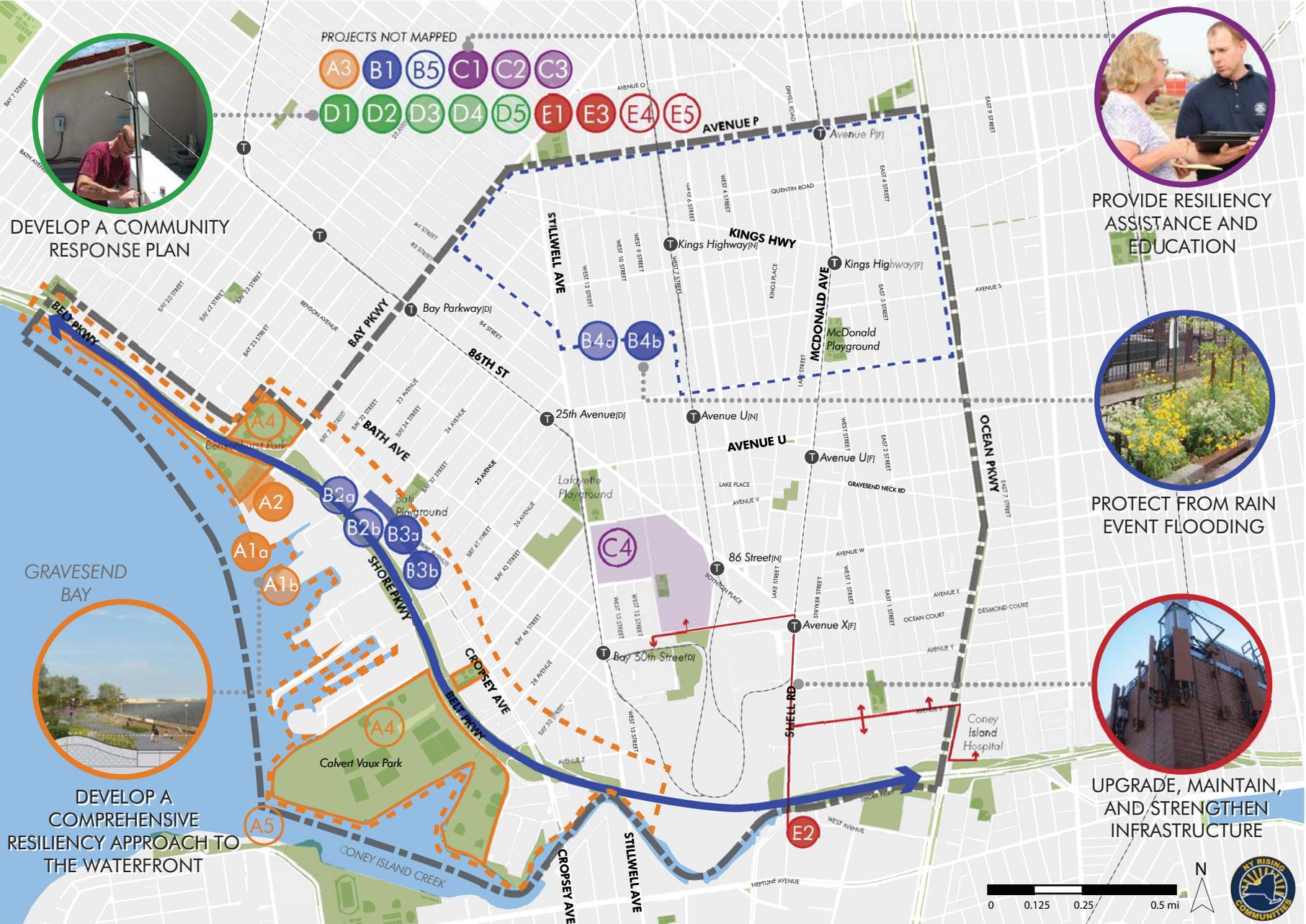
Gravesend and Bensonhurst

Proposed and Featured Projects

A Develop a Comprehensive Resiliency Approach to the Waterfront	B Protect the Community from Flooding During Significant Rain Events	C Provide Resiliency Assistance and Education for Homeowners, Renters, and Business Owners	D Develop a Coordinated Community Response Plan During Times of Extreme Weather	E Upgrade, Maintain, and Strengthen Community Infrastructure
<ul style="list-style-type: none"> A1a Develop a Comprehensive Waterfront Master Plan for Coastal Protection A1b Implementation of Coastal Defenses *Featured Project A2 Redevelopment of the Bensonhurst Park Tennis Center Site A3 Study the Feasibility of a Multi-purpose Pier with Resilient Dock *Featured Project 	<ul style="list-style-type: none"> B1 Analyze Hydrologic and Hydraulic Systems for Improved Stormwater Management B2a Belt Parkway Drainage Study (Phase I) *Featured Project B2b Improve Stormwater Drainage along the Belt Parkway (Phase II) *Featured Project B3a Cropsey Avenue Drainage Study (Phase I) B3b Improve Stormwater Drainage along Cropsey Avenue B4a Green Street Infrastructure Siting Analysis in Combined Sewer Area *Featured Project B4b Implement Green Infrastructure Pilot Project in Combined Sewer Area 	<ul style="list-style-type: none"> C1 Develop a Residential and Commercial Property Technical Assistance and Education Program C2 Establish Housing Loan Program for Resiliency Retrofits *Featured Project C3 Establish Commercial Loan Program for Resiliency Retrofits *Featured Project 	<ul style="list-style-type: none"> D1 Create a Community Disaster Recovery Training and Workforce Development Program D2 Development of a COAD to create a Community Disaster Recovery Plan D3 Expand Emergency Communications Network for First Responders *Featured Project D4 Establish Resource and Recovery Center at an Existing Social Service Facility *Featured Project 	<ul style="list-style-type: none"> E1 Install Backup Power Supply for Critical Facilities and Infrastructure E2 Expand Feasibility Study for Energy Resiliency for NYCHA and Mitchell-Lama Properties into Gravesend-Bensonhurst E3 Develop a Wireless Mesh Network as a Backup Communications Network

Additional Resiliency Recommendations

<ul style="list-style-type: none"> A4 Support Resilient Improvements at City Parks Along or Near the Waterfront A5 Support Coney Island Creek Feasibility Study 	<ul style="list-style-type: none"> B5 Support Zoning Education and Enforcement for Permeable Pavements 	<ul style="list-style-type: none"> C4 Support Resiliency Retrofits at Marlboro Houses 	<ul style="list-style-type: none"> D5 Support the Capacity Increase of the Local Community Emergency Response Teams (CERT) 	<ul style="list-style-type: none"> E4 Support Sewer Infrastructure Maintenance Project E5 Support Backup Power for Telecommunications Infrastructure
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Gravesend and Bensonhurst



Comprehensive Waterfront Master Plan (Project A1): Integrating with a comprehensive coastal protection system for South Brooklyn

A photograph of an outdoor amphitheater. The foreground is filled with rows of wooden bleachers arranged in a semi-circle. In the center of the bleachers stands a tall, slender lamp post with a single light fixture. The ground is paved with light-colored gravel or concrete. In the background, a dark metal railing runs along the edge of the seating area, overlooking a vast, blue ocean under a clear sky. A few small boats are visible on the horizon.

Section I

Community Overview

SECTION I: COMMUNITY OVERVIEW

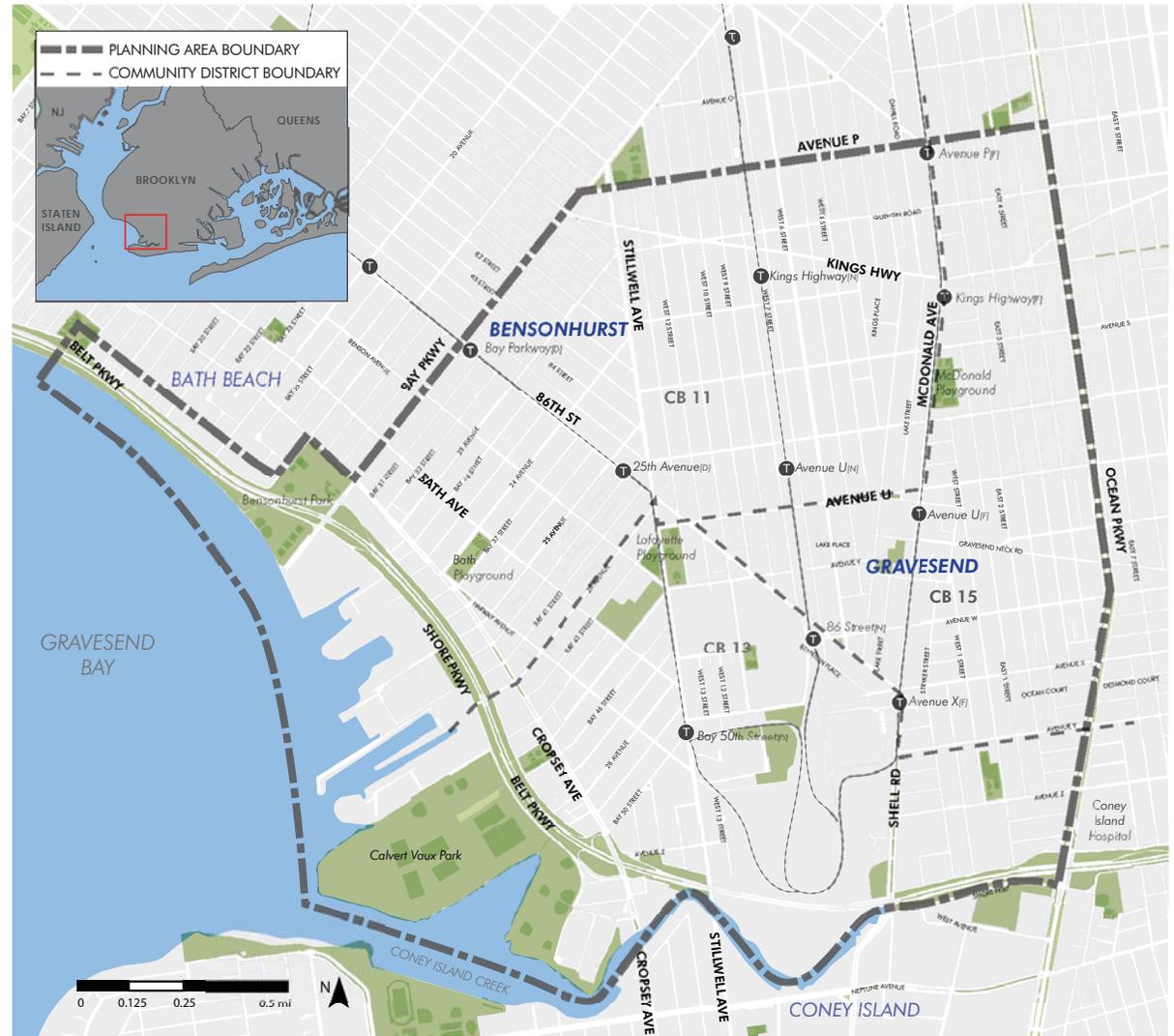
A. Geographic Scope of NYRCR Plan

The Gravesend and Bensonhurst NY Rising Community Reconstruction Community (Community) lies in the southern section of the New York City borough of Brooklyn, just north of the Coney Island peninsula. The Community, shown in Figure 1-1, encompasses the area between Gravesend Bay to the west, Ocean Parkway to the east, Bay Parkway and Avenue P to the north, and Coney Island Creek to the south. The Community extends along the coast from Bay Parkway to 17th Avenue, which is part of the Bath Beach neighborhood. The planning area's boundary was confirmed by the Planning Committee on July 8, 2014.

The Community centers on what was an original town in the Dutch colony of New Netherland and became one of the six original towns of Kings County in colonial New York. The former name survives and is now associated with the neighborhood. The neighborhood boundaries of Gravesend are not officially defined and many residents consider the eastern portion of the Community to be part of the Bensonhurst neighborhood. As seen in Figure 1-1, the Community includes a portion of Community Districts 11, 13, and 15. Adjacent neighborhoods include Bath Beach to the west, Coney Island to the South, Sheepshead Bay and Homecrest to the east, and Midwood and Mapletown to the north.

New York Rising Community Reconstruction Plans (NYRCR Plan) were developed for two

Figure 1-1: Geographic Scope



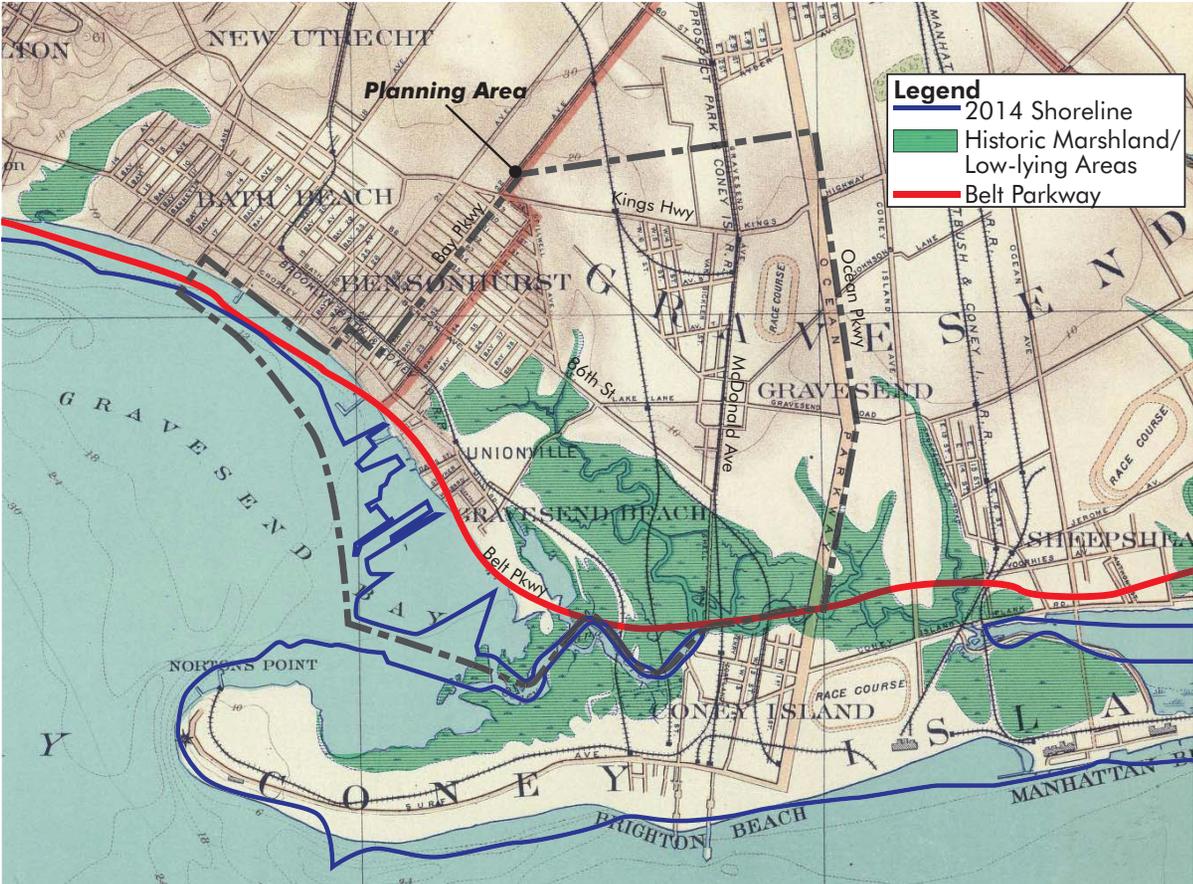
History

Almost the entirety of the Community was once part of the Town of Gravesend. The Town was first settled in 1643, making it the oldest settlement in Brooklyn and one of the oldest in Long Island. Its history is notable for many reasons, one being that it was founded by a woman, Lady Deborah Moody, an English expatriate. The original town center's square shape can still be seen in the roads surrounding the intersection of McDonald Avenue and Gravesend Neck Road.

The history and development of Gravesend and Bensonhurst in the 18th Century were closely linked with the rise of Coney Island as a popular vacation and leisure spot. During this time, Gravesend became a resort community of its own with three horse race tracks, resulting in the loss of its farmland character. Bensonhurst also lost its farmland character when it was developed in the mid-1800s into "Bensonhurst by the Sea," a gated suburban community.

When horse race betting was banned in 1911, Gravesend lost much of its appeal compared to Coney Island. Many older mansions and estates were abandoned in favor of smaller homes and apartment buildings constructed to meet the housing needs of immigrants. Bensonhurst also began to transform at this time into a working-class residential neighborhood. When the trains were built in the early part of the 20th Century, many Jewish and Italian families moved to Southern Brooklyn from the Lower East Side of Manhattan. Many of the large homes and estates were razed to build brick row houses and apartment buildings. After World War II, landfill increased the size of the area, and

Figure 1-2: Southern Brooklyn in 1891 and 2014



communities adjacent to Gravesend and Bensonhurst during round one of the NYRCR planning process - the Southern Brooklyn Peninsula and Gerritsen Beach and Sheepshead Bay. The Southern Brooklyn Peninsula NYRCR Plan includes the neighborhoods of Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate, and is located to the south of Gravesend and Bensonhurst. The Gravesend and Bensonhurst neighborhoods are linked very

closely with this community as they both border Coney Island Creek, which was a major source of flooding during Superstorm Sandy. Both communities are also closely linked with regard to jobs and services, transportation networks, and utility infrastructure systems. A NYRCR Plan was also developed for the neighborhoods of Gerritsen Beach and Sheepshead Bay during round one of the NYRCR planning process. These communities lie to the east of Gravesend.

Gravesend and Bensonhurst

the completion of the Belt Parkway in 1939 further stimulated development.⁴ In 1958, the Marlboro Houses were built by the New York City Housing Authority (NYCHA), replacing an area previously known by the same name.⁵

The historical map shown in page 19 illustrates how the topography of the land has changed since 1891, especially in the area towards the bay. When the town was first laid out, almost half of the lands were salt marsh wetlands and sandy dunes along the shore of Gravesend Bay. Coney Island was separated by water from Gravesend and a number of Coney Island Creek tributaries extended to the north in Gravesend. In the early 20th Century, most of these water bodies were permanently altered. The neighborhoods of Coney Island and Gravesend were joined with a landfill connection, separating Coney Island Creek and Sheepshead Bay. Almost all of the land west of Cropsey Avenue that currently exists today has been created with landfill. A significant portion of the landfill that forms the existing shoreline in the area was added during the construction of the Verrazano Bridge in the early 1960s.⁶

As marshlands were filled in for development purposes, flood storage capabilities decreased, resulting in an increased risk of flooding. These filled-in marshlands remain at low ground elevations, further increasing the flood risk to properties. The Metropolitan Transportation Authority (MTA) Coney Island Rail Yard was constructed on former marshlands and is just above sea level. A Beaux-Arts style pumping station was constructed on 86th Street and Avenue V in the early 1900s to deal with stormwater and sewer drainage in the quickly urbanizing area.

Community Profile

Today, Gravesend and Bensonhurst are predominantly working and middle-class residential neighborhoods with interspersed shopping corridors on the major avenues. The housing stock is diverse, consisting primarily of one- and two-family wood frame or brick houses, with some three- and four-family houses, cooperatives, and condominiums. Multi-family residential structures account for 84% of housing units within the Community, a share similar to Kings County (86%) but much higher than New York State (51%). The majority of housing units within the Community are renter-occupied (62%). The median owner-occupied home value in the Community is \$585,748.

The 2.5-acre Marlboro Houses NYCHA development is the largest single development in the area. The complex's 28 buildings

range from seven to 16-stories tall with 1,765 apartments housing an estimated 4,623 residents.⁷ The Community also features a high concentration of homes for the elderly and disabled. The Marks JCH Good Neighbors Naturally Occurring Retirement Community (NORC) is a NY State sponsored designated area in Bensonhurst where supportive programs and services are provided for the elderly.⁸

Gravesend and Bensonhurst have a diverse array of businesses, ranging from mom-and-pop storefronts to larger commercial establishments, such as big-box stores. Ocean Parkway, 86th Street, Bay Parkway, Shore Parkway, and Stillwell Avenue all feature shopping areas. McDonald Avenue has pocket industrial uses with auto repair shops, warehousing, and light manufacturing. Prominent parks in the neighborhood include Bensonhurst Park, the Shore Parkway Greenway

Table 1-1: Socio-Economic Comparison⁹

	Gravesend & Bensonhurst	Brooklyn	NYC
Demographics:			
Population	96,166	2,512,740	8,199,221
Total Households	35,844	911,995	3,063,393
Median Age	39.1	34.1	35.5
Population <18 years of age		596,667	1,774,909
Population 65+ years of age	16,145	290,700	1,002,872
Economics:			
Median Household Income	\$41,227	\$45,215	\$51,865
Percent of Household Incomes <\$67,000	70.7%	62.5%	60.1%
Housing:			
Median home value (owner occupied)	\$585,748	\$562,600	\$501,500
Percent Owner-Occupied Housing:	35.8%	27.2%	29.4%

Source: 2010 U.S. Census and 2008-2012 ACS estimates

and Calvert Vaux Park. There are a number of smaller parks and playgrounds dispersed throughout the Community. Although it is not in the Community, the Coney Island peninsula to the south is a regional destination with beaches, amusements, and a variety of restaurants and shops.

The Community is accessible by the D, F, and N subway lines, as well as local and express bus service to Manhattan. Almost the entire area is within close walking distance (0.5 miles) to a subway stop. Ocean Parkway and the Belt Parkway are the main vehicular arterials which connect the Community to downtown Brooklyn, Manhattan, Staten Island, Long Island, and JFK International Airport. The Community includes the 75-acre MTA Coney Island Rail Yard which includes workshops where maintenance and overhauls are performed for the subway fleet.

Demographic Profile

According to 2008-2012 American Community Survey (ACS) estimates, there were 96,166 people and 35,844 households in the Community. As shown in Table 1-1, the median household income for a family in the Community is \$41,227, which is almost 9% less than the median income for Brooklyn as a whole.

The neighborhood has a slightly higher owner-occupancy rate (35.8%) than Brooklyn (27.2%) and New York City as a whole (29.4%).

The Gravesend and Bensonhurst Community is very diverse. In addition to the Italian and Jewish communities, the area has recently seen an influx of Chinese, Spanish, Arabic, and Russian-speaking immigrants.⁸ As seen in

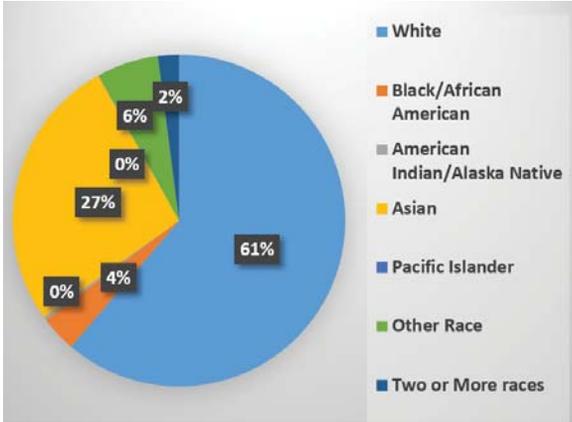
Figure 1-3, the area contains large numbers of non-native English speakers, many of whom have limited English proficiency. 61,378 (66%) of people in the Community speak a language other than English at home. Nearly 23% of the total population report that they speak English “less than very well.”

The Community is characterized by a relatively older population, which is typical for many of the neighborhoods in Southern Brooklyn. The median age is 39.1, compared to 35.5 citywide. Senior citizens are significantly represented in the Community, making up 15.7% of the total population of the Community. There are also 9,176 households in the Community with 1+ persons with a disability.

As of 2011, there were 33,000 employed residents in the Community. Nearly 80% of employed residents work in either Brooklyn (43%) or Manhattan (36%). Five percent of Community residents work in Gravesend. Sixty percent of workers use public transit for work, 8% walk, and 29% drive. This underscores the central role the public transportation plays in the livelihood of the Community.¹⁰

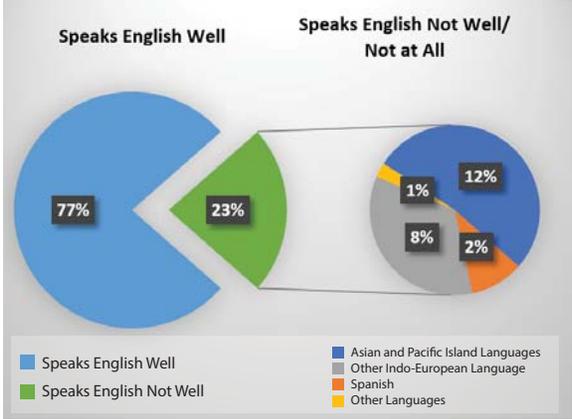
There are roughly 12,000 people that are employed within Gravesend and Bensonhurst. Of all the jobs located in the Community, health care and social assistance, and retail are the top two industries by employment. The healthcare sector comprises 30% of jobs, 20% are in the retail trade sector and the remaining workers are distributed amongst several other employment sectors.¹¹

Figure 1-3: Population by Race/Ethnicity



Source: 2010 U.S. Census

Figure 1-4: Languages Spoken



Source: 2008-2012 ACS

Gravesend and Bensonhurst

B. Description of Storm Damage

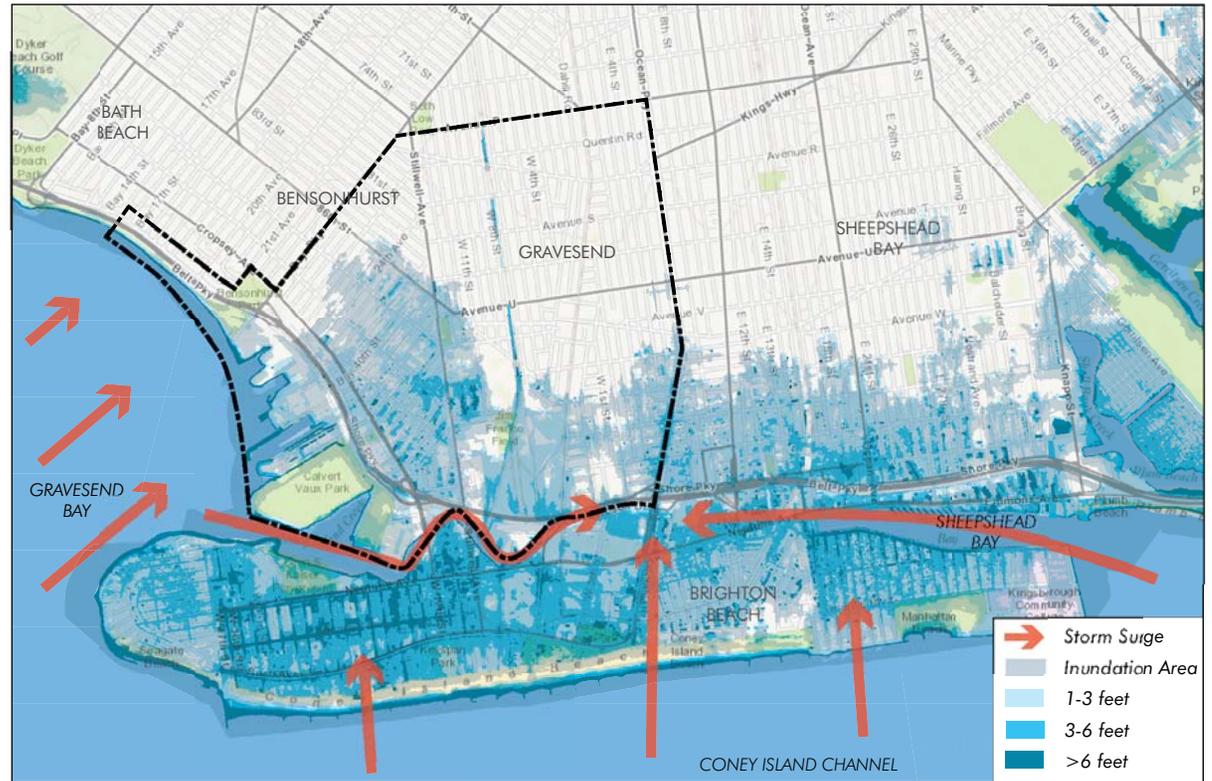
Superstorm Sandy

On October 29, 2012, Superstorm Sandy made landfall in Brigantine, New Jersey and hit the New York Metropolitan Region directly, causing flooding and power outages in Gravesend and Bensonhurst. Although Superstorm Sandy was no longer categorized as a hurricane when it made landfall in New Jersey, it was still a large and dangerous storm that brought damaging winds and elevated tidal surges. The severity of Superstorm Sandy's impact was made more extreme by four uncommon factors:¹²

- The storm was quite large, extending approximately 1,000 miles in diameter, which contributed to an elevated storm surge.
- It picked up strength from the warm Atlantic Ocean down south, and as it traveled north, it hit a cold, arctic blast. This difference between Superstorm Sandy's extremely low pressure and high pressure to its north increased wind speeds, heightening storm surge.
- Superstorm Sandy followed an unusual path, tracking from the east rather than the south, leading to a direct hit on the New York Metropolitan Area, instead of veering eastward into the Atlantic Ocean.
- The storm's landfall in the New York area coincided with a "spring" tide, meaning a high tide that occurs during a full moon, which translated into higher storm tides and flooding.

Flooding in Gravesend and Bensonhurst during Superstorm Sandy largely resulted from a

Figure 1-5: Southern Brooklyn Tidal Storm Surge Inundation from Superstorm Sandy

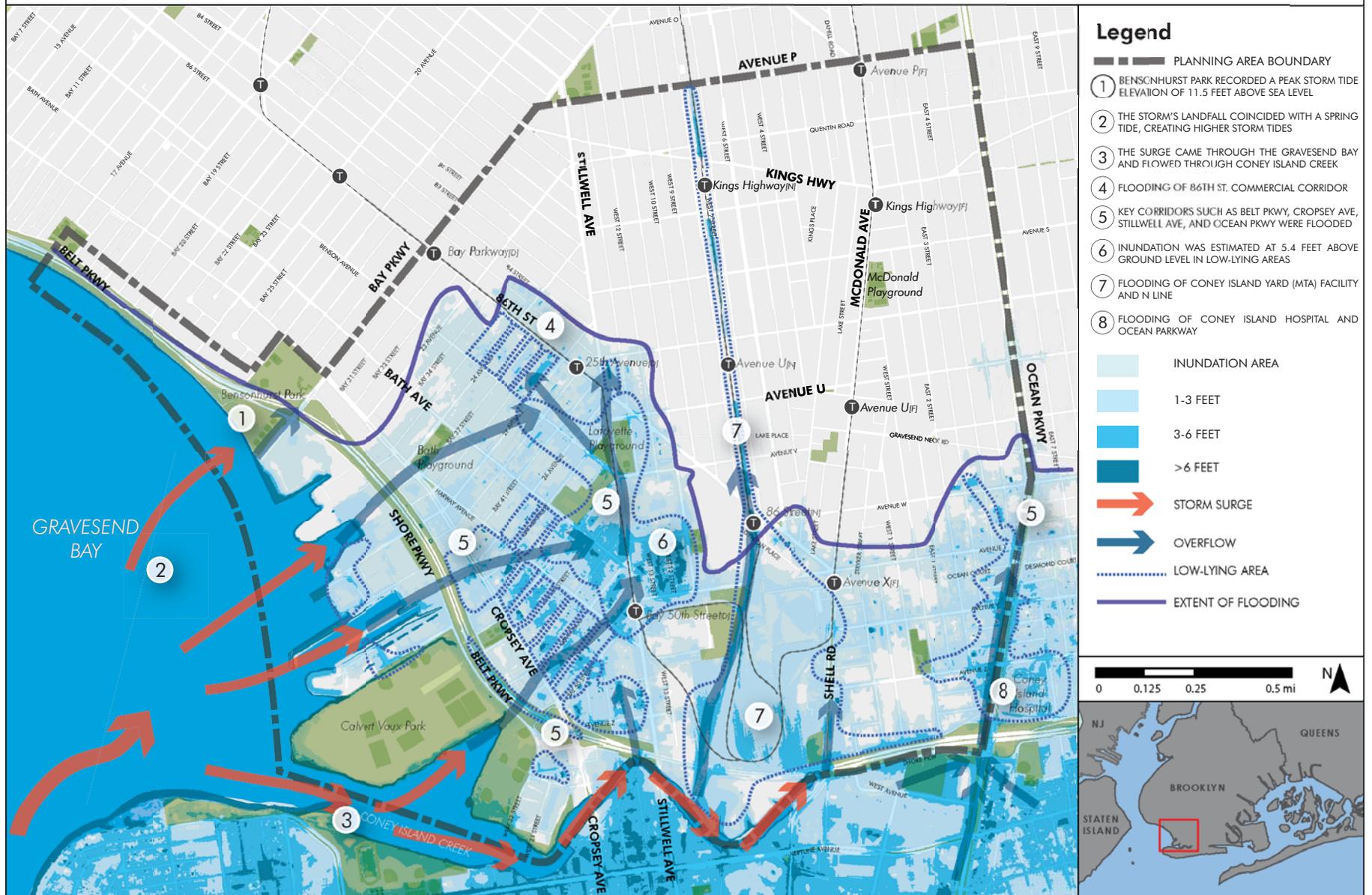


tidal storm surge that came through the New York Bight (Atlantic Ocean) to Gravesend Bay, which flowed through Coney Island Creek in an easterly direction, overtopping bulkheads and overflowing the creek. The USGS Tide Gauge at Lower New York Bay at Sea Gate recorded a peak storm tide elevation of 13.32 feet (NAVD88) above sea level, and a high water mark was recorded southeast of Bensonhurst Park near the intersection of Bay Parkway and

the Belt Parkway at 11.50 feet (NAVD88) above sea level.¹³

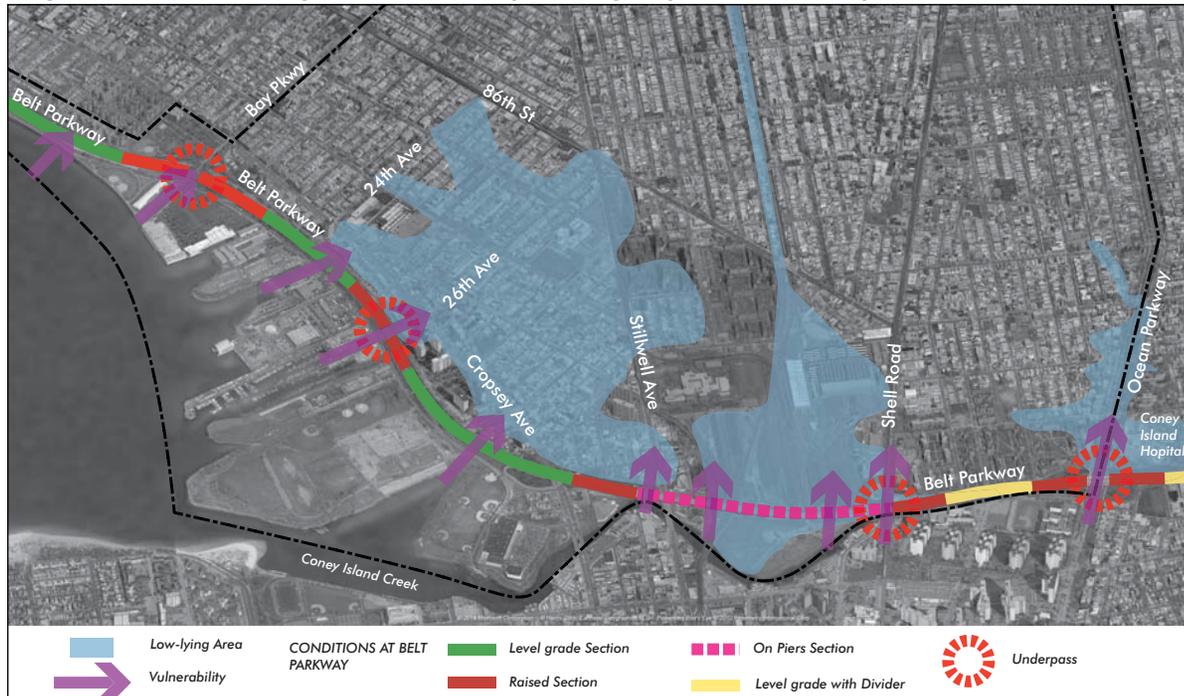
As seen in Figure 1-6 and Figure 1-7, flooding extended west from Gravesend Bay past 85th Street, and from Coney Island Creek north to approximately Avenue W. Inundation was estimated at 5.4 feet above ground level in Gravesend and Bensonhurst, with the most severe flooding in low-lying areas.¹⁴ These

Figure 1-6: Superstorm Sandy Inundation: Gravesend and Bensonhurst



Gravesend and Bensonhurst

Figure 1-7: Flooding at Belt Parkway During Superstorm Sandy



Superstorm Sandy Impacts: Belt Parkway
Source: www.bensonhurstbean.com



Superstorm Sandy Impacts: Shore Road
Source: www.bensonhurstbean.com

areas experienced a “bowl effect” in which tidal flooding flowed from higher to lower elevations, such as between Avenue X and Lafayette Playground along Bath Avenue, which saw inundation levels of three to six feet.¹⁵ Low-lying segments of roadways were inundated, including key corridors such as the Belt Parkway, Stillwell Avenue, Ocean Parkway, and segments of the N subway line, which varies from being above and at-grade in the Community.¹⁶ Damaging wave action compromised the commercial buildings at Caesar’s Bay Bazar, located at Bay and Shore Parkways. Waves also destroyed parts of the Shore Parkway Greenway.

Tidal flooding from creeks and inlets, also referred to as “backwater flooding,” caused backups in the stormwater systems in low-lying areas. As a result, rainwater runoff caused overflows of the stormwater system and led to flooding in areas that were beyond the range of the tidal flooding. Approximately 75 complaints of sewer issues were reported to New York City’s 311 Reporting System following Superstorm Sandy, ranging from clogged catch basins, raised or overflowing manholes, to flooding and sewer backups. According to the Gravesend and Bensonhurst NYRCR Program Planning Committee (Committee), this number may underrepresent the issues following Superstorm Sandy

because the 311 system was overwhelmed and many people may not have been able to file a complaint.

Approximately 90% of the Community is impervious, and much of the land upstream in the Coney Island Creek watershed is also impervious¹⁷. The lack of permeable surfaces upstream creates significant levels of runoff that collects in low-lying areas, adding to the “bowl effect.”

As previously mentioned, much of the low-lying areas constitute wetlands that were filled-in. The high soil density of fill is not conducive to infiltration, with areas classified as having

moderate, slow or very slow infiltration rates. The shallow depth of the water table in the Community also limits infiltration capacity, with approximately 10% of the Community having less than two feet in depth to the water table.¹⁸

Damage to homes resulted from flooded basements, garages and some first floor residences, as well as yards that are at lower grade than roadways. This flooding was the main cause of building damage in the Community, necessitating repairs to electrical, heat and elevator systems in high-rise residential buildings. Repairs to utility systems in affected high rise buildings took two-to-four weeks or more to complete. According to *A Stronger, More Resilient New York*, only two buildings in the Community were yellow-tagged by the NYC Department of Buildings following the storm, signifying that few buildings in the Community had major structural damage; however, portions of buildings may have suffered significant non-structural damage.¹⁹

Although the primary cause of damage from Superstorm Sandy was flooding, the storm also resulted in downed trees, damaged roofs, and damage to power lines in the Community. Wind damage downed trees on the D subway line, knocking out service in the area. The National Oceanic and Atmospheric Administration (NOAA) reported that the sustained winds were estimated at greater than 60 mph.²⁰ The broad wind field extended for hundreds of miles from the center, bringing damaging wind gusts and coastal surges. According to New York City’s 311 database, greater than 670 trees in the Community were reported as damaged, uprooted or fallen as a result of Superstorm Sandy.²¹



Hurricane Irene Impacts

Source: Marnee Elias-Pavia

Hurricane Irene

Gravesend and Bensonhurst are vulnerable to major flooding during large precipitation events. This was evident during Hurricane Irene, which brought more than three times the amount of rainfall as Superstorm Sandy²², causing stormwater flooding in low-lying areas. On August 28, 2011, Hurricane Irene made landfall near the neighborhood of Coney Island. Although Irene was downgraded to a tropical storm, it produced significant damage over much of New York City due to flooding, both from

substantial rainfall totals, storm surge in coastal areas, and wind gusts in excess of hurricane force. In comparison to Superstorm Sandy, the impacts from Hurricane Irene were largely a result of precipitation and wind. Localized rainfall totals during Irene ranged from seven to 10 inches,²³ while storm tide levels ranged from three to six feet.²⁴ Storm surge extended from Gravesend Bay and Coney Island Creek nearly as far as the Belt Parkway. Several other areas experienced localized flooding, including a low-lying area between Bay 46th and Bay 47th Streets east of Cropsey Avenue.²⁵

Gravesend and Bensonhurst



Hurricane Irene Impacts
Source: Marnee Elias-Pavia

Although maximum wind gusts in New York City ranged from 60 to 70 mph, New York City escaped severe wind-related damage because Irene's strongest winds were over water, east of the path's center. Because Hurricane Irene followed a summer of high precipitation and saturated soils, stormwater runoff was exacerbated and the number of downed trees was significant. Power outages were widespread in the Borough of Brooklyn, with an estimated 35,000 households without power.²⁷



Recurring flooding on Belt Parkway
Source: live.nydailynews.com

Recurring Tidal Flooding

Although Superstorm Sandy was an unprecedented event, the sources and causes of flooding observed during Superstorm Sandy occur frequently (albeit on a smaller scale) during high tide events, heavy rainstorms, and nor'easters. Much of the Community is built on what was once water and wetlands. Due to the low elevation of the neighborhoods immediately adjacent to Coney Island Creek and throughout the Community, the shoreline in Gravesend and Bensonhurst provides inadequate protection against certain levels of tidal flooding. Inundation from tidal waters occurs in some low-lying areas of the Community on a regular basis during spring tides. This is expected to increase as a result of climate change, which is anticipated to increase both the general sea level and the frequency of extreme events such as high wind-induced surges.

Recurring Stormwater Flooding

Gravesend and Bensonhurst frequently experience flooding during storms that are much less significant than Superstorm Sandy and Hurricane Irene. Feedback from the Planning Committee and public outreach meetings indicates that nor'easters, microbursts, a sudden powerful air current accompanied by heavy precipitation, and any other heavy rain events over a short time period cause flooding. Precipitation accompanied by everyday high tides generates recurring localized flooding of many local roads where the storm water drainage system has inadequate capacity or is not operating properly at lower elevations. Such localized stormwater flooding may result from a combination of aging infrastructure and inadequate stormwater system capacity, with peak flows exacerbated by impervious coverage upstream and low-lying areas near the shoreline.

C. Critical Issues

Superstorm Sandy exposed several challenges within the Community that the NYRCR Plan addresses. These critical issues, which can be categorized by the six Recovery Support Functions (RSFs) described below²⁸, were identified throughout the NYRCR Process through data analysis, site visits, extensive meetings with the Committee, key stakeholders and government agencies and through Public Engagement Events. These issues helped to guide the development of the NYRCR Plan and identify Proposed and Featured Projects to address problems faced by the Community.

Community Planning and Capacity Building

The Community Planning and Capacity Building RSF refers to the ability of the Community to organize, plan, manage, and implement recovery strategies. This RSF includes the role of local regulations in improving emergency preparedness, communications capacity during a disaster, collaboration between disaster recovery organizations, and the importance of resilience as an objective in planning processes.

One significant issue which was communicated through the public engagement process was the lack of a comprehensive community response to the storm. Superstorm Sandy showed that there were gaps in the organizational and social infrastructure that facilitates communication between homeowners and city agencies. NYC Office of Emergency Management's (NYC OEM) Community Emergency Response Team

(CERT) was not as effective during the response because many volunteers were affected by the storm themselves and were less available to assist other recovery efforts. Residents expressed that evacuation and recovery information came too late, if at all. The Block Institute for example, a facility that provides dedicated services for children and adults with developmental disabilities, was not evacuated before the storm. Although the facility was not in the evacuation area before the storm, it became stranded when the surrounding roads were inundated. The facility itself was not significantly flooded, however emergency responders could not reach the facility because the Shore Parkway was flooded.

Emergency preparedness and communications, especially for non-English speaking populations and seniors, must be improved. The Committee reported that many of these individuals did not know where to evacuate during Superstorm Sandy. Approximately 23% of the Community does not speak English with a high degree of proficiency. Therefore, in order to effectively reach the entire Community during a future storm event, outreach and education must be provided in multiple languages such as Spanish, Chinese, Russian and Arabic. The location and names of all evacuation centers should also be listed and publicized to the community before a storm in the aforementioned languages.

Economic Development

The Economic Development RSF deals with increasing the Community's ability to return economic activities to a state of health and to develop new economic opportunities that result in a sustainable and economically viable community. Economic resilience depends upon improving the ability of the area's key retail and commercial corridors to recover after major disasters. Businesses able to recover quickly are likely to survive, whereas businesses closed for extended periods will suffer from economic losses, including lost wages to employees.

Specific damages to local businesses include inventory losses, building damage and destroyed equipment. Power outages forced businesses to close at least temporarily. Businesses along Shore Parkway which abut Gravesend Bay were hit especially hard by damaging wave action and flooding, and remained closed for a long duration. In the Caesar's Bay Bazaar shopping center, Kohl's Department Store took five months and Toys "R" Us took eight months to reopen to the public.

Loss of employment has been identified as another critical economic issue in the Community after Superstorm Sandy. Many residents that were previously unemployed found work post-Sandy in the cleanup and rebuilding efforts. However, unemployment is still an issue as these temporary jobs did not transition into full-time employment after the immediate rebuilding efforts subsided.

Gravesend and Bensonhurst

Health and Social Services

The Health and Social Services RSF refers to organizations that provide resources to vulnerable populations and the Community as a whole, and the ability of these vulnerable populations to become more resilient during and after a disaster. These organizations include medical facilities, senior centers, religious institutions, and non-profit organizations providing social services. This RSF seeks to improve health and social service networks to promote the resilience, health, independence and well-being of the entire Community.

As mentioned in Section 1-A, there are significant numbers of the Gravesend and Bensonhurst population who fall into vulnerable categories, due to age or language limitations. These factors can complicate disaster planning and emergency preparedness at a community level, and require special attention during and after an emergency, particularly in the evacuation phase.

Emergency support services were identified by the Community as a major issue during the storm. Community members and organizations reported that they couldn't get emergency assistance after calling 911 for help. The disruption in emergency services was a significant threat, especially to the elderly and people with disabilities who rely on access to doctors, hospitals, and pharmacies. Coney Island Hospital—the area's leading public hospital, emergency room and trauma center—was severely damaged by Superstorm Sandy. Although the facility is just outside the Community, it provides medical services for



Multi-family building in Community

all Southern Brooklyn, and is also a source of employment for many residents. A fully functioning hospital is an important need for the Community during a future disaster.

Superstorm Sandy impacted several adult-care and nursing home facilities in the Community, disrupting services which care for vulnerable populations. The storm also significantly impacted public schools in the area. Students from schools that were closed on the Coney Island Peninsula were sent to other schools in the area, contributing to overcrowding, a significant issue reported by the Committee.



1-2 Family homes in Community

Housing

The Housing RSF refers to individual assets such as senior homes, multifamily housing, and affordable housing facilities, but also refers to residential neighborhoods that are at high or severe risk in the event of future storms like Superstorm Sandy. This RSF seeks to implement housing solutions that effectively support the needs of the Community and contribute to its sustainability and resilience.

Flooding in the Community mostly occurred from “backdoor” flooding from Coney Island Creek, and the risk to neighborhood housing stock, both high and low density, is a major concern for the Community. “Backdoor” water flooded ground floors and basement spaces of high-rise buildings, causing disruption to power services and destroying critical building systems.

In addition to flooding issues, many residential owners will face additional financial burdens when the Preliminary Flood Insurance Rate Maps (Firms) are adopted. The preliminary maps indicate that more than 2,500 parcels will

NY Rising Community Reconstruction Plan

Infrastructure damage in Gravesend and Bensonhurst was considerable and caused hardship to residents, businesses and emergency personnel. Flood damage to transportation, sewer, and power infrastructure created several issues for the Community, including blackouts, inability to access key services, and poor communication capabilities with emergency personnel. Tidal surge covered segments of the Belt Parkway and other low-lying roadways, making portions of these low-lying areas impassable which disrupted vehicular travel and the delivery of emergency services.

Traffic has been identified as a significant problem in the area specifically along Shore Parkway due to its one-way traffic pattern and inadequate access to the Belt Parkway. Shore Parkway and its access roads to neighboring communities such as Coney Island and Brighton Beach present unsafe conditions for drivers, pedestrians, and bicyclists, underscoring the need to protect and improve the existing roadway infrastructure.³²

As shown by Superstorm Sandy, the transit system is vulnerable, which is a critical issue for a Community that relies on mass transit to commute to work. Flooding and/or felled trees from the storm disabled the three subway lines in the Community (F, N, and D lines). The elevated B train in Sheepshead Bay was the only line in service after the storm but trains were extremely congested. The MTA's Coney Island Rail Yard facility is a regionally significant asset and its vulnerability to flooding is a critical issue that must be addressed.



Superstorm Sandy Impacts: Belt Parkway

Source: Marnee Elias-Pavia

be included in the revised 100-year floodplain. Property owners in this area may need to purchase flood insurance from a federally backed lender or retrofit their buildings to meet Federal Emergency Management Agency (FEMA) requirements.

Infrastructure

The Infrastructure RSF refers to systems and facilities for energy, water, communications, transportation, utilities, gas distribution, sanitation, flood control and other facilities that support essential services. The core recovery function for infrastructure is to efficiently restore systems and services to support a viable, sustainable community and improve resilience and protection from future hazards.

Gravesend and Bensonhurst

The disruption of power and telecommunications systems is a great concern for the Community. Flooding during Superstorm Sandy caused Community-wide power and telephone outages, significantly hindering telecommunications transmission and distribution infrastructure, including the overhead lines that are vulnerable during high-wind storm events.

Bulkheads are not contiguous along the coast, and in most of the Community bulkheads and revetments are not built at a height to withstand future severe weather events. The most significant infrastructure issue posed by Superstorm Sandy is that tidal surge overtopped bulkheads, flooding the Belt Parkway and inundating large portions of the neighborhood.

Sewer backups in basements were commonly reported by residents and business owners during Superstorm Sandy in Gravesend and Bensonhurst and pose a risk to the habitability of homes and the ability for businesses to continue operation. As discussed in Section 1.2, sewer backups also occur on some streets at lower elevations when heavy rain events overload the sewer system's drainage capacity.



Shore Parkway Greenway and Belt Parkway

Natural & Cultural Resources

The Natural and Cultural Resources RSF addresses the management of natural and cultural resources from a risk reduction and economic development perspective. The Gravesend and Bensonhurst Community has tremendous park and open space resources along Coney Island Creek and Gravesend Bay, however, access to these resources is poor and the remaining park system is fragmented throughout the Community, lacking parkland north of the Belt Parkway.

Coney Island Creek presents a major vulnerability for Southern Brooklyn. Backdoor flooding through the creek was a source of flooding during Superstorm Sandy and public infrastructure and private property remain at risk.

The Creek currently suffers from erosion, debris in the waterway and poor water quality, with eight major sewer outfalls discharging directly into the Creek. Identifying solutions to improve Coney Island Creek and the surrounding wetlands is a critical issue for Gravesend and Bensonhurst.

Development has contributed to the decline in stormwater retention capacity in both the Community and the surrounding neighborhoods. Managing stormwater and increasing pervious surfaces is a critical issue for the Community. The construction of bulkheads, piers, and hardened shorelines has significantly altered tidal wetlands, natural shorelines, subsurface water flow, aquatic habitats, and hydrology. The high percentage of impermeable areas upstream are contributing factors to stormwater runoff and flooding issues.

Gravesend and Bensonhurst

E. Relationship to Existing Plans and Studies

Gravesend and Bensonhurst are closely linked with other communities in Southern Brooklyn, especially Coney Island which shares access to the Coney Island Creek. The creek is an amenity as well as a source of risk for both communities as it was a major source of flooding during Superstorm Sandy. This issue was identified in the Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Plan, which was completed in March 2014. A NYRCR Plan was also created for the neighboring communities of Gerritsen Beach and Sheepshead Bay. Projects and strategies from both of these NYRCR Plans were considered in the development of the Gravesend and Bensonhurst NYRCR Plan.

In addition, there are a number of plans, policies, procedures, and resources that address the existing conditions, regulatory frameworks, community goals, and resiliency opportunities in Southern Brooklyn. These resources have been produced by public agencies at all levels of government, regional planning groups, businesses, non-profit organizations, and academic institutions. Reconstruction projects and resiliency programs included in the NYRCR Plan recognize the planning work completed to date. Current projects that address specific assets in Gravesend and Bensonhurst are shown in Figure 1-9.

Existing plans with direct or indirect connections to the Community were reviewed to identify Community goals and ongoing or proposed projects. These plans were also assessed to ensure that the Gravesend and Bensonhurst NYRCR Plan is not duplicating or conflicting with

other efforts. The most relevant existing plans, studies, and projects which contributed information and ideas to the NYRCR Planning Process are summarized below, including key analysis and lessons learned. A comprehensive list of the relevant regulatory and advisory documents that were reviewed as part of the NYRCR Planning Process are listed in Section V, G: Appendix.

Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Plan (2014)

The Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Plan, completed in March, 2014 includes a number of proposed projects, to be funded using the Community's Community Development Block Grant – Disaster Recovery (CDBG-DR) allotment. Since the Gravesend and Bensonhurst Community is closely connected with the Coney Island Peninsula, geographically, socially and economically, there may be opportunities to cooperate and/or learn from these projects that are currently being pursued.

The NYRCR Brighton Beach, Coney Island, Manhattan Beach, Sea Gate Plan supports the SIRR-recommended City project to restore and control flooding at Coney Island Creek. This project is currently managed by the NYC Economic Development Corporation (NYCEDC) and is in the feasibility stage of the planning process.

The NYRCR Plan also included a Proposed Project for a study to determine the feasibility

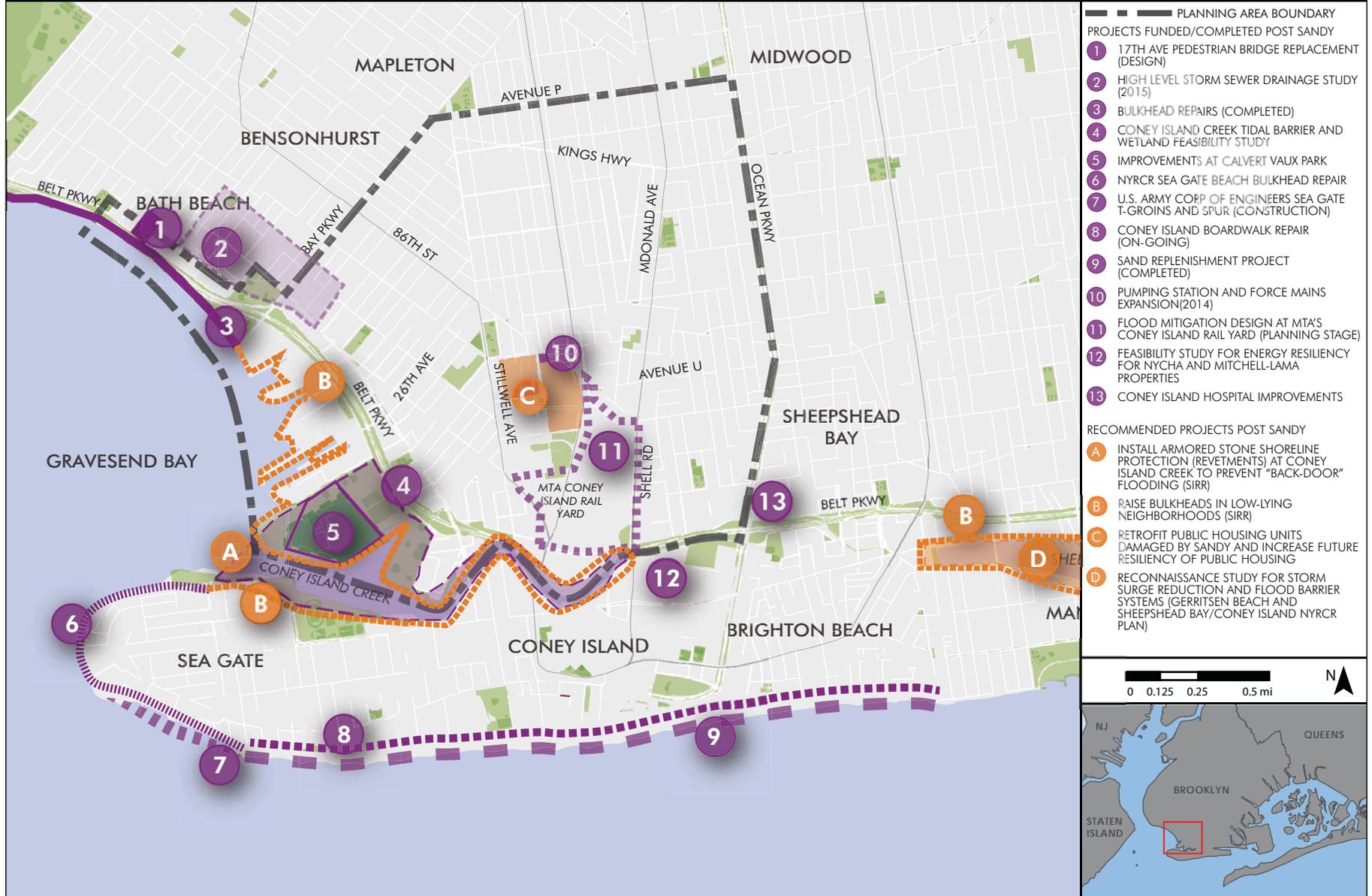
of developing microgrid, smartgrid, and/or cogeneration solutions to ensure that NYCHA and Mitchell-Lama properties maintain power in future storm events. The study would assess the potential for a microgrid powers by the existing power plant at the Amalgamated Warbasse Houses, to provide power to nearby facilities on Coney Island including the Coney Island Hospital.

Gerritsen Beach and Sheepshead Bay NYRCR Plan (2014)

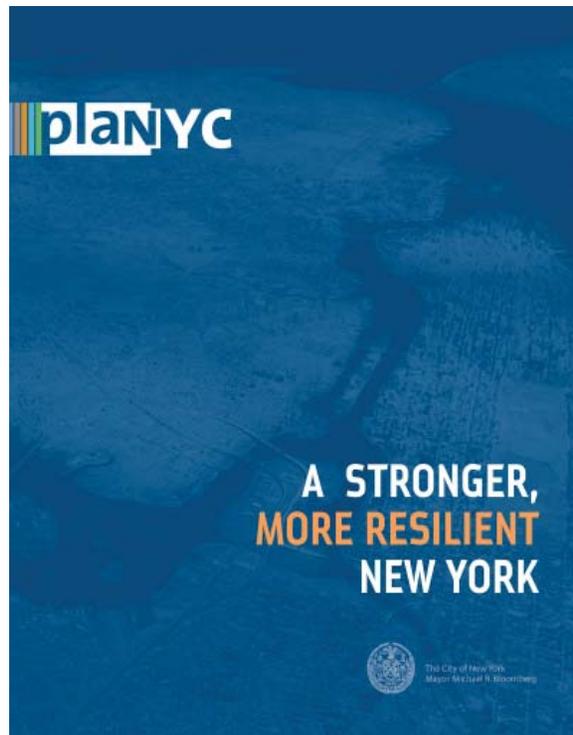
The Gerritsen Beach and Sheepshead Bay NYRCR Community lies directly to the east of Gravesend. During Superstorm Sandy, the source of flooding in this NYRCR Community was primarily from Sheepshead Bay and Jamaica Bay, and not Coney Island Creek. This Community is also in a different watershed than Gravesend and Bensonhurst. Therefore, many of the proposed projects and interventions related to stormwater and flood protection will not directly impact Gravesend and Bensonhurst. However, there are a number of community planning strategies developed in this NYRCR plan that are relevant to the Gravesend and Bensonhurst NYRCR Plan, including the building of an Emergency Response and Recovery Center in Sheepshead Bay and the recommended project to develop "community driven emergency response programs." There may be opportunities to cooperate with, build upon, and/or learn from these community and capacity building projects.

Figure 1-9: Current Projects and Plans

Gravesend/Bensonhurst
NY Rising Community Reconstruction Plan



Gravesend and Bensonhurst



SIRR Report

Source: NYC.gov

PlaNYC: A Stronger, More Resilient New York (2013)

The report produced by Mayor Bloomberg's Special Initiative for Rebuilding and Resiliency (SIRR) is a nearly \$20 billion plan that provides a framework for providing greater coastal protections, more resilient infrastructure systems, and more responsive municipal services. The goal of the report is to provide strategies that will help New York City adapt to the impacts of climate change and ensure that the city is better prepared to recover from disasters such as Superstorm Sandy.

The public engagement component of the plan included two public workshops in March 2013

for the Southern Brooklyn area. Participants in the workshop indicated that additional coastal protections were needed along the coast and Coney Island Creek. Other issues identified were the inadequacy of the stormwater drainage network, the need for improved communication between city agencies and the public and the need to address the lagging recovery of neighborhood services and commercial corridors.

The report recommends a number of initiatives to increase resiliency in Southern Brooklyn, including the development of an implementation plan and preliminary designs for new Coney Island Creek wetlands and tidal barrier. The report calls for U.S. Army Corps of Engineers (USACE) to develop an implementation plan for the reinforcement of Belt Parkway edge.

With regard to buildings, the report recommends that public housing facilities undergo retrofits to increase their resiliency. The report includes a number of other recommendations for infrastructure, healthcare, parks, water and wastewater, all of which have been considered in the development of this NYRCR Plan.

The New York City Comprehensive Waterfront Plan—Vision 2020 (2011) and Waterfront Action Agenda – WAVES (2011)

The New York City Comprehensive Waterfront Plan—Vision 2020 (CWP) is a comprehensive analysis and overall vision for New York City's 520 miles of shoreline. It includes a strategic framework for the City's waterfront, short- and long-term strategies, and is used to guide land and water use decisions. Priorities in the plan focus on expanding public access, supporting the working waterfront, improving water

quality, restoring the ecology of the waterfront, enhancing the Blue Network (the waterways between the five boroughs), and increasing the resiliency of the City in respect to climate change and sea-level rise. The Waterfront Action Agenda (WAVES) is the three year implementation component of Vision 2020. Recommendations specific to the Gravesend and Bensonhurst Community include:

- Reconstruct existing path and sea wall and support extension and widening of bike path at Shore Parkway Greenway;
- Support creation of Southwest Brooklyn Marine Transfer Station;
- Support provision of public waterfront access at redevelopment sites;
- Support remediation of Westshore Ave. site as condition of possible development; and
- Support improvements at Calvert Vaux Park including construction of new sports fields, lighting and pedestrian paths.

New York City Natural Hazard Mitigation Plan (2014)

The Hazard Mitigation Plan (HMP) provides hazard risk-reduction strategies and projects that are based on risk analyses, and developed through a community-wide planning process. The HMP was reviewed closely, specifically Chapter 3.6: Risk Assessment for Coastal Storms and section IV Mitigation Strategy which includes programs, plans, projects, and policies to decrease or eliminate potential losses from hazards identified in the Risk Assessment section. Overarching mitigation strategies pertain to the Community, but no specific projects were listed for Gravesend and Bensonhurst.

Shore Parkway Greenway Connector Master Plan (2005)

The master plan developed by the New York City Department of City Planning in 2005 proposed recommendations to link the two separate sections of the Shore Parkway Greenway that parallels New York Bay and Jamaica Bay. Completing this five-mile gap would provide a continuous 23-mile greenway along or near the waterfront. The recommended greenway route follows the Shore Parkway South Service Road (Shore Road South) adjacent to waterfront parcels until Cropsey Avenue. The route continues south on-street into Coney Island, and then traverses the Coney Island peninsula on Neptune and Emmons Avenues. This plan examines existing conditions, highlights opportunities, and presents short and long term recommendations, supported by technical analysis, to guide the implementation of new or improved bicycle facilities on this five-mile connector.

The New York City Waterfront Revitalization Program (2002)

The New York City Waterfront Revitalization Program (WRP) is the city’s principal coastal management tool, and implements the CWP. It establishes the City’s policies for development and use of the waterfront, and provides the framework for evaluating the consistency of all discretionary actions in the coastal area. When a proposed project is located in the City’s designated waterfront area, and it requires a local, state, or federal discretionary action, a determination of the project’s consistency with the policies and intent of the WRP must be made before the project can move forward.

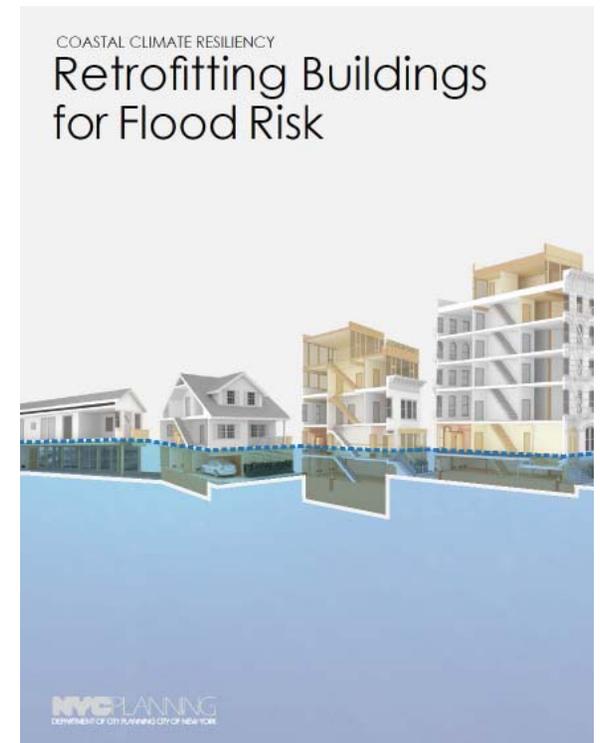
Coney Island Creek Tidal Barrier and Wetlands Feasibility Study (2015 anticipated completion)

This feasibility study for flood protection measures at Coney Island Creek is currently being managed by NYCEDC on behalf of the Mayor’s Office, in close partnership with NYC DEP, the Parks Department, and City Planning. State and Federal agencies (i.e., NYS DEC, and USACE) are also involved. The plan is scheduled to be completed by the end of 2015. The plan will include the following:

- Feasibility of a tidal barrier and wetlands concept including environmental, engineering, and regulatory challenges;
- Short and long-term flood prevention measures;
- Cost estimation for potential interventions;
- Other opportunities to provide benefits, such as improved access to waterfront recreation, improved natural functions of the creek, and new transportation connections; and
- Stakeholder input and feedback on potential designs for the Creek.

Urban Waterfront Adaptive Strategies

The Urban Waterfront Adaptive Strategies (UWAS) report, prepared by the New York City Department of City Planning, provides a systematic assessment of the coastal flood hazards from climate change and sea-level rise that face New York City. The UWAS lays out a risk-based, flexible process for identifying, evaluating and implementing potential coastal protection strategies. It recognizes that waterfronts vary, and may require a range of strategies at different scales. The report



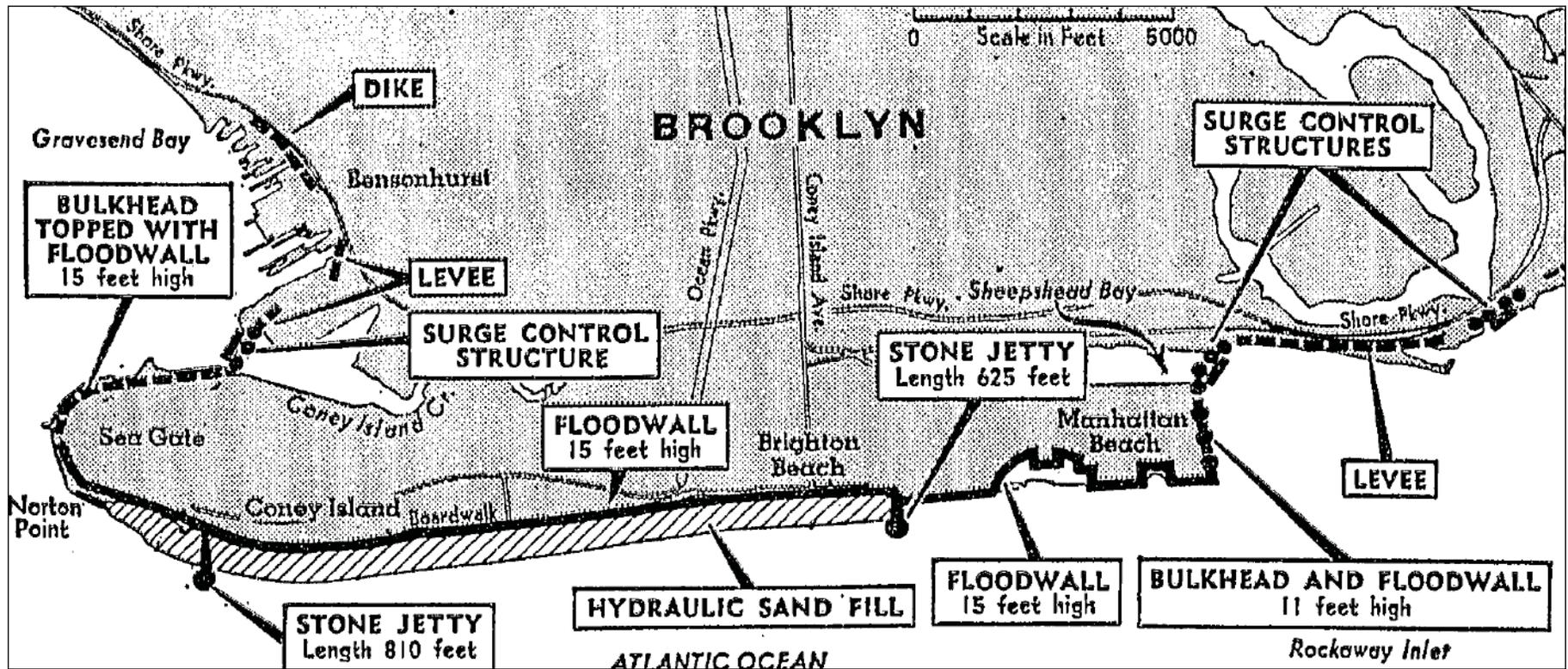
Retrofitting Buildings for Flood Risk (NYC DCP)

also identifies a range of potential adaptive strategies, and analyzes each for their ability to protect waterfront communities.

Retrofitting Buildings for Flood Risk

This document, prepared by the NYC Department of City Planning in 2014 provides guidance to property owners on how to retrofit their buildings in accordance with applicable Federal, State and City regulations relating to flood risk. The report provides homeowners with measures they can take to meet these requirements and make their buildings more resilient to coastal flood risks. Solutions address building

Gravesend and Bensonhurst



USACE 1972 Study of Coastal Protections in Brooklyn

Source: NYTimes

and mechanical equipment elevation, freeboard requirements, alternative uses of ground floor space, and parking issues. These guidelines are provided for a wide range building types found in New York City.

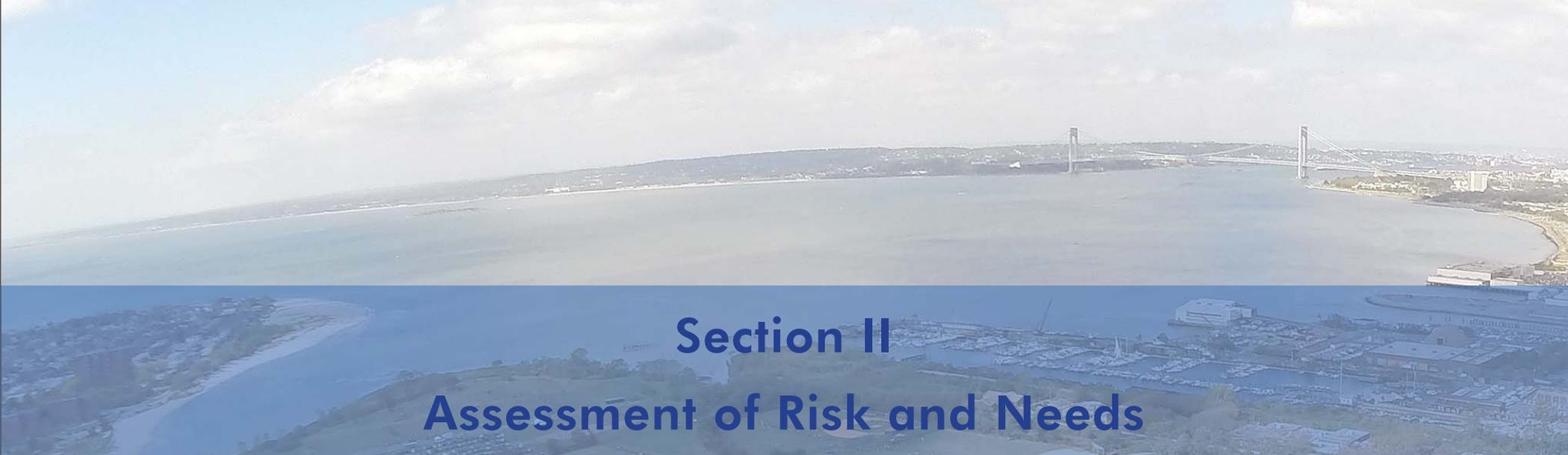
Designing for Flood Risk

Designing for Flood Risk identifies key principles to guide the design of new buildings in flood zones so that construction will be more resilient to the effects of climate change and coastal flood events. Recognizing the distinct character and

needs of higher-density urban environments, the report provides recommendations for how regulations and individual project design can incorporate these principles. The study informed the Department of City Planning's Flood Resilience Zoning text amendment adopted by City Council in 2013.

U.S. Army Corps of Engineers Study of Coastal Protections

In 1972, USACE proposed a plan for coastal protection that proposed grass-covered levees along part of Shore Parkway at a height of 15-18 feet, with a top width of 8 feet. The plan also included a 15-foot-high flood wall on Coney Island from Manhattan Beach to Sea Gate, with flood gates at Coney Island Creek, Gerritsen Inlet, and Sheepshead Bay.⁵¹



Section II

Assessment of Risk and Needs



SECTION II: ASSESSMENT OF RISK AND NEEDS

A. Creating an Asset Inventory and Risk Assessment

The Gravesend and Bensonhurst NY Rising Community Reconstruction Plan (NYRCR Plan) for the Gravesend and Bensonhurst NYRCR Community (Community) seeks to protect community assets and reduce their risk from future storm events. Assets include facilities, institutions, or networks that are essential to day-to-day life, rapid disaster recovery, and long-term resilience of the Community. The Gravesend and Bensonhurst NYRCR Program Planning Committee (Committee) prioritized assets that are critical or locally significant and provide services for socially vulnerable populations, such as people with disabilities, low-income populations, the elderly, children, and homeless populations.

In order to create a plan that protects critical and locally significant assets, the Committee also considered the relative risk of these community assets to damage or loss of service during future severe weather events.

The Asset Inventory and Risk Assessment helped the Committee and Community to identify those assets at highest risk for negative impacts from future storm events, providing an understanding of the needs and opportunities within their Community, and enabling them to develop projects that reduce the risk to these assets. The Asset Inventory and Risk Assessment Process is illustrated in Figure 2-1.

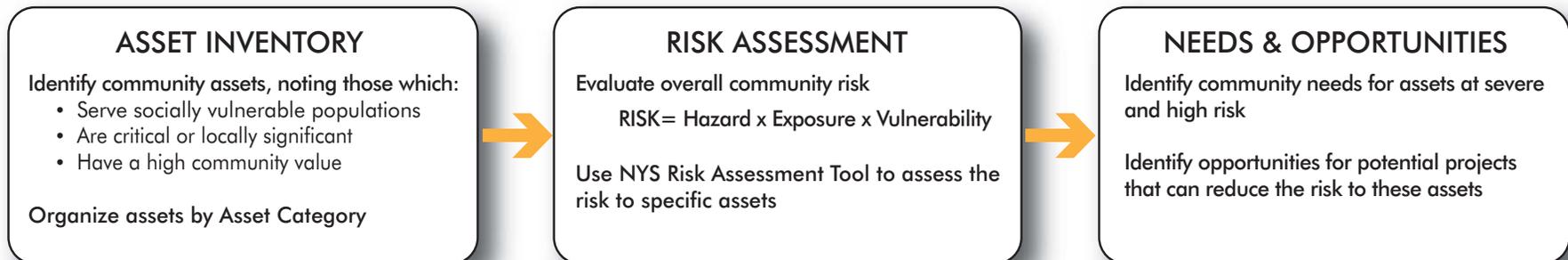
The Asset Inventory and Risk Assessment is compiled to measure the current levels of risk to assets in Gravesend and Bensonhurst, and will serve as a baseline for determining the risk-reduction benefits of potential NYRCR Proposed and Featured projects.

Community Assets

To be a more resilient community, Gravesend and Bensonhurst must identify ways to strengthen and protect its social, economic, and natural resources that have been, or will be, affected by future hazards. These assets are places or facilities where economic, environmental, and social functions of the Community occur, or are critical infrastructure required to support those functions. Assets are features the Community values, ranging from commercial areas, neighborhoods, schools, and healthcare facilities, to infrastructure, natural habitats, and cultural resources. The NYRCR Plan seeks to ensure that reconstructed assets and new assets are built to withstand the impacts of future storms, while programs and policies are designed to increase the Community's resilience.

The Committee has identified numerous assets that were impacted by Superstorm Sandy, are

Figure 2-1: Asset Inventory and Risk Assessment Process



NY Rising Community Reconstruction Plan

at risk of being impacted by future storms, or provided critical recovery support for residents and businesses in the inundation zone. Assets were defined according to the following categories:

- Economic
- Health and Social Services
- Housing
- Infrastructure Systems
- Natural and Cultural Resources, and
- Assets that serve Socially Vulnerable Populations

Assets were identified through a series of exercises that involved community input, research, and analysis, including:

- Discussions at NYRCR Committee Meetings;
- Feedback at Public Engagement Events;
- Meetings at the neighborhood level with Committee members, New York City and State agencies, local officials, and community members;
- Site tours; and
- Data analysis.

Assets included in the risk assessment were those that are:

- Located in the Extreme or High Risk areas in the New York State Risk Maps (see “Assessing Risk to the Community”);
- Are considered to be critical or locally significant assets (see below) whose loss or impairment would compromise essential services; or,

- Were identified by the Committee as having a High Community Value (see below).

Critical and Locally Significant Assets

According to the Federal Emergency Management Agency (FEMA), critical facilities are essential to the health and welfare of the whole population and are especially important following hazard events. Examples of critical facilities include emergency-service facilities such as hospitals and other medical facilities, police and fire stations, emergency operations centers, public works facilities, generating plants and other principal point of utility lines, evacuation shelters, schools, and other uses that house special-needs populations.³³

However, FEMA-defined critical facilities may not include the full range of assets considered critical by the Community. Therefore, the NYRCR Plan also identifies locally significant facilities that would be considered critical by other Federal agencies, State and local officials, and the Committee. Together, these two sets of critical assets will provide the Community with a more complete picture of risk to important assets.

Assets with High Community Value

This NYRCR Plan is the result of a participatory planning process that gained input from the Committee and the public. Therefore, community value weighed heavily in determining which assets the NYRCR Plan seeks to protect. “Community Value” equated to the value of the asset to the Community and is expressed as high, medium, or low.

The criteria for identifying assets is further detailed in Section V-Additional Materials: Community Asset Inventory and Risk Assessment.

Assessing Risk to the Community

Risk is the chance that an asset will be impacted by future storm events. Assessing the risk to community assets helped the Committee identify assets at high risk, determine Reconstruction Strategies, and develop projects that will reduce their risk.

Risk is an expression of three factors:

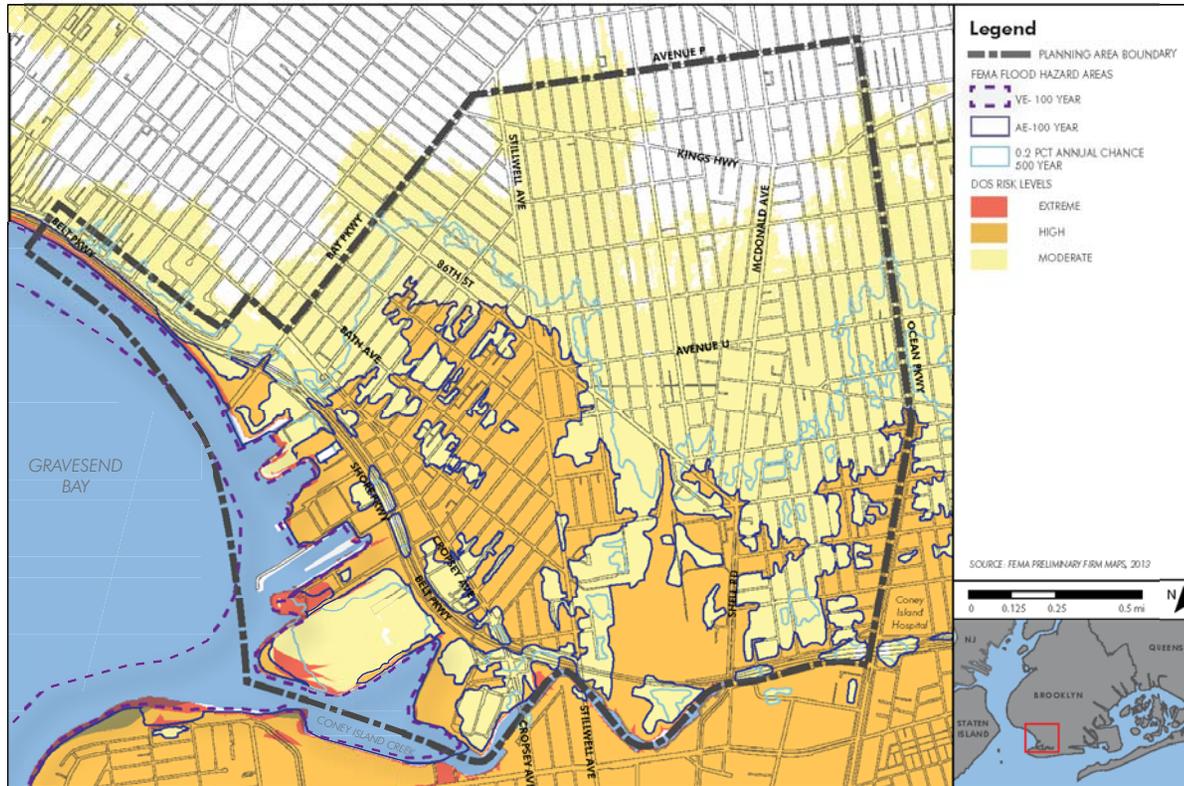
- **Hazard**, the likelihood and magnitude of a future storm;
- **Exposure**, or the moderating effect of topographic and shoreline features; and
- **Vulnerability**, the ability of an asset to resist damage from a future storm event for each group of assets.

These factors, which are described in detail below, were multiplied to calculate the risk score for each asset:

$$\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$$

Gravesend and Bensonhurst

Figure 2-2: NYS Hazard Risk Map



Hazard: Likelihood of Future Storm Events

Hazards are considered storms that are typical for the Community. The most typical hazards in Gravesend and Bensonhurst are low-intensity storm events ranging from above-average rainfall to nor'easters and microbursts that cause flooding of low-lying areas and roadways. Less typical hazards include infrequent, high-intensity storm events such as Superstorm Sandy. While these hazards are less frequent now, extreme weather events are likely to increase due to

climate change. Areas of the Community with a higher degree of hazard can be seen in both the New York State Risk Maps and the FEMA Flood Hazard Areas. These two hazard maps are explained below and are shown in Figure 2-2.

NYS Risk Maps

The New York State Department of State (NYS DOS) has developed risk area mapping, which illustrates the coastal hazards faced by the Community in relation to its topography, FEMA flood zones, previous storm surge inundation,

sea level rise, National Weather Service (NWS) shallow coastal flooding advisory thresholds, and natural shoreline features. As shown in Figure 2-2, the NYS Risk Maps have three area classifications:

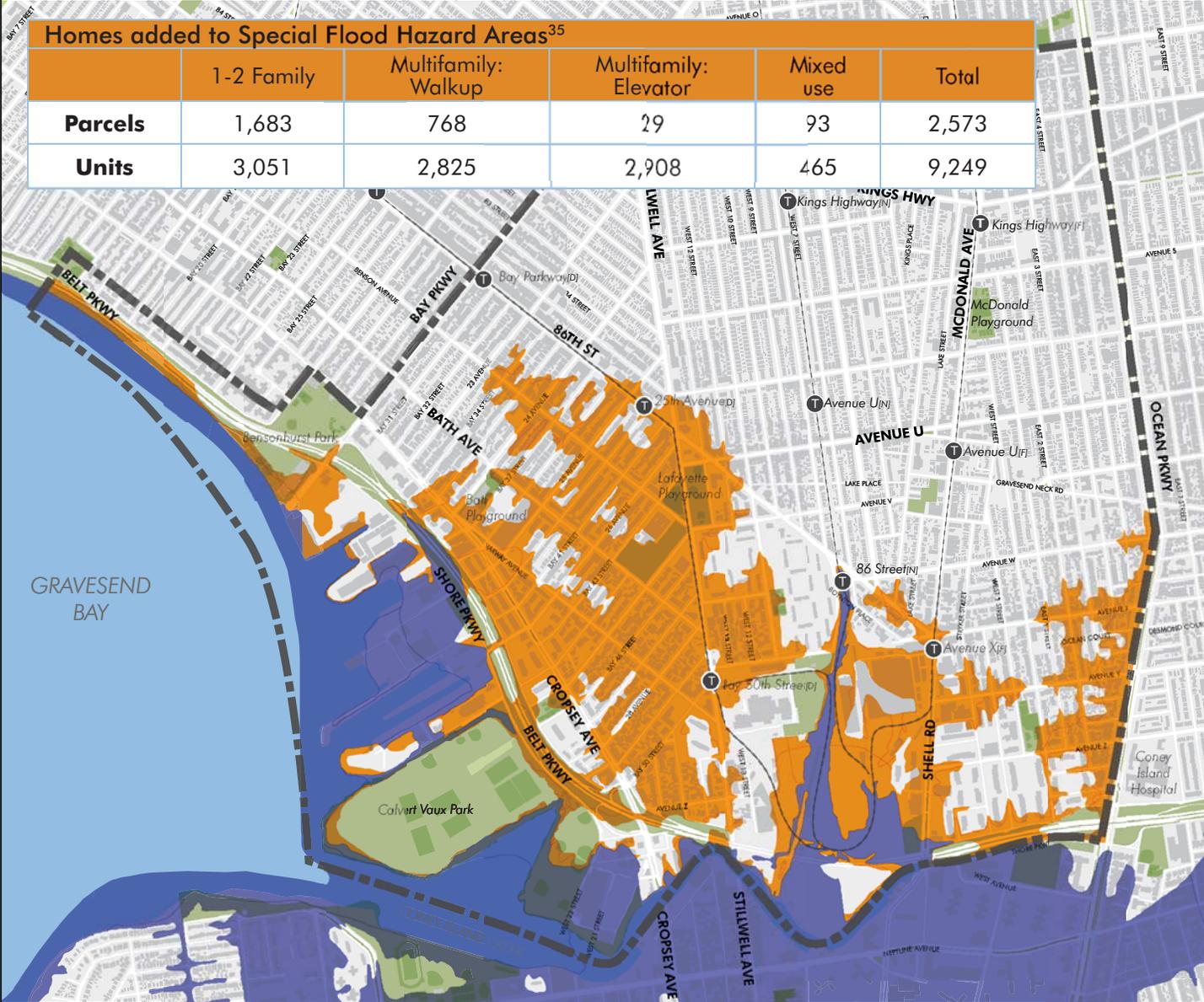
Extreme Risk Areas: Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise.

High Risk Areas: Areas outside the Extreme Risk Area that are currently at infrequent risk of inundation or at future risk from sea level rise.

Moderate Risk Areas: Areas outside the Extreme and High Risk Areas but currently at moderate risk of inundation from infrequent events, or at risk in the future from sea level rise.

Approximately 1% of the Community is located in the extreme risk area, while 26% is in the high risk area and 53% is in the moderate risk area. Only 18% of the Community is not located in a risk area. Extreme risk areas in the Community lie along the shoreline of Coney Island Creek and Gravesend Bay, including areas in Calvert Vaux Park and along Bay 43rd Street. High risk areas are concentrated in the low-lying parts of the Community, between the shoreline of Gravesend Bay and Stillwell Avenue extending northwest to 86th Street, and the shoreline of Coney Island Creek extending northeast along Ocean Parkway to roughly Avenue W, encompassing the Metropolitan Transit Authority (MTA) Coney Island Rail Yard. The remainder of the Community lies within a moderate risk area, with the exception of the northeastern portion, which is the only area not considered at risk.

Figure 2-3: Additions to Special Flood Hazard Area (SFHA) in FEMA's Preliminary Firm Map



Homes added to Special Flood Hazard Areas ³⁵					
	1-2 Family	Multifamily: Walkup	Multifamily: Elevator	Mixed use	Total
Parcels	1,683	768	29	93	2,573
Units	3,051	2,825	2,908	465	9,249

Legend

- PLANNING AREA BOUNDARY
- NEW AREA INCLUDED IN SPECIAL FLOOD HAZARD AREA (SFHA) IN PRELIMINARY FLOOD INSURANCE RATE MAPS (FIRMS) RELEASED IN 2013
- ORIGINAL SFHA 100-YEAR FLOODPLAIN

THE SFHA IS THE AREA THAT WILL BE INUNDATED BY A 100-YEAR FLOOD EVENT. THE SFHA IS WHERE THE NATIONAL FLOOD INSURANCE PROGRAM'S (NFIP'S) FLOODPLAIN MANAGEMENT REGULATIONS MUST BE ENFORCED AND IS THE AREA WHERE THE MANDATORY PURCHASE OF FLOOD INSURANCE APPLIES.



Gravesend and Bensonhurst

FEMA Flood Hazard Areas

FEMA produces Flood Insurance Rate Maps (FIRMs) that identify areas at risk of flooding. Areas are assigned different zones depending on the level of flood risk. The current Effective FIRMs for New York City are from 2007. On December 5, 2013, FEMA released Preliminary FIRMs for New York City, which are currently in the regulatory review process. It is expected the maps will become effective by early 2016.³⁴

As can be seen in Figure 2-3, the 100-year floodplain for Gravesend and Bensonhurst, as indicated in the Preliminary FIRMs, has tripled from 12% to 36% of the Community, indicating an increase in the hazards that the Community faces. Table 2-1 shows an approximation of the number of housing units this change will affect by housing type.

Once the Preliminary FIRMs are finalized, owners of properties within the updated 100-year floodplain will be required to carry flood insurance if they have a mortgage from a federally backed lender. The increase in flood insurance rates has the potential to be a significant financial burden for these homeowners. Flood insurance premiums are not uniform, but are based on a number of factors, including the location of the building within the floodplain, the building's lowest floor elevation (including basement) relative to the 100-year or Base Flood Elevation (BFE), and the policy value. Property owners wishing to reduce their premium may have to elevate their homes or retrofit them so that there are no residential units, boilers or other important utilities below the BFE. Elevating homes in this Community may be difficult since many of the residential

buildings are older attached row homes or larger multi-family homes.

To ensure that structures are built using the best available information, the New York City Building Code requires new and substantially improved buildings to use the Preliminary FIRMs in anticipation of its adoption in 2016.

Exposure: Moderating Effect of Topography and Shoreline

Exposure refers to local topographic and shoreline conditions that tend to increase or decrease the effects of coastal hazards on the Community. Exposure is measured using the following factors:

- Shore defense structures;
- Coastal vegetation; and
- Depth to water table.

Local topographic and shoreline conditions that impact stormwater flooding and coastal hazards in the Community and its assets are shown in Figure 2-4 and described below.

Approximately one-third of the Community's shoreline is located in a coastal erosion hazard area, spanning from the eastern boundary of the Community southwest past Calvert Vaux Park. Coastal erosion hazard areas are those areas that are subject to erosion or provide protection for other lands against erosion. Storm impacts may increase on shorelines with high erosion rates, as development on an eroding beach can heighten risk from wave impacts and storm surge. The New York State Department of Environmental Conservation (DEC) requires activities or development within these coastal

erosion hazard areas to be reviewed to minimize damage caused by erosion to structures and to prevent damage to natural protective features.

The entire Gravesend Bay shoreline experiences wave action, which increases the Community's exposure to storm impacts because the water line is frequently in contact with shore defense structures (i.e., bulkheads and seawalls).

Structural defenses along the shoreline are either deteriorating, were damaged during Superstorm Sandy, or are not considered adequate protection against future storm events given anticipated storm or sea level rise conditions. Low seawalls have been constructed along the Shore Parkway promenade from the eastern boundary of the Community southwest past Calvert Vaux Park, and smaller seawalls exist along Bay 41st Street near the New York City Department of Sanitation Facility and at the end of Bay 43rd Street past the Block Institute. Several segments of shoreline feature a combination of natural marsh and rip rap, while other areas have concrete or steel bulkheads. Figure 2-4 illustrates shoreline conditions and structural defenses in the Community.

Coastal vegetation is not present in enough depth or continuity to provide adequate coastal protection. Sufficient depth of vegetation is only present at a small location between Coney Island Creek and the MTA Coney Island Rail Yard, as well as at Calvert Vaux Park. Such vegetation did little to prevent damage of the rail yard during Superstorm Sandy, and while Calvert Vaux Park is at a higher elevation, flood waters flowed around the Park into the low-lying areas north of it during the storm.

The Community’s topography also increases its exposure to coastal flooding, as low-lying areas are situated on a high groundwater table and developed on filled wetlands. This has created a “bowl” effect in the area between Cropsey Avenue and West 11th Street, bounded to the south by the Belt Parkway and to the north by 86th Street. The bowl effect occurs because tidal flooding in low-lying areas cannot recede due to topography, and water-logged soils prevent water from dissipating through the ground.

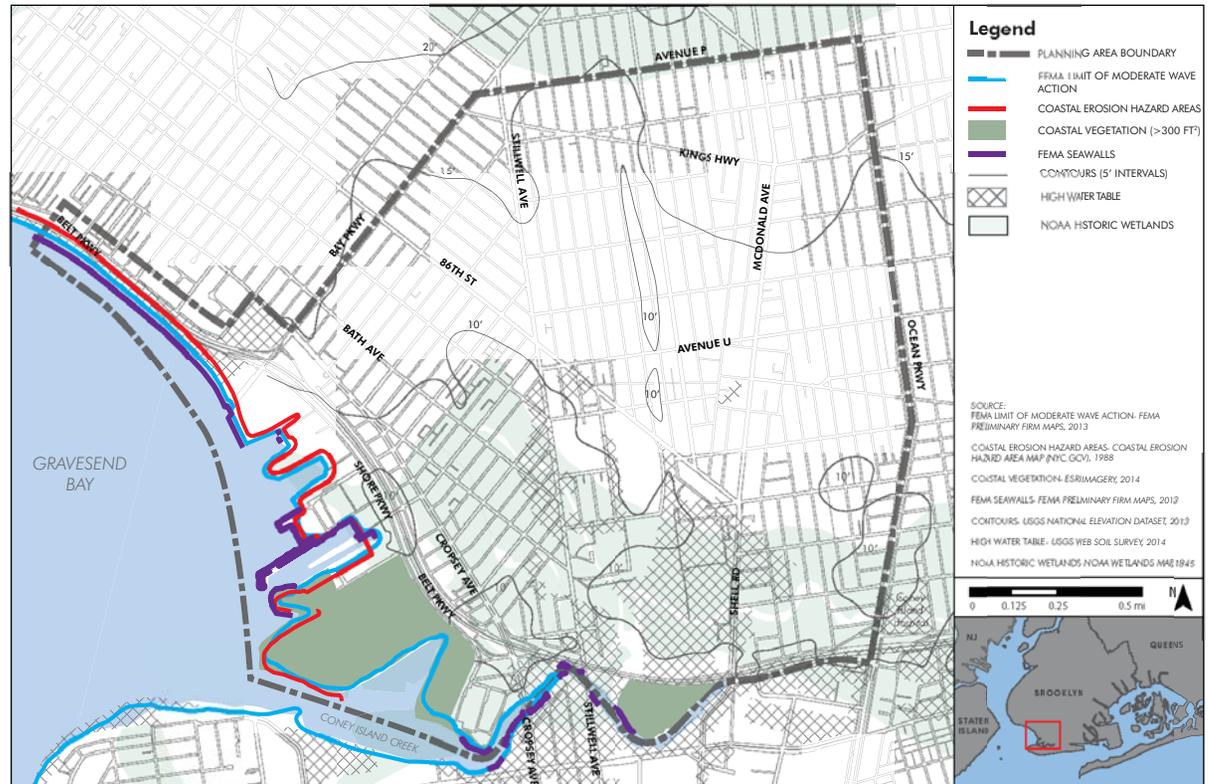
Vulnerability: Ability to Resist or Recover from Future Storm Events

The Community’s vulnerability is largely determined by both its strength to resist impacts from coastal hazards and its resiliency to recover quickly from those impacts. Therefore, vulnerability is measured by the loss of service, or amount of time which an asset or community was impacted by a previous storm event.

Figure 2-5 illustrates the factors that affect vulnerability of the Community as represented by inundation from Superstorm Sandy and storm surge from Hurricane Irene. It shows that the most vulnerable areas are those along Gravesend Bay west of Calvert Vaux Park and along Coney Island Creek, as well as in the “bowl” area described above. The MTA Subway N line corridor is also vulnerable to flooding throughout the Community, as are parts of the key vehicular corridors of Ocean Parkway, Stillwell Avenue, Cropsey Avenue, and low-lying (at-grade) segments of the Belt Parkway.

New York City’s Hurricane Evacuation Areas and FEMA Base Flood Elevations can be indicators of future vulnerability to inundation. Figure

Figure 2-4: Exposure Risk Map



2-5 illustrates these vulnerabilities, showing that base flood elevations range from 17 feet along the shoreline to 10 feet inland. The entire Community is within a New York City Hurricane Evacuation Zone, with the areas south of the Belt Parkway designated as Zone 1 and areas north of the Belt Parkway ranging from Zone 2 to Zone 6.

Vulnerability also reflects factors beyond inundation, including wind damage and power outages. The Committee reported that power outages were responsible for loss of

elevator service in high-rise buildings, while flooding and power outages caused losses in telecommunications systems, and wind damage cut off access to the MTA D Subway line.

Assessing Risk to Community Assets

The risk to each asset or system of assets has been quantified using the Coastal Hazard Asset Inventory and Risk Assessment tool developed by NYS DOS. This risk assessment provides a baseline level of risk for each asset or system of assets. The levels of risk to assets and systems

Gravesend and Bensonhurst

Figure 2-5: Vulnerability Risk Map

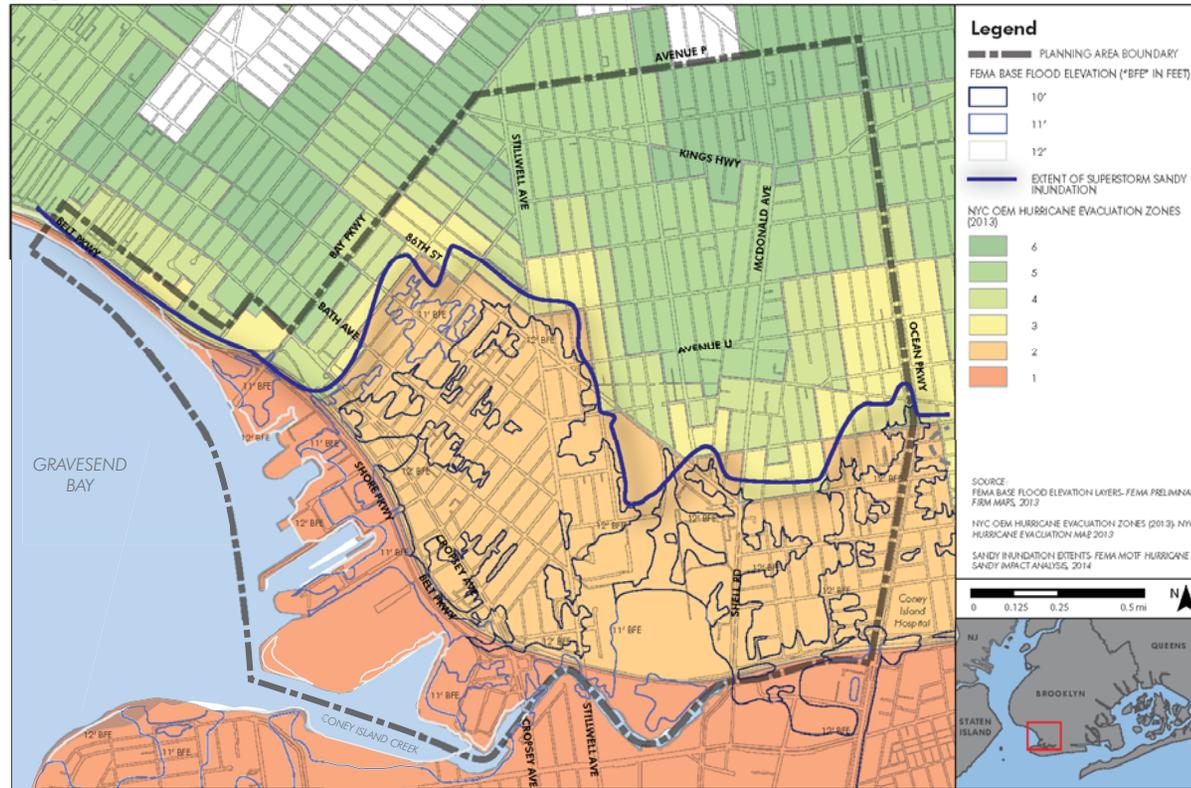


Table 2-1: Risk Levels

Severe
Assets at severe risk are in a dangerous situation, and both exposure and vulnerability of these assets should be reduced. Assets at high risk indicate conditions that could lead to significant negative impacts from a storm, and signify that actions should be taken to reduce the assets' vulnerability.
Moderate
Assets at moderate risk signify that they may suffer moderate to serious storm impacts, but that adaptation may be of a lower priority because either exposure or vulnerability are low.
Residual
Residual risk results from both low exposure and vulnerability; however, if assets are critical or have a very high community value, actions may be warranted to reduce their risk.

are detailed as shown in Table 2-1.

Pinpointing the assets at highest risk helped to guide the Committee's development of reconstruction strategies and projects that can mitigate risk and protect the most vulnerable assets. The reduction in risk caused by implementing a potential project will be a key determinant of the risk-reduction benefit generated by that project. In addition to risk, other contributing factors in determining which assets should be protected include:

- The contribution of the asset(s) to life safety;
- If the asset(s) are critical or locally significant;
- The community value of the asset(s);
- Environmental services provided by the asset(s);
- Economic contribution of the asset(s);
- Availability or alternative asset(s) or facilities; and
- The capacity of the asset(s) to adapt.

See Section V: Additional Materials for an

explanation of the Coastal Hazard and Risk Assessment Tool used to calculate risks for assets in the Community.

B. Description of Community Assets and Assessment of Risk to Assets

The following is a summary of the assets within the Gravesend and Bensonhurst NYRCR Community identified through the asset inventory process above and an assessment of their risks to future storm events.

Infrastructure Assets

Infrastructure assets include critical transportation routes and facilities, stormwater and sewer networks and facilities, and the electrical power grid. Figure 2-6 illustrates the infrastructure assets identified as part of the asset inventory process.

The Community is served by multiple modes of transit including subway, buses, and private commuter vans. Local bus lines connect the Community to surrounding neighborhoods in Brooklyn, however, there is no express bus service available. The N, D and F subway lines all run through the Community and terminate at the Coney Island-Stillwell Avenue Station. As reported by the Committee, as a result of Superstorm Sandy, parts of the N subway line were flooded, and trees fell on the D subway line as well as roadways causing transit disruptions. The B subway line in Sheepshead Bay was the only line in service just after Sandy; however congestion was a major issue due to the other subway service disruptions. As seen in Figure 2-7, all of the subway lines in the Community are at moderate risk. The Ulmer Park MTA Bus Depot is also at moderate risk. Among public transportation assets, the MTA Coney Island Rail Yard is at the highest risk, and was inundated during Superstorm Sandy, requiring interim repairs and ongoing planning for long-term resiliency.



Bay Parkway Subway Station (D Train) at 86th Street

A study conducted by the New York Metropolitan Transportation Council (NYMTC) in 2006 identified a number of issues related to public transit in the South Brooklyn area including Gravesend. Key issues included³⁶:

- Lack of rapid transit service along major corridors in Southern Brooklyn;
- Underutilization of express subway track capacity;
- Need for increased transfer opportunities between subway lines;
- Passenger crowding on bus routes;
- Slow bus operating speeds;
- Need for bus stop amenities;
- Potential to increase ferry service in Southern Brooklyn; and,
- Improved connections to JFK Airport.

The Committee pointed out that another key transportation issue is the difficulty for students to travel to schools in other areas.

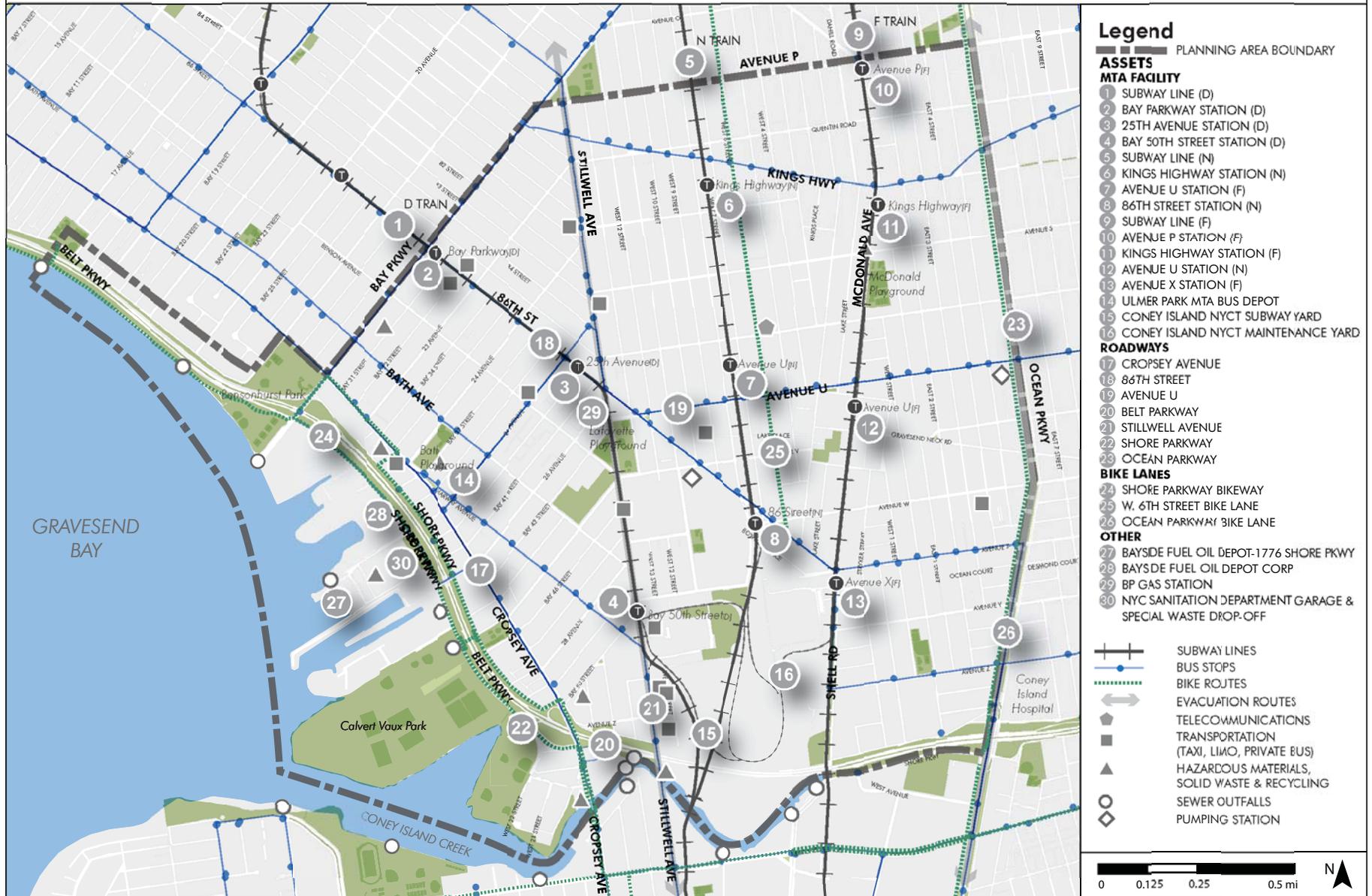
The major transportation corridors in the Gravesend and Bensonhurst area, in addition to those mentioned above are Cropsey Avenue, Stillwell Avenue, 86th Street, McDonald Avenue, Shell Road, Avenue U, Bay Parkway, and the Belt Parkway. The Belt Parkway lies in the southern to western end of the Community and is an integral part of the regional highway network. Water from Gravesend Bay overtopped at-grade areas of the Belt Parkway, extending past Cropsey and Bath Avenues beyond 86th Street. The Belt Parkway also has low-lying points that frequently experience coastal inundation during storm events.

Backwater flooding during Superstorm Sandy also extended north from Coney Island Creek along Ocean Parkway, McDonald Avenue, and Stillwell Avenue. Some of the Community's major vehicular arterials including Cropsey Avenue, the Belt Parkway, Stillwell Avenue, 86th Street, and Avenue U are all at moderate risk for future storm events. Ocean Parkway and its adjacent bike lane are both transportation assets at high risk of future storm events, while Shore Parkway and its bikeway are at moderate risk. Localized flooding during storm events also occurs along key north-south routes within the Community on Shore Parkway, Cropsey Avenue, Stillwell Avenue, McDonald Avenue, and Ocean Parkway. This flooding becomes hazardous for emergency response and when residents must evacuate the area.

Gas stations are critical to storm recovery, and also present public health and environmental hazards if flooded. Among the eight gas stations and fuel depots identified along the Belt Parkway and Shore Parkway, the Bayside Fuel



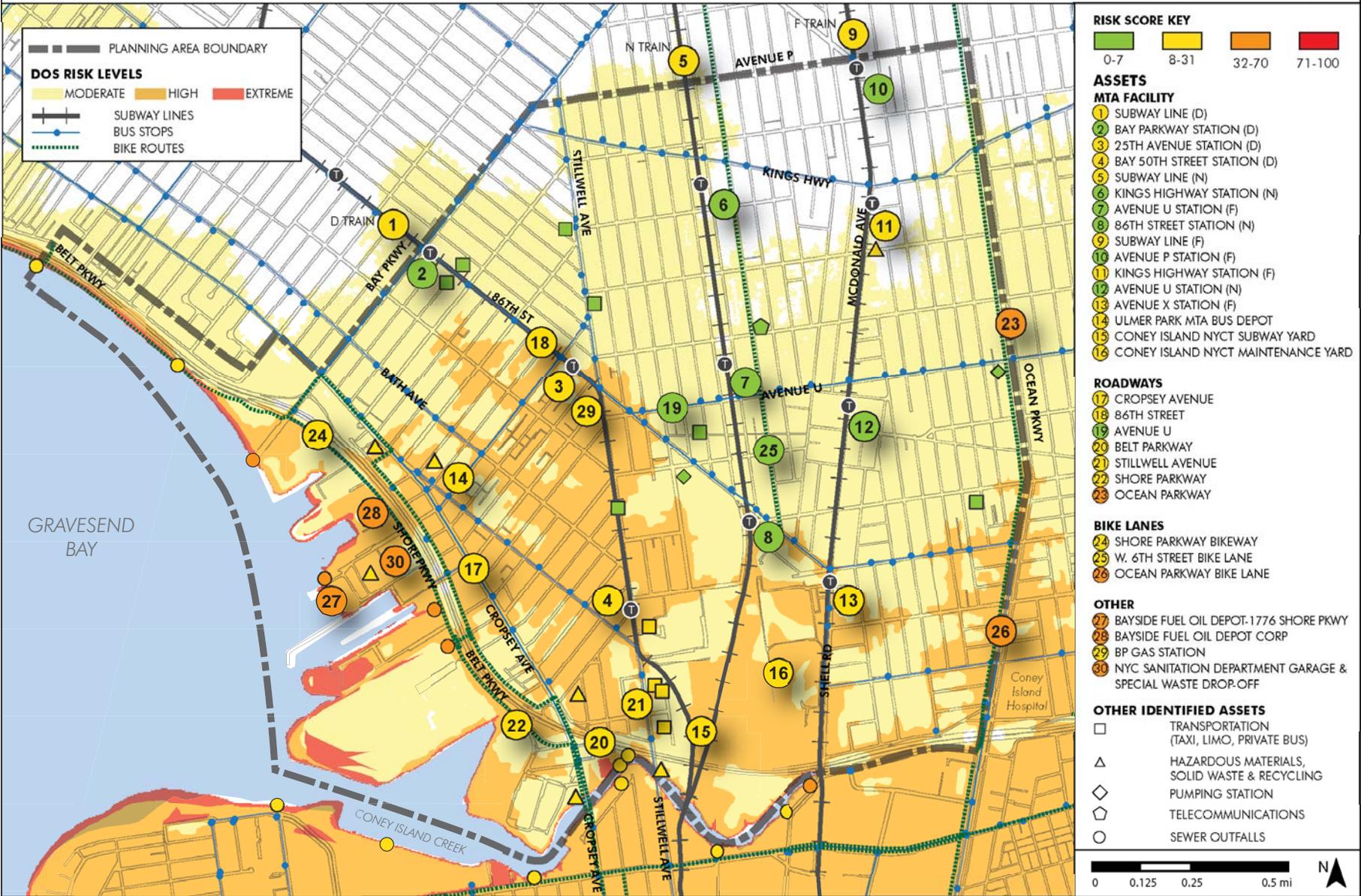
Figure 2-6: Infrastructure Asset Inventory



Gravesend/Bensonhurst
NY Rising Community Reconstruction Program



Figure 2-7: Risk to Infrastructure Assets



Gravesend and Bensonhurst

Oil Depot, which has several fuel holding tanks for distribution, is at the highest risk. Other gas stations are at moderate risk. The NYC Sanitation Garage and SW Brooklyn Marine Transfer Station are both at high risk.

Storm sewer and water supply networks are also critical infrastructure systems that are at risk during average storm events. Tidal flooding can enter outfalls that do not have tide gates, as detailed in the Tide Gate Analysis performed by the New York City Department of Environmental Protection (NYC DEP) as part of its Wastewater Resiliency Plan, which identified four outfalls in the Community for further analysis of the benefits of tide gates. The Committee reported that during Superstorm Sandy, the source of much of the flooding along low-lying areas near Cropsy Avenue was from overtopped sewers where water came up through manholes and sewer drains. The Avenue V Pumping Station is a critical infrastructure asset, which is at moderate risk. NYC DEP is completing a major upgrade to the pumping station and is beginning a drainage study to assess issues in the drainage system from Bay 20th Street to 23rd Avenue from Bath Avenue to the shoreline.

Another key infrastructure network impacted by Superstorm Sandy was the Community's electrical power system. Power outages were widespread, as indicated by field surveys in which one-quarter of respondents noted power outages as an impact from the Storm, many in areas not impacted by flooding. Trees were uprooted due to high winds and water-logged soils, damaging overhead telecommunications and power lines. Underground telecommunications lines were also flooded, resulting in failures in communication during storm response.

Natural and Cultural Resource Assets

Natural and Cultural Resources include habitats, wetlands and marshes, parks, recreation facilities, open space, museums, libraries, historic landmarks, and religious establishments. Natural and Cultural Resource assets identified and confirmed by the Committee are shown in Figure 2-8. The corresponding risk to each Natural and Cultural Resource asset is shown in Figure 2-9.

Gravesend Bay and Coney Island Creek are both assets and major sources of flooding. Waterfront access along these waterways is limited and unsafe in many areas. The New York City Economic Development Corporation (NYC EDC) has initiated a study at Coney Island Creek to investigate hydrological management strategies to prevent and mitigate upland flooding and improve waterfront open space, as a trigger for economic development around the Creek. Coney Island Creek has a few areas where parks (Calvert Vaux Park and Six Diamonds Park) or tidal wetlands are present and help to form a network of natural tidal barriers.

Gravesend and Bensonhurst has a number of waterfront parks south of the Belt Parkway, including Bensonhurst Park, Calvert Vaux Park, and Six Diamonds Park. Bensonhurst Park was overtopped during Superstorm Sandy, which destroyed benches, damaged concrete bulkhead, and flooded the tennis center. The tennis courts were repaired but the racquet club building remains in disrepair and is unusable as of September 2014. Calvert Vaux Park has been partially reconstructed with new recreational fields. The second phase of



Bensonhurst Park

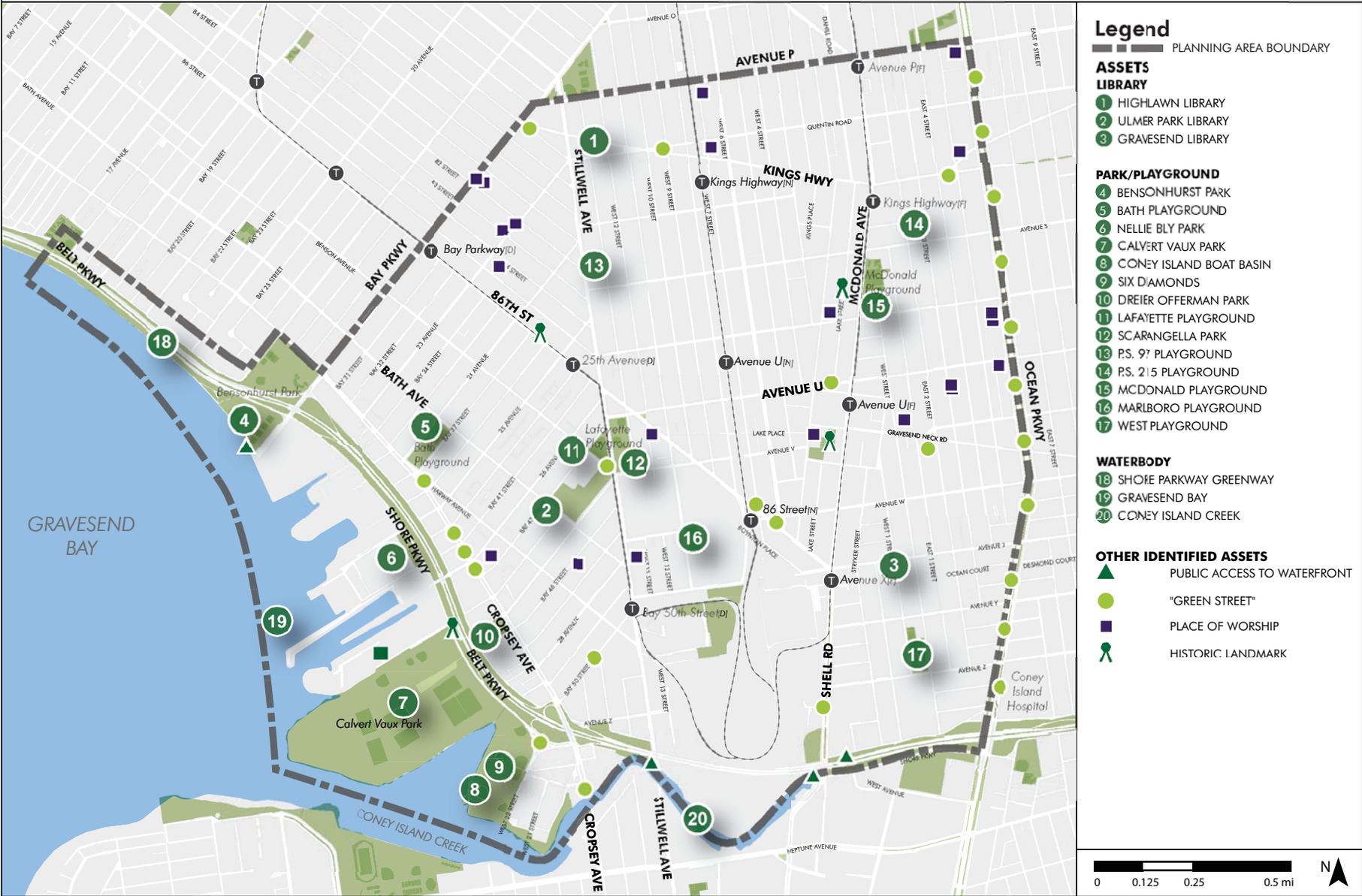
the park reconstruction will include additional active recreational amenities such as ball fields and a kayak launch.

The Shore Parkway Greenway is composed of two disconnected segments that together form 12 miles of paved pathways along the Brooklyn shoreline. The segment in the Community terminates at Bensonhurst Park and is considered at high risk due to its coastline location. The concrete bulkhead barrier wall was significantly damaged during Superstorm Sandy but has since been repaired by the New York City Department of Parks and Recreation ("NYC Parks").

North of the Belt Parkway, there are a number of smaller parks and playgrounds. Bath Playground, Lafayette Playground, and Scarangella Park were identified by NYC Parks as in need of revitalization.

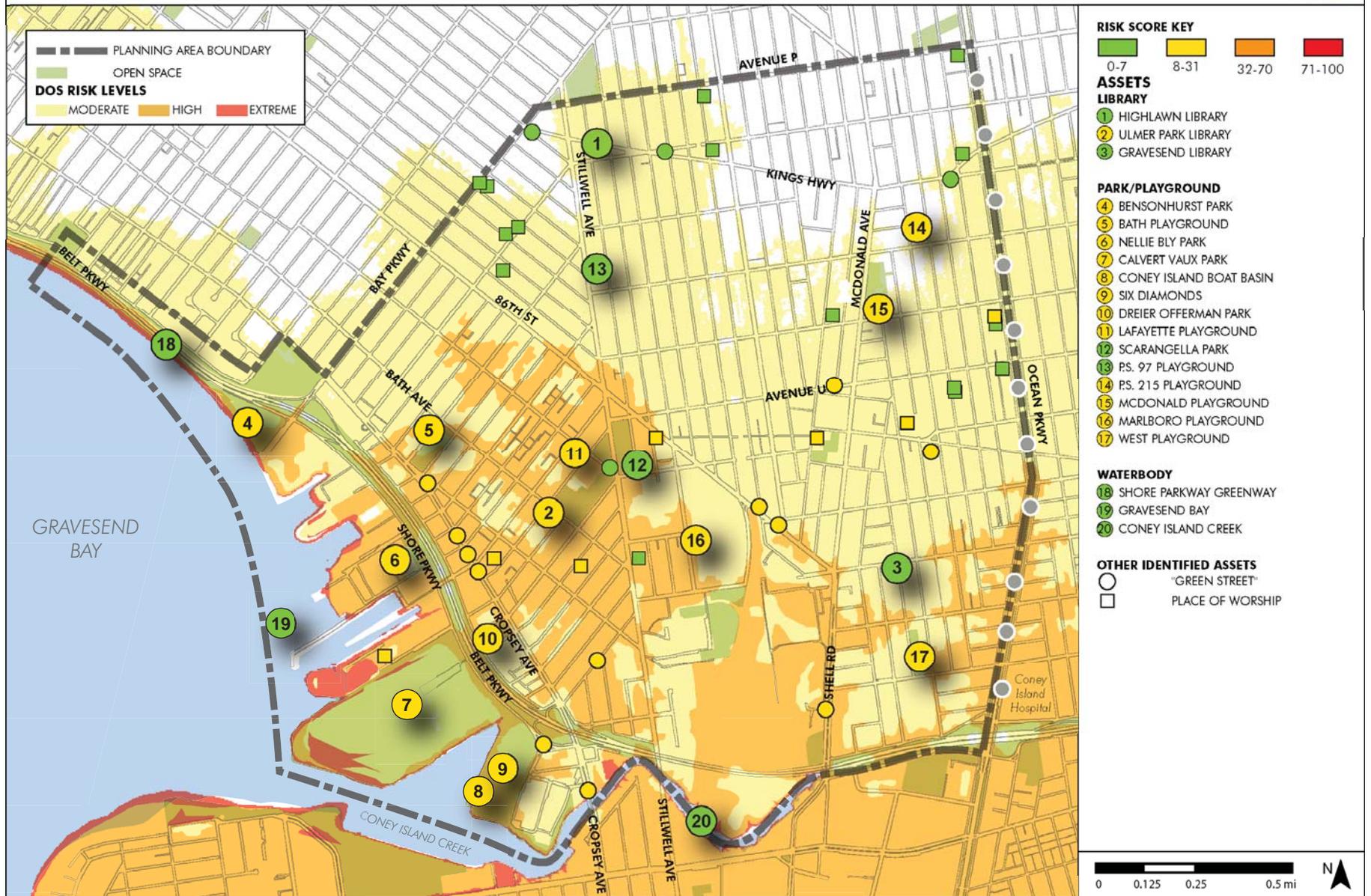
All three libraries in the Community, Ulmer Park, Highlawn, and Gravesend, are at moderate risk. These library services, while not at substantial risk, are considered locally significant facilities in the Community.

Figure 2-8: Natural and Cultural Resource Asset Inventory



Gravesend and Bensonhurst

Figure 2-9: Risk to Natural and Cultural Assets



Economic Assets

Economic assets in the Community include employment hubs and commercial corridors, ranging from large retail stores to industrial complexes, small businesses, service establishments, and tourism destinations. Economic assets identified and confirmed by the Community are shown in Figure 2-10.

As seen in Figure 2-10, the Community has a diversity of economic assets ranging from small retail businesses and personal services, to large big box stores and light industrial areas.

Local retail corridors can be found along Coney Island Avenue, Ocean Avenue, Stillwell Avenue, Kings Highway, 86th Street, Bay Parkway, Cropsy Avenue, Avenue Z, and Avenue U. These corridors feature a number of small retail businesses, chain stores, fast-food and full-service restaurants, personal services, pharmacies, grocery stores, convenience stores, and mom-and-pop shops.

Shore Parkway is a regional commercial corridor featuring big box stores which provide opportunities for shopping and employment in the community. Major retail stores include



Caesar's Bay Shopping Center

Kohl's, Best Buy, Toys 'R' Us, Modell's, BJ's Wholesale Club, and Home Depot. McDonald Avenue features a light industrial area, with warehousing, manufacturing, auto repair shops, and related businesses.

The assessed value for all commercial properties at any level of risk for future inundation is approximately \$190 million. Table 2-2 shows the assessed value for properties in each risk area. Three-quarters of all commercial properties (74%) are located in the moderate risk area, while 9% of commercial properties are in the high risk



Commercial uses along 86th Street

area. No commercial properties are located in the extreme risk area.

Economic assets at highest risk are those along Shore Parkway, between Shore Parkway and Gravesend Bay. Among these, stores in the Caesar's Bay Shopping Center, such as Kohl's and Toys 'R' Us, are at highest risk due to direct exposure to wave action and frequent contact of the water line with the existing shore defenses. An existing concrete wall provides minimal protection for these retailers. Kohl's was significantly flooded during Superstorm Sandy, and consequently

Table 2-2: Risk to Commercial Properties

NYS Risk Area	Extreme Risk Area		High Risk Area		Moderate Risk Area	
	Percentage of commercial properties	Assessed Value	Percentage of commercial properties	Assessed Value	Percentage of commercial properties	Assessed Value
Commercial Properties						
Retail	0%	\$0	3%	\$10,984,095	19%	\$91,951,776
Industrial	0%	\$0	< 1%	\$511,650	4%	\$16,992,887
Mixed Use	0%	\$0	6%	\$6,955,328	51%	\$60,401,286

Gravesend and Bensonhurst

Figure 2-10: Economic Asset Inventory

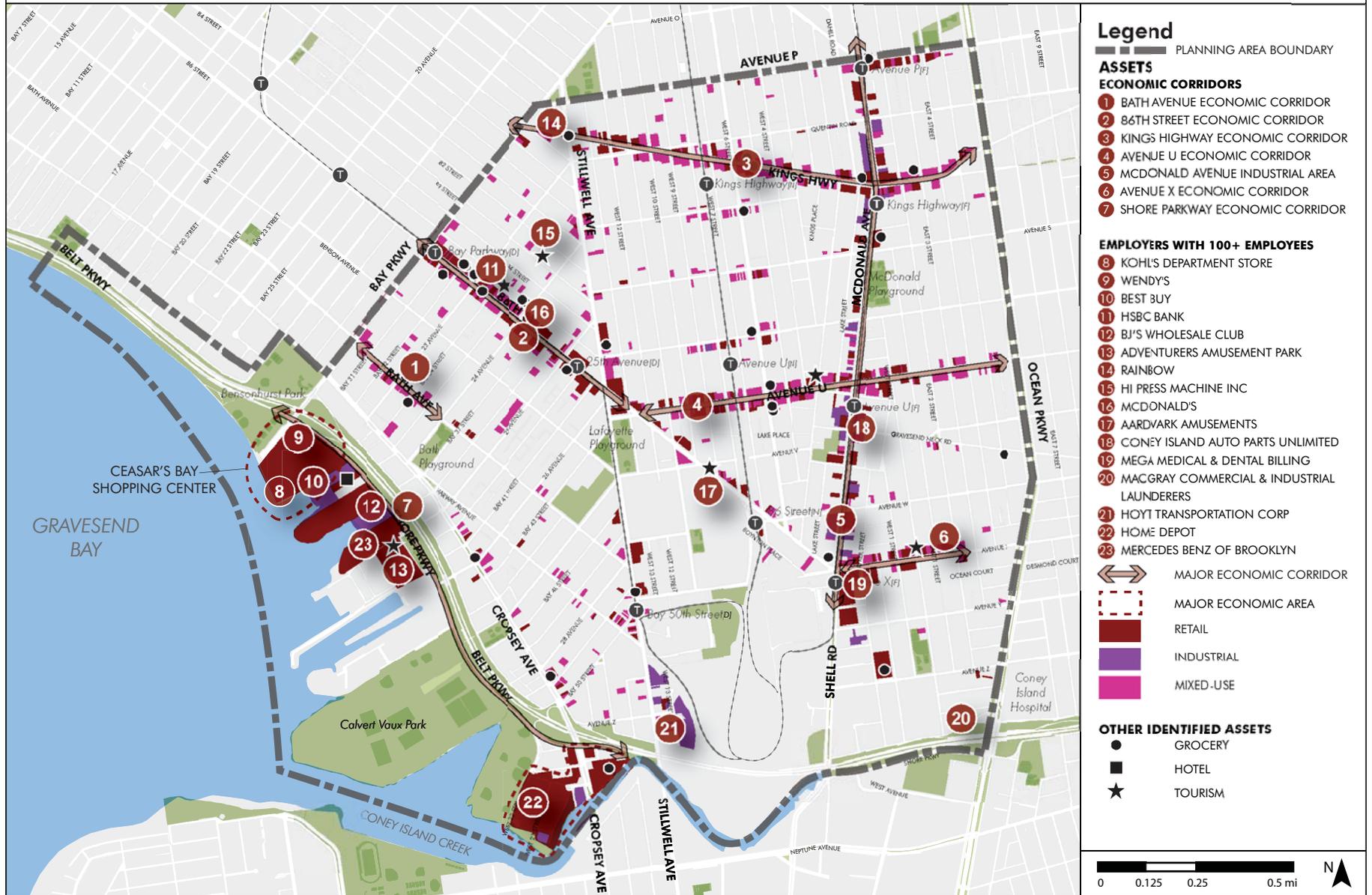
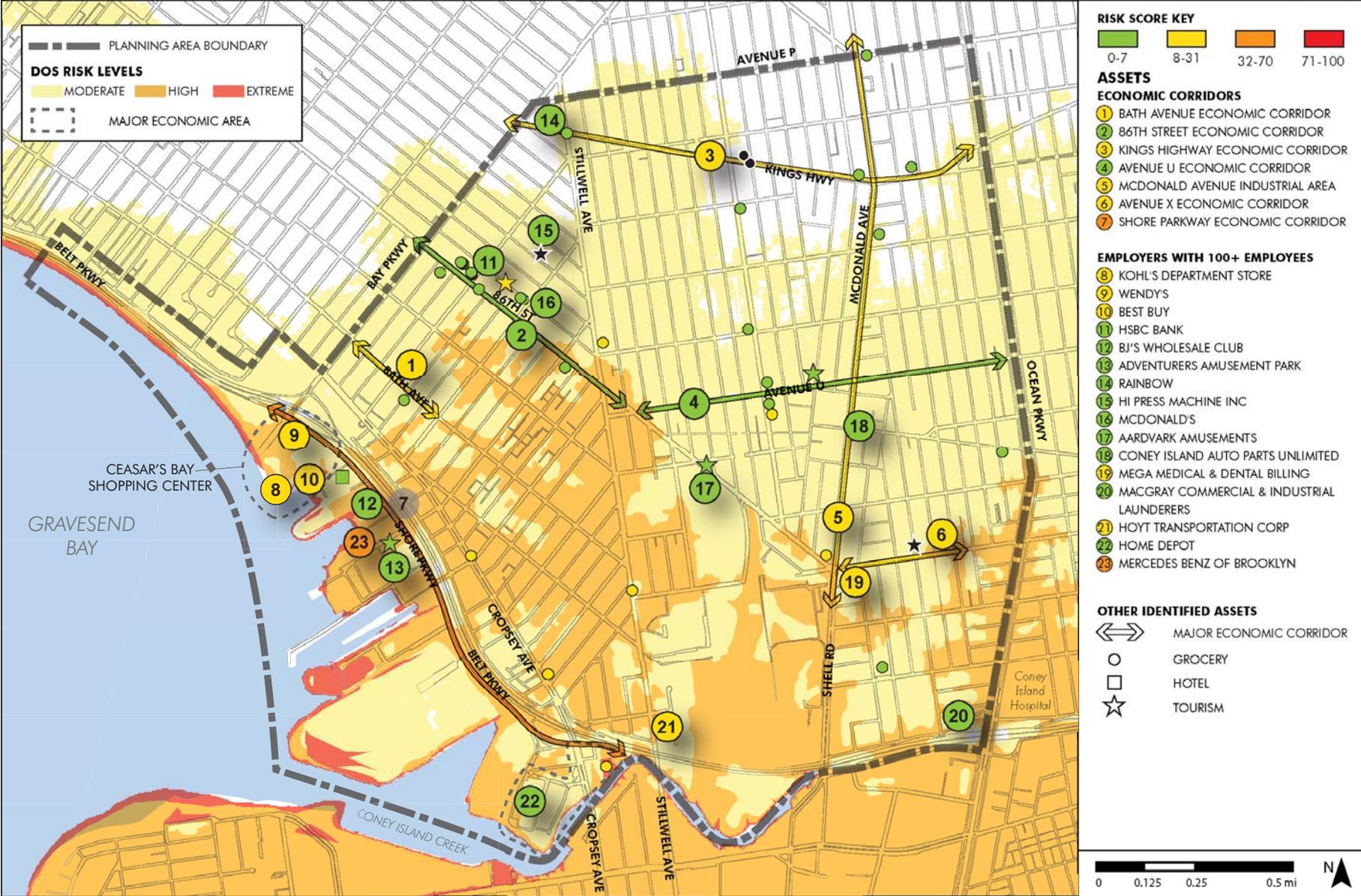


Figure 2-11: Risk to Economic Assets

Gravesend/Bensonhurst
NY Rising Community Reconstruction Program



Gravesend and Bensonhurst

brought in buses to transport employees to work at other Kohl's locations for several months until the store reopened. Best Buy, also in Caesar's Bay Shopping Center, is at high risk, bordered to the east by a combination of natural marsh and rock shoreline. All retailers surveyed in this shopping center reported significant flooding, and some reported power outages as well.

Further east on Shore Parkway, Mercedes Benz of Brooklyn and BJ's Wholesale Club are also at high risk. BJ's is the least vulnerable store along this retail corridor, as it was constructed after Superstorm Sandy and was built with a seawall for coastal protection. However, the store is still at high risk, along with the other Shore Parkway businesses, because the lack of contiguous shoreline protection can allow water to pass around piecemeal coastal defenses.

Shore Parkway has a few economic assets at high risk that would be key to disaster response and recovery including Home Depot and BJ's Wholesale Club, and the Harbor Motor Inn, which can provide lodging after a disaster. The Home Depot and CubeSmart Self Storage reported minor flooding and sewer backups and are both at moderate risk, as is the Harbor Motor Inn. Grocery stores are critical during disaster recovery. Among the Community's 34 grocery stores, those at highest risk include Pathmark Super Center on Cropsey Avenue and Key Food on Avenue Z.

The Community has two amusement parks. Adventures Amusement Park flooded during Superstorm Sandy and is at high risk given its location on Shore Parkway behind deteriorating bulkheads. Aardvark Amusements is at moderate risk, as it is located further inland on 86th Street and was not inundated by Sandy.

Small businesses are especially vulnerable, as they may lack the capital to recover from storm impacts. Economic corridors in the Community with concentrations of small businesses include 86th Street, Ocean Parkway, Bath Avenue, Avenues U and X, and Kings Highway. Each of these corridors is at moderate risk for future inundation. Among these, the 86th Street Corridor experienced the greatest inundation, followed by Avenue X. Relative to these corridors, Avenue U, Bath Avenue, and Kings Highway experienced minor flooding. The McDonald Avenue Industrial Area is also at moderate risk, experiencing inundation that flowed north from Coney Island Creek.



Attached homes with sunken driveways

Housing Assets

The housing stock in Gravesend and Bensonhurst is comprised of one and two family buildings, multi-family walk-up buildings (2-4 family) and multi-family elevator buildings. Figure 2-12 illustrates the locally significant housing assets in the Community, which includes multi-family high-rise buildings and affordable housing properties. The Gravesend and Bensonhurst Community is primarily characterized by one- and two-family residential neighborhoods, many of which were constructed on filled wetlands with a high groundwater table. Residential neighborhoods that experienced the most damage during Superstorm Sandy and Hurricane Irene were those in low-lying areas with basements, yards, or garages below grade. As reported by the Committee and field surveys, many of these homes experienced sewer backups, flooding, and power outages.

Table 2-4 shows the percentage of properties located in the three risk areas. The majority of residential properties (72%) are located in the moderate risk area, while approximately 14% are in the high risk area, and an equal amount (14%) are not at risk. The total assessed value

Table 2-3: Residential Units in Community³⁷

Land Use	Parcels	Residential Units	
One and Two Family	7,685	13,011	33%
Multi-Family Walk-Up	2,871	11,979	30%
Multi-Family Elevator	100	11,349	29%
Mixed Res/Com	729	2,748	7%
Other	1,072	199	1%
Total	12,457	39,286	100%

for all residential properties in the extreme and high risk areas is approximately \$513 million.

Figure 2-13 shows the risk score for the identified housing assets. Among the 27 housing assets identified, three are at high risk, 15 are at moderate risk, and five have minimal to no risk. The Beach Haven Apartments were inundated during Sandy, resulting in significant damage. They are at highest risk to future inundation because they are adjacent to Coney Island Creek. High-rise apartments on Cropsey Avenue, such as Waterview Towers, Oceanview Towers, and Contello Towers, are at moderate risk. Planning Committee and public feedback indicated that during Superstorm Sandy, these buildings were flooded and lost power. The Southampton apartments on Shore Parkway also flooded in the basement and lobby and reportedly lost their boilers and elevator service.

Residential properties with basements, back yards, or garages below grade and those constructed in low-lying areas are especially at risk due to exposure from topographic conditions, construction on filled wetlands, and the high groundwater table.

Although flooding occurred in many homes, very little structural damage to housing was reported.

Storm impacts that were more common in the inundated areas include flooded basements and first floors, power and telecommunication outages, utility outages in high-rise buildings affecting elevator service and water pumps, downed trees, and sewer backups. Significant losses and flooding occurred at the Beach Haven Apartments where in addition to outages to utility systems, cars were lost in the parking garage.

As seen in Table 2-5, there are 3,468 affordable housing units in housing complexes in the Community. The Marlboro Houses, the only New York City Housing Authority (“NYCHA”) property in the Community, has the largest concentration of affordable housing. The 35-acre complex of 28 buildings is home to nearly 5,000 residents. During Superstorm Sandy, the Marlboro Houses and Marlboro Senior

Table 2-5: Affordable Housing Buildings in the Community

Property Name	Units	Year Built	Tenure	Type	Risk Score
Ahi Ezer Plaza	50	1987	Rental	Senior	Moderate
Avenue W	51	1979	Rental	Senior	Moderate
Oceanview	161	1967	Coop	Mod-Mid Income	Moderate
Contello Towers 2	320	1961	Coop	Mod-Mid Income	Moderate
Harway Terrace	360	1963	Coop	Mod-Mid Income	Moderate
Highlawn Terrace	124	1960	Coop	Mod-Mid Income	Moderate
Regina Pacis	167	1972	Rental	Senior	Low
Sons of Italy Senior Citizens Housing	106	1987	Rental	Senior	Moderate
Waterview Towers	364	1963	Coop	Coop	Moderate
Marlboro Houses	1,765	1958		NYCHA	Moderate
Total	3,468				

Sources: Furman Center for Real Estate and Urban Policy, NYCHA and Ocean View Towers websites

Table 2-4: Risk to Residential Properties

NYS Risk Area	Extreme Risk Area		High Risk Area		Moderate Risk Area	
	% of Residential Properties	Assessed Value	% of Residential Properties	Assessed Value	% of Residential Properties	Assessed Value
Residential Properties						
One & Two Family Bldgs.	0%	\$0	9%	\$27,563,397	52%	\$158,914,521
Multi-Family Walk-Up Bldgs.	0%	\$0	5%	\$23,229,124	20%	\$11,2843,380
Multi-Family Elevator Bldgs.	0%	\$0	<1%	\$21,769,655	<1%	\$168,326,270

Gravesend and Bensonhurst

Gravesend/Bensonhurst



NY Rising Community Reconstruction Program

Figure 2-12: Housing Asset Inventory

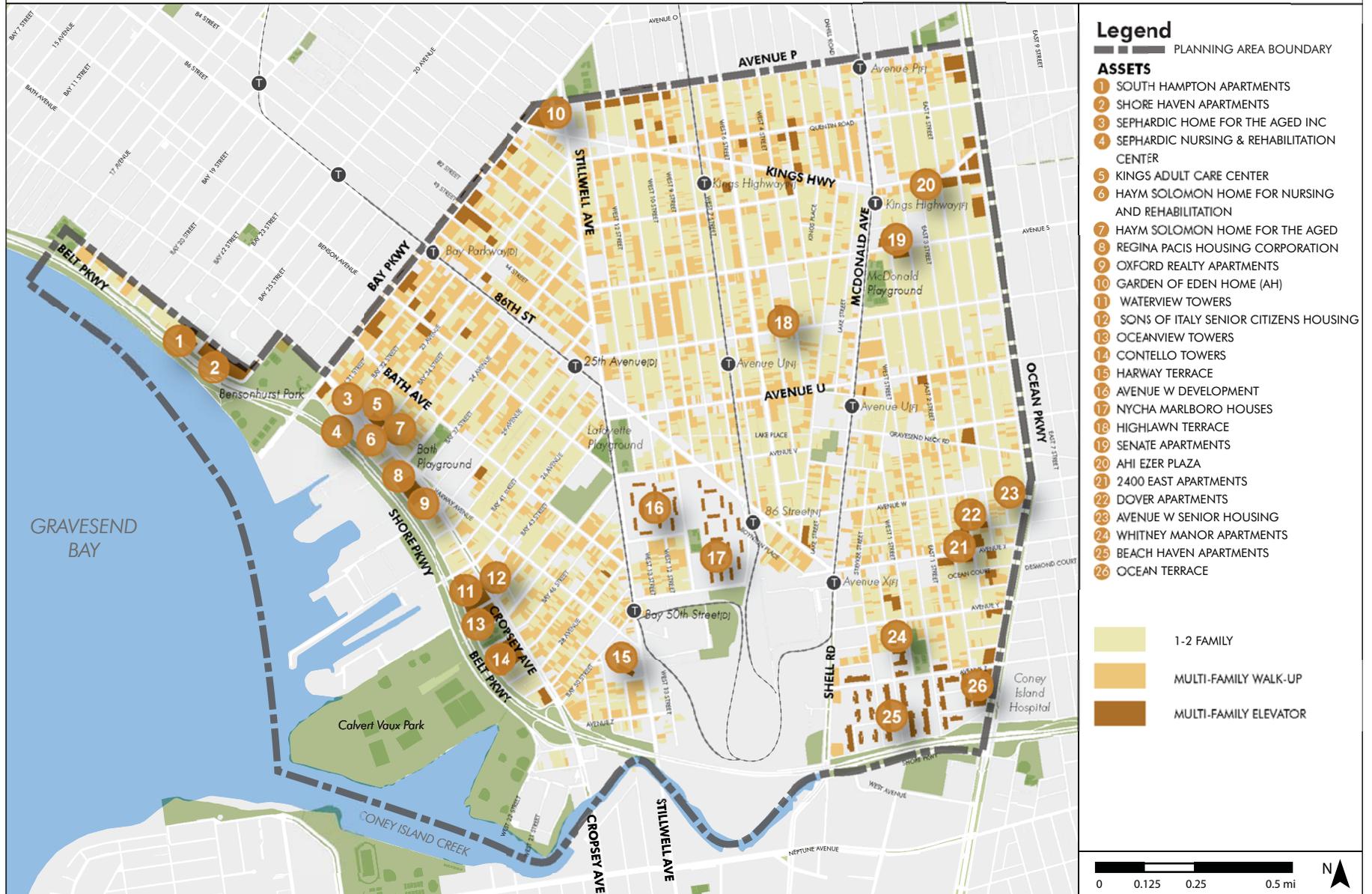
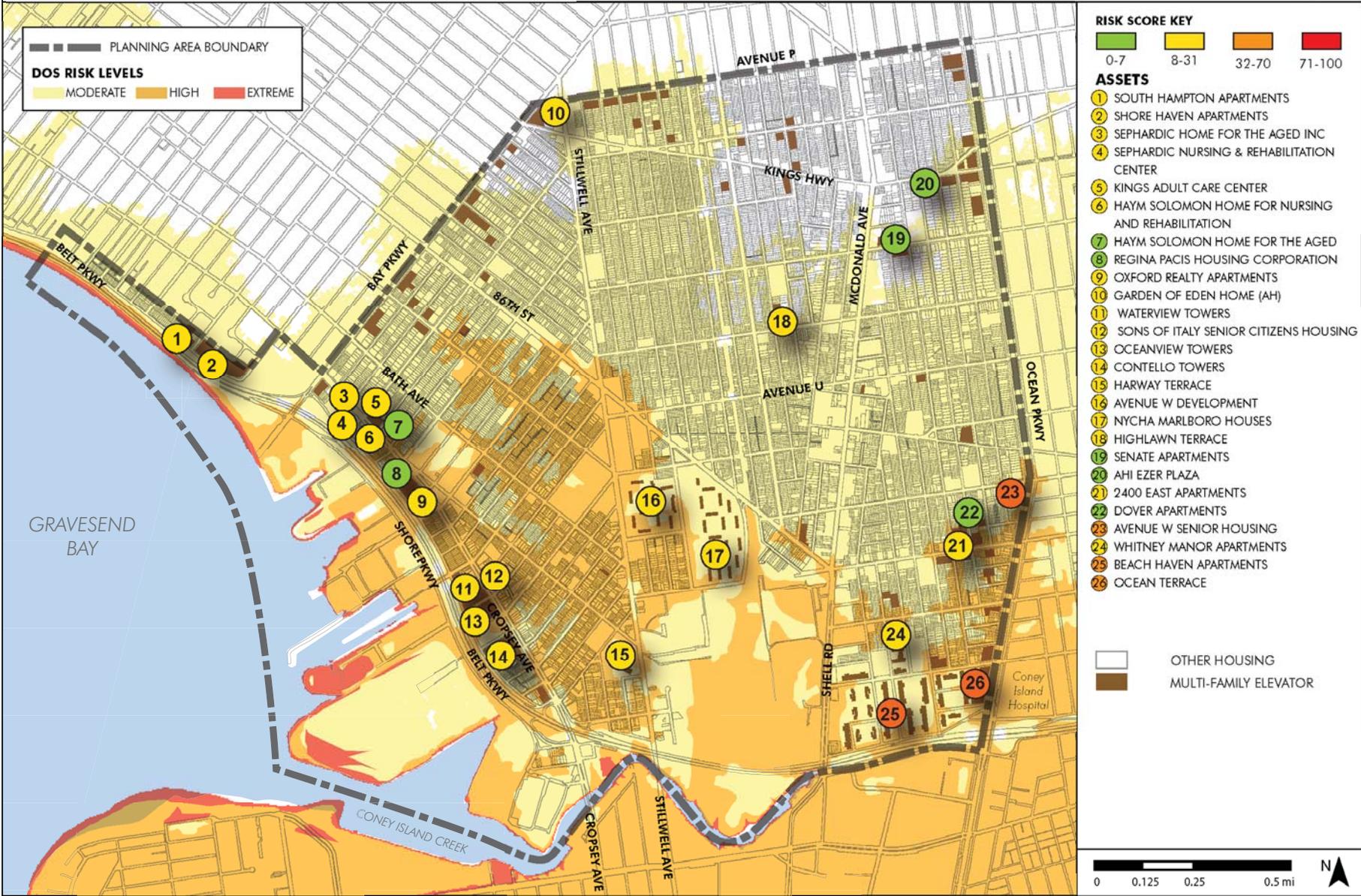


Figure 2-13: Risk to Housing Assets

Gravesend/Bensonhurst
NY Rising Community Reconstruction Program



Gravesend and Bensonhurst

Center experienced moderate flooding and sewer backups.

The Sons of Italy Senior Housing, a 106 unit NYC Department of Housing Preservation and Development (HPD) building, experienced significant flooding in the basement. As a result, there was major power loss, damage to mechanicals and residents were displaced for over a month. Cars in the parking lot were also destroyed.

Residential healthcare facilities (nursing homes) include Haym Salomon Home for Nursing and Rehabilitation and Sephardic Nursing and Rehabilitation Center. These facilities experienced damage from downed trees and power outages. Residential adult-care facilities include Garden of Eden Home and Kings Adult Care Center.



Lafayette High School

Health and Social Services Assets

Health and Social Services assets include those that are critical for emergency response and disaster recovery, as well as government services, social services, schools and day care facilities, and healthcare facilities. Figure 2-14 and Figure 2-15 show the Health and Social Service assets and the risk associated with those assets.

Critical facilities in the Community include those for emergency response and recovery. The Community has one fire department, Engine Company 253, as well as the NYPD Counter-Terrorism Division, Bensonhurst Volunteer Ambulance Service, and several private ambulance operators. Coney Island Hospital is a critical facility located just outside the Community, and is at the highest risk among critical assets inventoried. Its risk was evidenced during Superstorm Sandy, when backwater flooding from Coney Island Creek severely damaged the Hospital, knocking out emergency room service and destroying the electrical system. Emergency services were not restored until early 2013. The U.S. Social Security Administration (SSA) office served as a resource center following Superstorm Sandy, but is also at high risk.

Government services in the Community beyond the SSA building are at moderate to no risk, while social-services agencies are at higher risk. Among the nine social-services facilities, each which serve socially vulnerable populations, the Block Institute is at highest risk. The Block Institute provides special education and evaluation services to children with special needs ages 3 to 8 years old, as well as day habilitation, vocational services, day treatment, and quality residential care for adults with disabilities. Both

group homes operated by the Block Institute were flooded, while the school building suffered from power outages and minor damages from flooding. Haym Solomon Home for Nursing and Rehabilitation also experienced power outages.

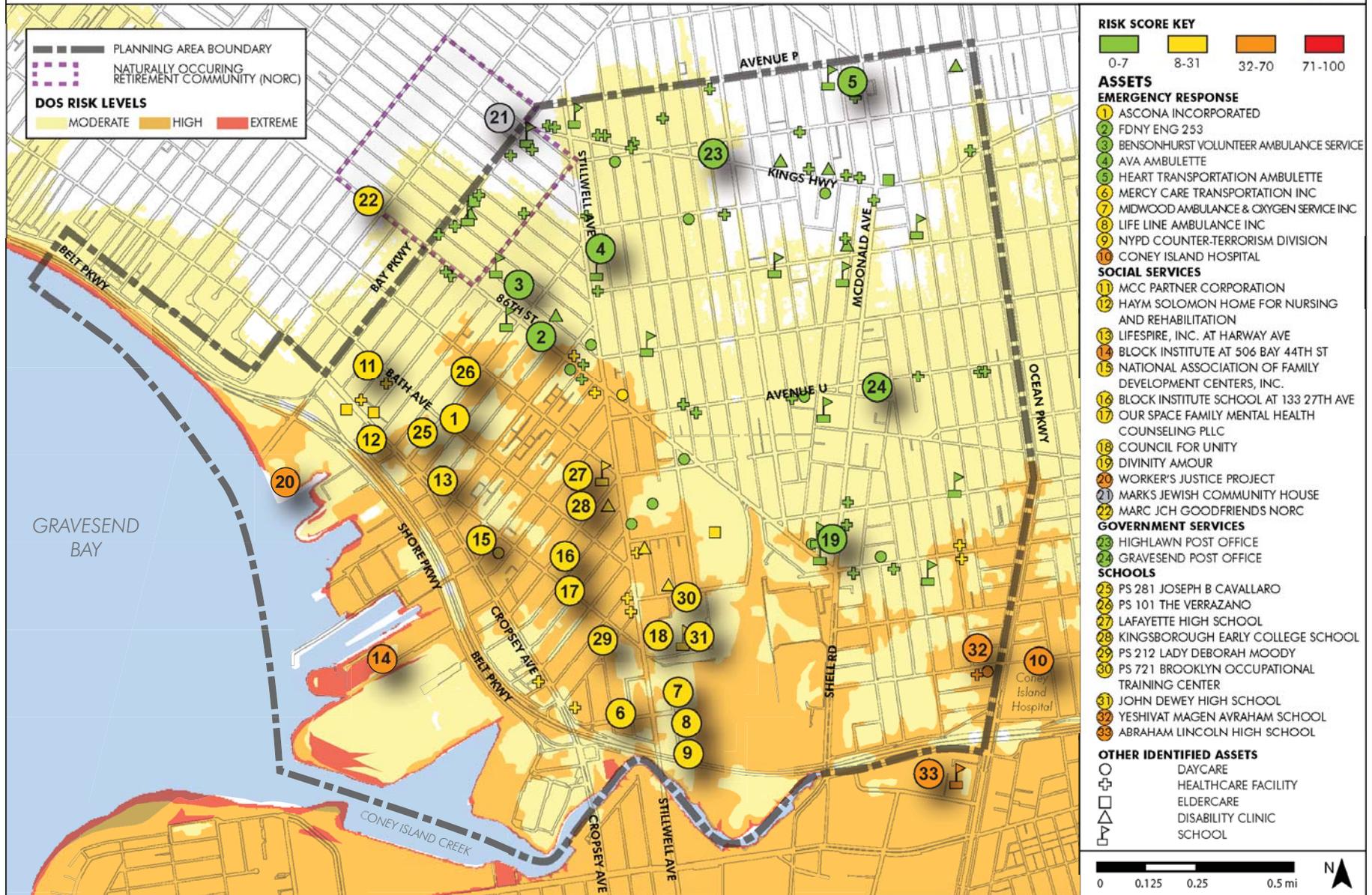
There are 28 schools identified in the Community's locally significant assets. Yeshivat Magen Avraham School is the only school within the Community at high risk, having experienced flooding from Superstorm Sandy, while 22 schools are at moderate risk. Only five schools are at residual or no risk to future storm impacts. Abraham Lincoln High School is just outside the Community, but is at high risk and was significantly damaged by Superstorm Sandy.

There are 72 healthcare facilities, which includes a variety of disability clinics, medical offices, and health centers. 49 of these assets are at moderate risk. Of the 18 day care centers identified Hendrix Street Day Nursery and She'arit Academy are both at high risk, while nine others are at moderate risk. The Community's four senior centers include three at moderate risk: the Big Family Social Adult Day Care Center, Block Institute, and the Marlboro Neighborhood Senior Center. The Sephardic Multi Service Senior Center is not at risk. The Community has two food pantries, both at moderate risk.

The Gravesend and Bensonhurst Community has a number of Community-Based Organizations, including civic associations, religious institutions, and other social-services organizations. These groups are well-established and maintain strong connections to residents within the Community. The services that these groups already provide range from community planning efforts and advocacy to environmental education and assistance for the elderly.



Figure 2-15: Risk to Health and Social Service Assets



Assets that Serve Socially Vulnerable Populations

Assets that serve socially vulnerable populations include facilities that provide services for people with disabilities, those with language barriers, low-income populations, the elderly, young children, and homeless populations (see Figure 2-16). Superstorm Sandy had devastating impacts on socially vulnerable populations within Gravesend and Bensonhurst, as a number of group homes operated by the Block Institute and assets that serve the elderly population such as the Marlboro Senior Center were inundated or impacted by loss of power, or staff that had difficulty getting to work.

Gravesend and Bensonhurst is generally a low- to moderate-income community. As seen in Figure 2-18, low-income households are dispersed throughout the Community, with nearly half of households (49% or greater) earning less than \$50,000 annually.

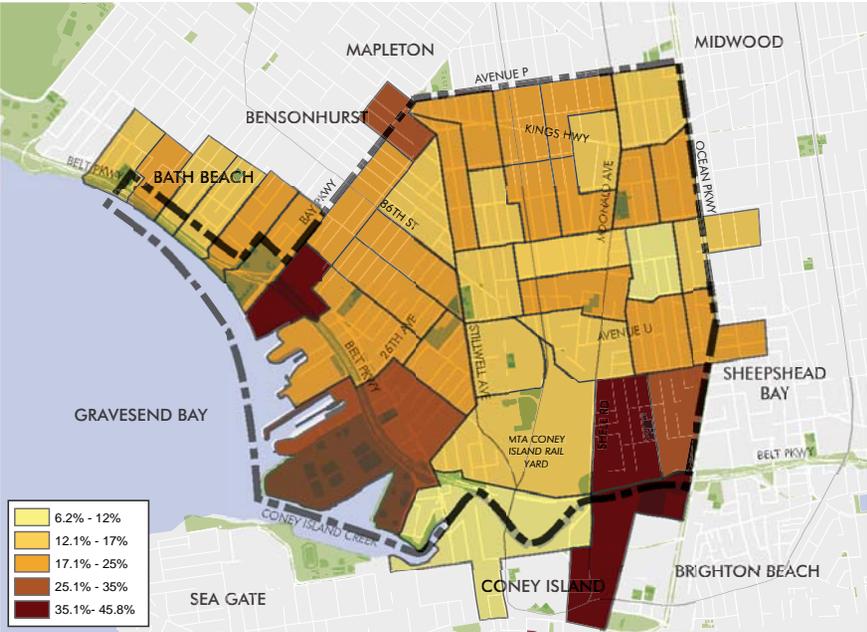
A significant portion of the Community does not speak English “very well.” Figure 2-18 shows that across the Community, almost all of the Census block groups have 30% or more of residents who do not speak English well. In about half of the Census blocks, more than 45% of the population does not speak English well.

Assets that serve socially vulnerable populations, such as affordable housing

complexes, adult-care facilities, nursing facilities, and other social-services centers, are illustrated in Figure 2-15. Most of the assets are discussed in previous sections, notably in the sections on Housing and Health and Social Services. As seen in Figure 2-17, Coney Island Hospital, the Block Institute, and the Worker’s Justice Project are all at high risk. There is also a significant concentration of adult-care facilities along Cropsey Avenue. Some of these, such as the Sons of Italy Senior Housing, were significantly impacted. Others, such as the Sephardic Home, were evacuated but not significantly damaged and operations resumed when residents returned after the storm.

Figure 2-16: Socially Vulnerable Populations³⁸

Aged Population- 65 Years and Older



Disability- Percentage of Population with Disabilities

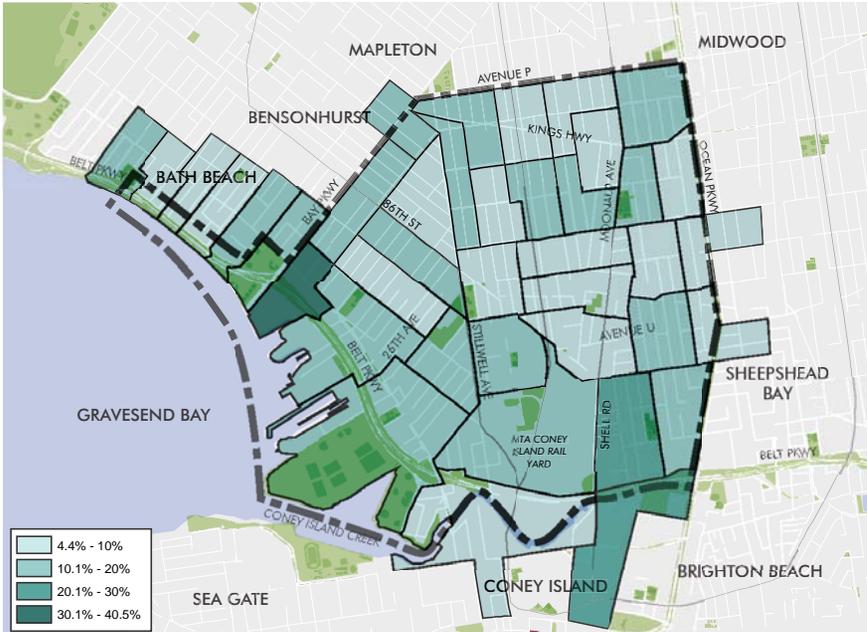
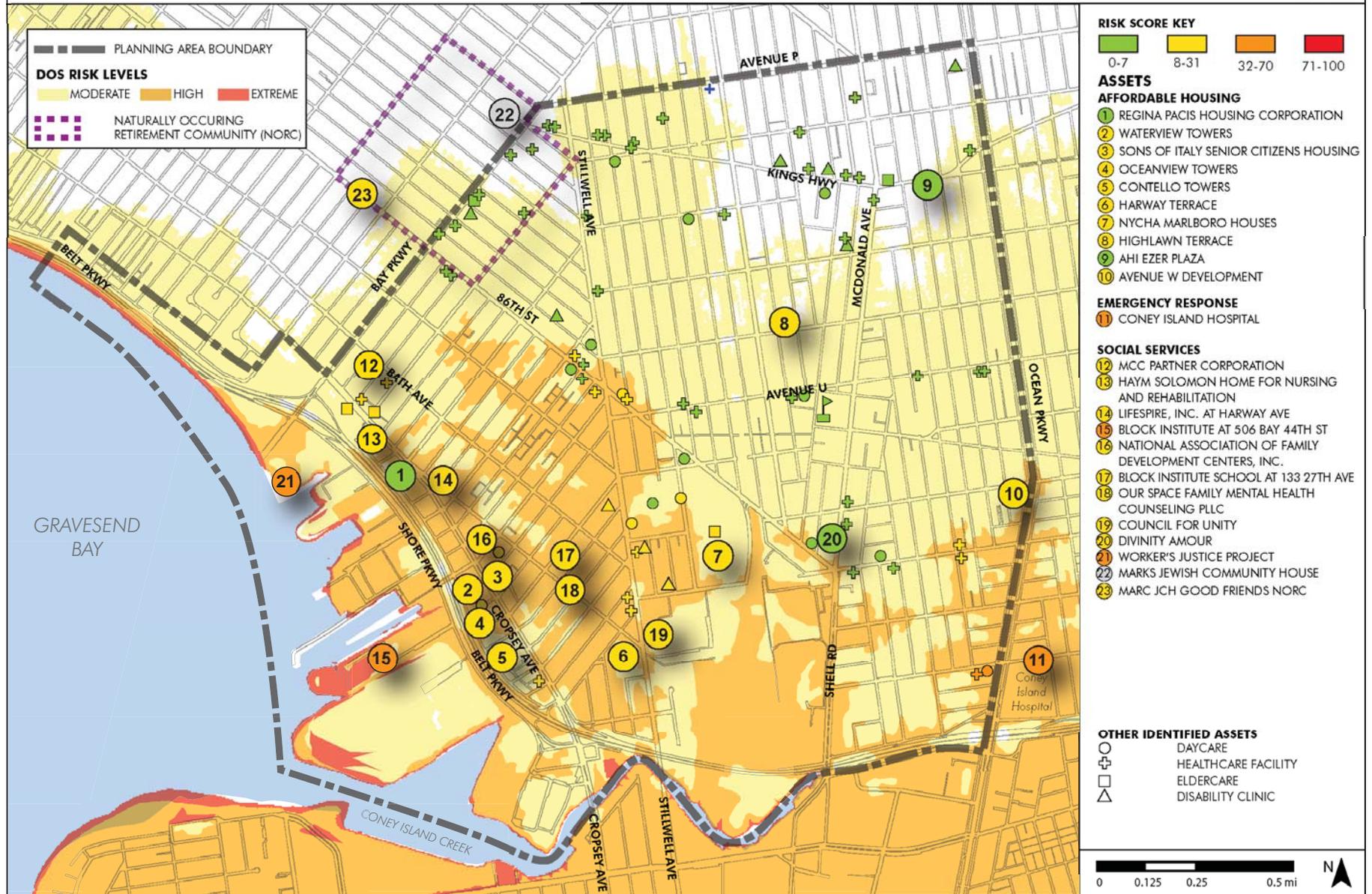




Figure 2-17: Risks to Assets That Serve Socially Vulnerable Populations



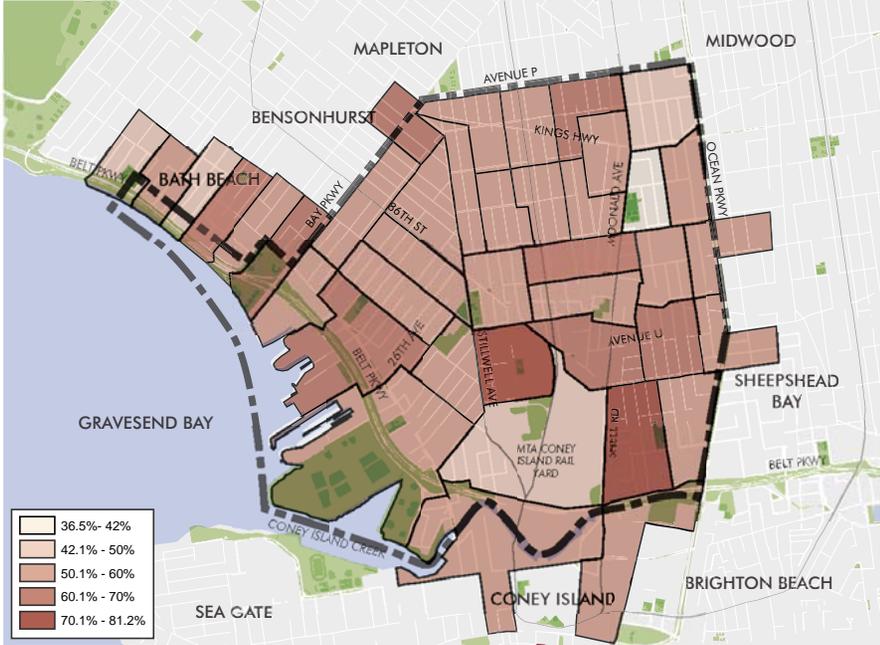
A Naturally Occurring Retirement Community (NORC) lies in the northern portion of the Community. The Mark JCH Good Friends NORC asset shown in Figure 2-17 is a designated area where programming and services are provided for elderly residents. This NORC is run out of the Edith and Carl Marks Jewish Community House (JCH) of Bensonhurst. As part of UJA-Federation of New York’s Safety Net Initiative, JCH of Bensonhurst provides screening, intake, and case management focusing on food security and housing stability. Although the Marks Jewish Community House JCH is not at risk itself, the NORC area is at moderate risk because the elderly residents are vulnerable during a time when power goes out or when there are disruptions that affect access to medication or food.



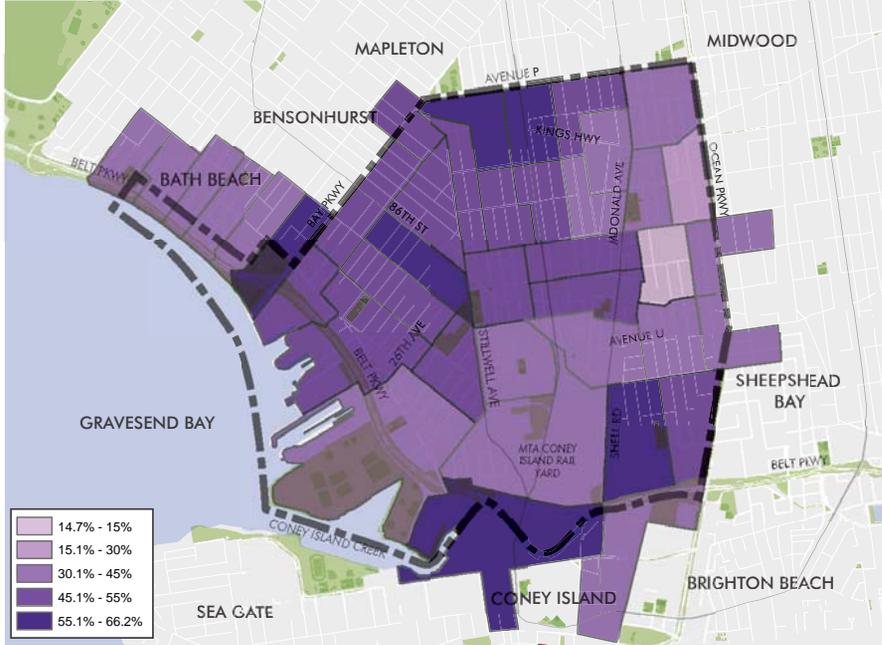
Sephardic Home Nursing and Rehabilitation Center

Figure 2-18: Socially Vulnerable Populations

Income- Households With Income Less Than \$50,000



Language- Population Speaking Less Than “Very Well English”



C. Needs and Opportunities

Infrastructure

Superstorm Sandy caused significant damage and stress to many of the Community's infrastructure assets and systems from inundation and flooding. The Community faces severe risk not just from direct storm surge but also from backflow inundation, a high groundwater table, and overland stormwater runoff. Stormwater and sewage backflow flooded homes and businesses during Superstorm Sandy, causing building damage and potential human exposure to toxic materials. Many neighborhoods remain highly vulnerable to this type of inundation in future storm events, including less severe and more frequent storms than Superstorm Sandy. Infrastructure upgrades were identified as a primary need within the Community.

Needs

During the planning process, several critical issues arose through feedback by the Planning Committee and the public, as discussed in Section 1. The following reflect critical issues this Community faces, and opportunities to enhance and improve infrastructure would directly address those issues by strengthening coastal defenses, improving stormwater and sewer capacity, increasing the reliability of telecommunication networks, and building a more reliable power grid and transportation network system. Infrastructure needs have a broad impact on the Community and the surrounding areas in Brooklyn. While some infrastructure issues can be addressed through

the implementation of projects through this plan, other projects will require additional study, significant regional coordination, and greater capital investments.

Coastal Protections: Superstorm Sandy coincided with a high tide, exacerbating flooding in Southern Brooklyn. Flood levels averaged 3 to 5 feet throughout the Community. In some areas, where floodwaters reached a height of 10 feet, homes and businesses were inundated with more than 5 feet of floodwater. Backwater inundation, or flooding from Coney Island Creek and Gravesend Bay, also flooded the Community. The Shore Parkway Greenway adjacent to the Belt Parkway has been noted to flood during significant weather events and only acts as a minimal coastal defense structure. The existing bulkheads are built to withstand the 10-year but not a 100-year storm event, based on revised FEMA elevations. There is a need to improve coastal defense structures in the short- and long-term to protect against both frequent coastal storm events (i.e., 10-year storms) and extreme weather events (i.e., 100-year storms).

Stormwater and Sewer Networks: While stormwater systems throughout the Community were compromised during Superstorm Sandy, worsening upland flooding, these systems also experience system backups during frequent rainstorms and high tides. Recurring flooding occurs in low-lying areas such as Bay Parkway to 26th Avenue between the Belt Parkway and Benson Avenue. Stormwater systems throughout the Community require hydrologic and hydraulic studies

to determine the specific nature and extent of the sources of stormwater backups. The specific needs identified within the Community include:

- Prevent tidal flooding from entering sewer system;
- Reduce Combined Sewer Overflow Events at the 17th Avenue Outfall;
- Mitigate localized flooding in the area of Bay 20th Street to 23rd Avenue from Bath Avenue to the shoreline;
- Improve maintenance of stormwater facilities;
- Minimize sewage backups in homes; and
- Lower the water table to prevent sinkholes.

Power Supply and Telecommunications Networks: After Superstorm Sandy, the Community experienced widespread power outages, lasting up to three weeks in some areas. As a result, the Community faced a lack of heat, interrupted communications, hardship for local small businesses, and inadequate capacity to operate critical facilities and high-rise buildings. Gas stations in the area lost power and could not operate. Three needs outlined below were identified to mitigate this problem:

- Reduce power outages caused by downed overhead power lines;
- Diversify the power supply network; and
- Ensure that critical facilities and high-rise buildings have backup power supply.

Superstorm Sandy highlighted the fact that the telecommunications network in the

Community requires upgrades to become more resilient in the face of future extreme weather. Several needs were identified to strengthen the telecommunication network within the Community:

- Protect underground telecommunications lines to prevent loss of traditional phone service during heavy rains;
- Protect wireless communication networks and power supply to safeguard cellular phone service during emergencies;
- Ensure emergency response call centers (i.e., 911 and 311) are accessible during emergencies; and,
- Modernize telecommunications infrastructure.

Transportation Infrastructure: Although approximately 80% of all evacuations are by mass transit in New York City³⁹, congested transportation corridors such as Stillwell Avenue and 86th Street can slow evacuation and prevent access to major highways, such as the Belt Parkway prior to an extreme weather event. In addition, flooded roadways, such as McDonald Avenue, Cropsey Avenue, and Shore Parkway



Superstorm Sandy Flooding at Coney Island Rail Yard
Source: MTA

can slow recovery time and prevent residents from returning to their homes.

The MTA Coney Island Rail Yard is a significant asset in a low-lying area that is vulnerable to frequent flooding during storm events. There are no defenses in place to protect the MTA Coney Island Rail Yard and subway infrastructure, including protection of the N subway line from flooding and the D subway line from falling trees.

The Community recognized several needs to protect transportation from flooding and improve the resiliency of these networks before, during, and after a severe weather-related event:

- Protect the Community edge and the Belt Parkway from storm surge;
- Protect the MTA Coney Island Rail Yard and subway infrastructure;
- Mitigate localized flooding on key north-south roadways, including Shore Parkway, Cropsey Avenue, Stillwell Avenue, McDonald Avenue, and Ocean Parkway;
- Repair roads that are in poor condition or are improperly graded and collect water during storm events;
- Reduce traffic congestion and mitigate flooding at key intersections;
- Provide more frequent bus service and improve bus stop amenities along key corridors in southeastern areas of the Community, including Cropsey Avenue; and,
- Improve traffic circulation on Cropsey Avenue, Shore Parkway, and Bay Parkway and on north/south access roads to Coney Island.

Opportunities

Coastal Protection: The Gravesend and Bensonhurst Community has an extensive waterfront, including both living shoreline opportunities and areas with bulkheads that could be enhanced. Opportunities exist to improve coastal protection measures that would protect the Community from extreme tidal flooding:

- Coordinate with the Coney Island Creek Tidal Barrier Feasibility Study which will evaluate the elevation of bulkheads along Coney Island Creek and Gravesend Bay to see what level of storm protection they currently provide. Long-term coastal protection recommendations will evaluate a potential flood barrier at the mouth of Coney Island Creek.
- Create a natural buffer on Coney Island Creek along the Belt Parkway and restore natural grasses and living shoreline that would bolster shoreline armoring along Bensonhurst Park, Coney Island Creek, and Calvert Vaux Park.
- Create wetlands within Coney Island Creek and Gravesend Bay, allowing for flood mitigation and protection for small storms while improving water quality and habitat.
- Coordinate with the New York City Department of City Planning (NYC DCP) to modify zoning to enable buildings in the Special Flood Hazard Areas be built to FEMA flood-resilient standards.

Stormwater and Sewer Networks: Stormwater and sewer systems throughout the Community were compromised during Superstorm Sandy,

Gravesend and Bensonhurst



Coney Island Creek

causing flooding in low-lying areas and sewer backups into basements. Opportunities to improve stormwater management include:

- Coordinate with ongoing NYC DEP High Level Sewer System Drainage Study to determine the source and amount of runoff that the system currently experiences and identify opportunities for flood mitigation measures;
- Coordinate with the New York City Department of Transportation (NYC DOT) on their reconstruction plans for the 17th Avenue pedestrian bridge to identify co-benefits such as green infrastructure to mitigate stormwater impacts and provide water quality improvements; and
- Leverage the NYC EDC Coney Island Creek study to implement green infrastructure best management practices upstream in the Coney Island Creek watershed and near the shoreline to help reduce the amount of stormwater runoff that the system must carry. In addition to green infrastructure, installation of check valves on stormwater outfalls and catch basins throughout the system would

provide additional capacity and prevent backflow during high tides.

Stormwater and Sewer Networks: Superstorm Sandy highlighted the fact that the power supply network in the Community requires upgrades to become more resilient in the face of future extreme weather. Several opportunities include:

- Work with the NYC Parks and Con Edison to identify opportunities for tree pruning and routine maintenance of overhead power lines;
- Leverage ongoing and established programs to encourage improvements to the natural gas network and use of energy supply from renewable power sources; and,
- Partner with large institutional uses and residential complexes such as the Warbasse Apartments on the Coney Island Peninsula to increase resiliency of power supply through generators and microgrids.

Superstorm Sandy highlighted the fact that the telecommunications network in the Community requires upgrades to become more resilient in the face of future extreme weather. Several opportunities include:

- Promote ongoing resiliency efforts by private telecommunications providers to harden flood-prone telecommunications lines;
- Work with ConnectNYC and private telecommunications service providers to invest in fiber-optic and telecommunications system upgrades, including mandatory backup batteries; and
- Work with New York City agencies such as the Department of Information Technology (NYC DOITT) to expand Wi-Fi in public spaces.

Transportation Infrastructure: Opportunities also exist to improve the transportation network that would help to ease traffic congestion within the Community and provide for better-served evacuation routes, which, in conjunction with roadway improvements, could protect the Community from extreme tidal flooding. The opportunities to improve the transportation network include:

- Evaluate existing roadway infrastructure, such as at-grade underpasses under the Belt Parkway, for opportunities to protect against flooding;
- Support NYC EDC's ongoing efforts to study a Coney Island Creek coastal barrier which could mitigate coastal inundation that flows north from Coney Island Creek;
- Leverage NYC DOT's Coney Island/Gravesend Sustainable Development Transportation Study (2011) to provide an opportunity to raise low-lying intersections;
- Coordinate with the MTA's interim flood mitigation contract (temporary flood barrier) at Coney Island Rail Yard and with its long-term flood mitigation plans to see what effect their mitigation measures will have on the surrounding community;
- Advocate for improved north-south corridor enhancements and potential ferry service to be evaluated as part of NYC EDC's Coney Island Creek Study; and
- Leverage the large amount of paved areas and poorly managed parking that presents an opportunity to improve the turn-around on Bay Parkway at Shore Parkway near Caesar's Bay Shopping Center.

Natural and Cultural Resources

Natural and Cultural Resources are important to the Community as economic drivers, recreational amenities, and for environmental and public health. Much of the Community was built on filled wetlands, and this development has significantly degraded these natural assets and their function. Though the local topography and environment have been substantially altered, many natural assets still exist, such as Coney Island Creek.

Needs

Natural and Cultural Resource needs have a broad impact on the Community and the surrounding areas in Brooklyn. These needs reflect critical issues this Community faces including creating more parks and open spaces and enhancing existing ones, improving the overall environmental quality in the Community, and enhancing access to cultural resources.

Watershed and Water-bodies: Through increased development over the last century, Coney Island Creek is no longer a natural feature. The majority of the creek has been channelized with bulkheading and rip rap, and a portion of the creek was filled in, no longer providing a flushing connection to Sheepshead Bay and Gravesend Bay. Sediment build-up within the creek can cause problems. For example, sand and finer grained sediment, including silts and clays, can degrade habitats for localized species and degrade water quality as well. The lower portion of Coney Island Creek is lined with numerous obstructions including wrecks, old barges, pilings, and construction debris. The



Shore Parkway Greenway

upper portion of the creek becomes choked with abandoned cars and boats, pilings, and other urban refuse. Two needs identified by the Community are outlined below to return Coney Island Creek into a functioning tidal creek that provides habitat and potential recreational opportunities:

- Reduce erosion and sedimentation of Coney Island Creek, and
- Improve water quality of Coney Island Creek and Gravesend Bay.

Urbanization of the area has resulted in the paving over of natural features with impervious surfaces such as roads, buildings, sidewalks, driveways, and parking lots. These surfaces have reduced the area’s ability to absorb water. The Committee has identified the need for green infrastructure such as bioswales and other landscape features that will reduce runoff thus reducing the load on the stormwater drainage system.

Parks and Open Space: Parks and open spaces within the Community are fragmented, and in the northern portion, very few exist. The Community prides itself on its existing parks

system, with a network of natural features and active recreation areas. Parks can balance opportunities for active and passive recreation while beautifying the neighborhood. Parks also present opportunities to accommodate green infrastructure and storage capacity for stormwater runoff, capturing it before it enters the stormwater network.

South of the Belt Parkway, several parks exist, however, parks and open space are lacking north of the Parkway. Several needs for parks and open space were identified to create and maintain existing parks and open space within the Community:

- Maintain existing park system in Community;
- Improve access to open space resources along the waterfront; and,
- Provide resilient amenities and landscaping along the Shore Parkway Promenade.

Access to the waterfront for the Community is limited and difficult at times. The Shore Parkway Greenway ends at Bensonhurst Park, and there is no contiguous park system connecting the Greenway to Calvert Vaux Park. The land between the two parks is dominated

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by commercial and industrial uses, and opportunities should be investigated to provide improved public access along the waterfront.

The Shore Parkway Promenade has experienced flooding during significant weather events and needs continuous maintenance. The Committee has also expressed the need for improved amenities as well as landscape features along the promenade which will help to reduce water runoff and also minimize the visual impact of the Belt Parkway.

Opportunities

Key opportunities exist that address the gaps in the Community's collective resiliency to both moderate and severe storm events. These opportunities reflect the first-hand experiences of residents and their knowledge of risks, challenges, and opportunities across Gravesend and Bensonhurst.

Watershed and Waterbodies: The Community's resilience to severe storms can be increased by restoring natural resources such as parks, wetlands, and marshes to increase its capacity in absorbing and limiting the impacts of flood and rainwater. The Community has an extensive waterfront. Installing living shoreline measures along Coney Island Creek, swirl separators and filtration mechanisms near outfalls, and traps on catch basins can increase resilience within the neighborhoods. Restoring degraded marshes and stream banks in the waterways surrounding the Community will help mitigate the impacts of tidal and stormwater flooding. Wetlands are vital to the health of waterways and surrounding communities. Wetlands feed downstream

waters, trap floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. They are also economic drivers because of their key role in fishing, agriculture, and recreation. Very little wetland area remains adjacent to the Community in Coney Island Creek. Those areas that do remain are severely degraded and disappearing. No wetlands exist within Gravesend Bay

Although wetlands would not act as a buffer to extreme storm surge, they can filter stormwater, decrease the release of pollutants into waterways, and help reduce wave action from small storms. Coastal protection measures can also be implemented in addition to or in conjunction with wetland restoration. Several opportunities within the Community include:

- Identify living shoreline measures along Coney Island Creek, such as swirl separators and filtration mechanisms near outfalls, and traps on catch basins;
- Increase wetlands within Coney Island Creek; and;
- Limit overflow of sewage into Coney Island Creek and Gravesend Bay by maintaining and expanded the sewer and storm water systems in the community.

Parks and Open Space: The Community prides itself on its parks system, with a network of natural features and active recreation areas. Calvert Vaux Park and Bensonhurst Park are two major parks in the area with active and passive recreational resources. To continue to act as an asset within the Community, the existing parks need regular maintenance to enhance their function and better provide co-

benefits such as stormwater management and flood mitigation. Creation of expanded open spaces would add to the park system as well as capturing stormwater utilizing green infrastructure techniques. Bioswales and other green infrastructure improvements can be used to capture rainwater on underutilized areas in the roadway, such as the median on Cropsey Avenue. The vacant tennis court facility at Bensonhurst Park also provides an opportunity to rehabilitate and/or redevelop the space.

Within the Community there are opportunities to establish public access areas that respond to local geography and needs, with clear linkages between the waterfront and upland areas:

- Leverage the Shore Parkway Greenway Connector Master Plan (2005) to continue the phasing of the greenway to make the path contiguous and improve access to the waterfront;
- Identify opportunities to combine coastal protection measures with recreational amenities; and
- Improve corridors crossing under the Belt Parkway presents an opportunity to connect upland areas to the recreational and economic assets along the waterfront.

The educational aspect of public access is often ignored. As a waterfront neighborhood, Gravesend and Bensonhurst has an especially rich heritage and relationship with the water, and great educational opportunities exist. The Committee suggested that schools use the waterfront for educational purposes. Access points could include interpretive programs to teach and inspire.

Economic Needs and Opportunities

Expedient post-storm recovery is advantageous for local economies, and resilience measures that help avoid or mitigate future storm damages will help speed future recoveries. The health of the local economy is vital from several standpoints. Businesses provide goods and services that residents need, as well as employment and local businesses minimize distances that people need to travel to obtain these goods and services. Additionally, when businesses are closed, employees lose wages, and businesses suffer loss of revenue. For many small businesses, even a short period of revenue loss is enough to affect a business's ability to remain open.

Needs

Flooding from Superstorm Sandy occurred along a number of key commercial corridors impacting businesses in the Community. Protective measures are needed to minimize future damage and flooding to these assets. Local businesses along Shore Parkway and Cropsy Avenue provide jobs and services, but these corridors are at high risk for flooding. Coastal and flood protection measures need to be taken to prevent future damages to these businesses.

Communication and coordination: Economic assets in the Community are clustered along a number of commercial corridors identified in the Economic Asset section. These commercial areas, especially those located in high risk areas, need improved systems for communicating with residents, New York

City agencies, and other businesses in times of emergency. The coordination of business owners who are able to help each other encourages faster and more efficient recovery and resilience. The large number of businesses in the Community can make coordination and recovery unwieldy, and outreach needs to be made more manageable. Informal communication networks between business owners and employees are also needed, especially when other communication networks are not functioning due to storm damage.

Nearly a quarter of residents in the Community speak English less than "very well," and it should be expected that some local business owners and employees will have similarly limited English proficiency.⁴¹ There is a need to disseminate information to business owners and employees in multiple languages including Chinese, Spanish, and Russian. It is important to help business owners who do not speak English very well to understand recovery steps as well as the various sources of post-disaster funding, and new regulations related to rebuilding, protection, and resiliency.

Employment: Effects of catastrophic events are far-reaching in the Community; many local businesses during Superstorm Sandy were forced to close and workers lost wages. While unemployment rates vary throughout the Community, some Census tracts are forecasted to see unemployment rates of between 15% and 19% in 2014.⁴¹

According to the Committee and conversations with residents, the low-wage immigrant workforce in the Community was instrumental

in the cleanup and rebuilding efforts after the storm. Many of these workers are now underemployed or unemployed. There has been an expressed need for training and coordination of this workforce to help them find living-wage jobs and remain in the Community.

Access to Goods and Services: After Superstorm Sandy, many workers could not reach their jobs due to damaged infrastructure and lack of transportation. This highlights the need for people to be able to access their workplaces in the aftermath of a storm. Ensuring access to jobs is a key economic need. Most employed Community residents work within Brooklyn and Manhattan, with the Downtown Brooklyn area being the top employment destination. As such, resilient public transportation is an economic need in the Community.

Just as workers need to be able to reach their jobs, residents need to be able to access commercial areas in the Community. There are specific transportation needs along the Shore Parkway corridor, which suffers from poor transportation access. Although specific assets such as Home Depot and BJ's have a low risk of flooding, if the surrounding roads are flooded, residents cannot access the goods they provide to help recover after a storm. Also, the Community as identified the need for improved transportation services along Cropsy Avenue and Shore Parkway. This may include express bus services along Shore Parkway as well as improved access for pedestrians to cross under/over the Belt Parkway.

Shore Parkway is a one-way street with limited access points to areas north of the Belt Parkway. Mitigating congestion, parking, and access

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issues along Shore Parkway has been expressed by the Committee as a need especially considering new commercial development, including BJ's Wholesale Club, which has occurred in the area prior to Superstorm Sandy.

Opportunities

There are a number of opportunities to improve the economic health of the Community through recovery and enhanced resiliency. Local businesses can find funding through various agencies to address recovery.

Existing Resources for Businesses: To the extent that local businesses suffered damage, the NYC Economic Development Corporation (NYC EDC) and the NYC Department of Small Business Services (NYC SBS) have a program to help businesses recover and become more resilient to future storms. The Committee has suggested that access to the Belt Parkway from Shore Parkway could be reconfigured to improve access and make vehicular travel more efficient and safe. Additionally, there may be opportunities to improve pedestrian corridors and access to the retail areas along the waterfront. The introduction of ferry service is an opportunity presented by the Committee to bring shoppers to the area and incentivize economic development. This would need careful study, as it would need clear destinations with enough passengers to support the service. The ferry service could partner with a large retail operator, similar to the Red Hook Ferry/Ikea association. There also may be opportunities to work with MTA to expand bus services along Shore Parkway.

In order to facilitate better collaboration and coordination, the Community can create a database that networks businesses in the area so they can be reached during times of emergency and recovery. Local economic development organizations such as the Brooklyn Economic Development Corporation or the Brooklyn Chamber of Commerce could be helpful in business development initiatives. There is an opportunity to partner further with these organizations to coordinate post-disaster

mobile supply stations that will help with recovery, and to provide supplies and services. This could be organized into a mobile distribution network where underutilized locations outside of flood zones can collect emergency supplies (food, flashlights, etc.) to be distributed in the event of a storm.



Commercial areas along Shore Parkway

Source: Butch Moran

Housing Needs and Opportunities

A number of housing-related needs and opportunities were identified through public input as well as interpretation of data gathered.

Needs

Repairs and Retrofits: During Superstorm Sandy, many homes were flooded which has caused a significant financial stress on homeowners and renters. The Committee

identified a need to retrofit buildings to make them more flood resistant. Floodproofing measures in high-rise buildings may include the raising of electrical, mechanical and HVAC systems so they are at a lower risk of inundation. These retrofits will require a significant investment by homeowners and financial assistance may be needed to help them make these improvements.

Just under one-third (31%) of all housing units in the Community are located within apartment

complexes with 20 or more units. Apartment complexes with elevators that are at risk of flooding require storm-proofing retrofits, given that elevator equipment is often located in the basement, an area most at risk during an extreme weather event.

Additionally, 63% of the residential units in the Community are either in one and two family homes or multi-family walk-ups buildings. 90% of housing units within the Community were built prior to 1983 when flood-resistance standards were added to the New York City building code and floodproofing retrofits are needed in a number of these buildings throughout the Community.

Flood Insurance Assistance and Communication: Flood insurance is a great concern for the Community. As discussed in Section 2.1, when officially adopted, FEMA's Preliminary FIRM Maps will significantly increase the number of homeowners in the Special Flood Hazard Area (SFHA), or the 100-year flood plain, requiring some homeowners to carry flood insurance.⁴² This change is likely to increase flood insurance premiums significantly and create an additional cost for renters and owners, many of which are already cost-burdened. Additionally, after insurance premiums increase, properties generally see a matching decline in value, and substantial premium increases reduce disposable income, wealth, or both.⁴⁴ This issue represents a need to mitigate financial risks to homeowners by keeping their insurance coverage at an affordable level.

Many homeowners of properties newly added to the SFHA may wish to retrofit their homes



Mix of housing types in Community

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with measures such as dry floodproofing and elevation where applicable. Certain measures may enable them to reduce their flood insurance premiums. Advice and help is needed so that Community residents are able to find credible information on housing programs, new FEMA flood maps, implications on insurance premiums, and opportunities for floodproofing retrofits which may reduce flood insurance premiums in the future.

The Committee identified a need for better communication with residents living in large residential complexes. Distribution of information through multi-family complexes is vital for public safety, emergency preparedness, and recovery. Additionally, multi-family buildings need local emergency plans.

Housing Affordability: Based on data provided by the 2008-2012 American Community Survey and by New York University's Furman Center, 34% to 37% of Community households spent more than 30% of their monthly income on rent (including heat and electricity) and are considered "rent-burdened," according to HUD.⁴³ Additionally, only 4% of apartments in the Community are considered affordable. As property owners pass on increasing flood insurance premiums or retrofit costs to residents in the form of rent increases, more households in the Community may become rent-burdened if additional affordable rental housing is not made available. The Community will also need to ensure that existing affordable housing remains, as a recent survey of renters affected by Superstorm Sandy shows that the median rent paid by households has increased by \$200 a month after the storm.⁴⁶ To ensure adequate

affordable housing in the Community, there is a need to develop new units and protect existing affordable housing, such as senior housing, from a severe weather event.

Opportunities

Repairs and Retrofits: Many homeowners, especially those with buildings that are in areas newly added to the 100-year floodplain as part of FEMA's updated FIRM, are in need of resiliency upgrades. Some of these owners may not have the financial resources to pay for these improvements. There are existing storm recovery programs that can be leveraged to help them rebuild and become more resilient, such as New York Governor Andrew M. Cuomo's Disaster Homeownership Repair and Rebuilding Fund, which provides funding to homeowners on top of FEMA funding,⁴⁷ and the Neighborhood Recovery Fund,⁴⁸ which provides grants or loans to homeowners who were affected by Superstorm Sandy. Loans for repairs are available through agencies such as the U.S. Small Business Administration (SBA), which provides financial assistance to homeowners and renters in declared disaster areas.⁴⁹ The Individuals and Households Program (IHP), administered by the U.S. Department of Homeland Security, also provides funding and help for housing needs related to disasters.⁵⁰

Other existing programs that provide homeowner assistance for home elevation, storm damage repairs, or floodproofing assistance include NYC Build It Back, and the Local Initiatives Support Corporation (LISC) Home Repair Program. While these programs provide some assistance to homeowners who

experienced property damage from Superstorm Sandy or Hurricane Irene, there may be additional opportunities to provide gap funding to those who are not served by these programs such as involving a Community Development Financial Institution (CDFI) that could sponsor low-interest loans to homeowners.

To the extent that additional housing is needed to maintain affordability, vacant and underutilized parcels can be identified for development, redevelopment, and infill. For example, there is a vacant site along Shore Parkway and Bay 43rd Street that could be a potential site for new housing development.

Flood Insurance Assistance and Communication: There is an opportunity to work with organizations to provide advice and aid to households in understanding their options as it relates to new flood insurance regulations. Ongoing workshops and meetings could be conducted to help residents and homeowners in the Special Flood Hazard Area or the 100-year flood plain understand the flood insurance and premiums. Assistance should also be offered to those who have questions or problems with their flood insurance. These problems have been recognized, and the New York State Department of Financial Services has investigated and announced new regulations regarding insurance company practices after Superstorm Sandy, which can also be leveraged by this Community.

Health and Social Services Needs and Opportunities

Health and Social Services assets, and those assets that support Socially Vulnerable Populations, were reviewed to determine the extent that their services were impacted by Superstorm Sandy and what these assets need to provide improved services in the event of future storms.

Needs

Resources for the Elderly and Disabled: The Committee identified a need for more robust and comprehensive support for the elderly and disabled population, ranging from education during normal conditions, notification and transportation during pre-storm conditions, and local support personnel after a disaster in case of phone and power outages. The Community needs a comprehensive strategy to support the elderly and disabled populations before and after disasters.

Critical Facilities: Many high-rise facilities lost power during Superstorm Sandy and did not have backup power supply to keep lights on, provide water, and run elevators. These critical facilities, as well as schools, healthcare, and social-services organizations, need backup power to maintain consistent operations during power outages.

Overall, the Community has a diverse set of community and social service assets, but is lacking in hospital and emergency response facilities. Superstorm Sandy severely damaged mechanical systems at Coney Island Hospital

and forced the closure of this and other hospital, health- and social-service providers throughout Southern Brooklyn. In general, there is a need to increase emergency room capacity for both disaster and non-disaster related events.

During Superstorm Sandy, there were significant disruptions to schools, as many facilities in the area were closed due to flood damage, electrical failure, or access issues. Many students that attended schools in heavily impacted areas such as Coney Island were temporarily relocated to schools in Gravesend and Bensonhurst. Parents in the Community need to be well informed of the available transportation options that their children can take to schools.

Overcrowding was reported to be a significant issue in these schools. Further complicating the need to move students, the school bus storage facility in Coney Island was inundated, and many buses that were not moved to higher ground suffered sustained damage. This issue highlights the need for greater planning and coordination between the NYC Department of Education and schools to identify schools at risk and how to effectively relocate students after a disaster event.

Opportunities

Gravesend and Bensonhurst have a number of community facilities such as places of worship, senior centers, and community centers that could serve as recovery centers after a disaster event. Although facilities in high-risk areas are not ideal candidates, there may be some large facilities that can serve as a community assistance centers after a disaster, when

residents are allowed to return. The Block Institute has expressed a need for more space to better serve its population.

There is an opportunity to coordinate with local first responders or CERT to develop a volunteer registry of homebound seniors and disabled residents, coordinate educational campaigns and emergency transportation planning for evacuations, and post-disaster searches. Existing resources for the elderly could be expanded to include additional information, outreach, and support for older adults in the event of a disaster. The Marks JCH Good Friends NORC could work with local senior centers to develop a voluntary registry of seniors who are aging in place, and conduct home visits before and after disasters as a service to those living in NORCs. Community Emergency Response Teams could also be expanded to better serve vulnerable populations, including seniors and people with mobility impairments.

Many of the nursing homes, assisted-living facilities and elder care facilities in the Community still need to elevate mechanical systems. There are opportunities to provide organizations that house and serve vulnerable populations with technical and financial support to protect their facilities and mechanicals from a severe weather-related event.

Redundant power and/or communication equipment will also help to ensure that first responders maintain the ability to communicate with each other and community groups while coordinating recovery efforts during any type of disaster.

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Community Planning and Capacity Building

Community Planning and Capacity Building examines existing public education initiatives, recommendations from previous plans created for the Community, and policies and programs related to resilience and emergency preparedness undertaken by community groups and New York City agencies. In order to assess needs for Community Planning and Capacity Building, the Community was assessed for its ability to:

- Mobilize storm recovery activities,
- Adequately educate residents, and
- Implement long-term plans to mitigate storm damage.

Needs

Emergency Response Capabilities: The New York City Office of Emergency Management (NYC OEM) manages two Community Emergency Response Teams in the Community. The Community District 11 Bay Ridge Bensonhurst CERT provided assistance in Coney Island and Sea Gate during Superstorm Sandy. The Community District 13 CERT covers Gravesend, Bensonhurst, and the Coney Island Peninsula, however, during Superstorm, its ability to effectively perform first response duties in the Community was limited due to a number of factors. It was reported that after Superstorm Sandy made landfall, there was greater need in the Coney Island Peninsula for a localized emergency response, so many of the first responders were more active in that area compared to

Gravesend and Bensonhurst. Secondly, many of the CERT volunteers, especially those located on the Coney Island Peninsula, were affected themselves during the storm and were hampered in their ability to provide assistance to others. There is a need to strengthen emergency response capabilities in Gravesend and Bensonhurst.

Disaster Preparedness Communication, Education and Resources: Public education and awareness as it relates to emergency preparedness emerged as a critical need within the Community because of the presence of several vulnerable populations, including a substantial elderly population, and the fact that so many residents did not evacuate prior to Superstorm Sandy making landfall.

There is a need for redundancies in dissemination of information and more reliable ways to communicate during a disaster. There is a need to harden telecommunication networks to ensure communication is maintained in a future storm. During Superstorm Sandy, many residents lost power as well as telephone service, and therefore were unable to communicate with emergency responders.

Although tools from NYC OEM exist to provide information to residents in the Community on emergency preparedness and floodproofing, localized educational campaigns are needed to effectively reach residents. This includes the provision of information in languages reflecting the Community's demographics such as English, Spanish, Russian, Chinese, and Arabic.

Outreach is also needed to the elderly population to ensure they have the knowledge and support to help them evacuate and recover in the event of a disaster. A database of social services as well as volunteer registry of the location of these populations will help ensure that their transportation, health, and social needs are met during a future disaster event.

Resource and Recovery Center: After Superstorm Sandy, residents of the Community had difficulty getting information on recovery assistance. There is a need within the Community for local facilities where Community Based Organizations (CBOs) can provide emergency-response education and training during normal conditions while also serving as sites for distribution of resources and other assistance after disasters.

Opportunities

Coordination of Community-Based Organizations: The Gravesend and Bensonhurst Community can begin to respond to the needs outlined above by increasing its capacity to protect residents from extreme weather. One opportunity is to develop a defined network of CBOs in the Community, including civic associations, religious institutions, and other social-services organizations, that are willing to assist during and after a disaster event. In addition to the CBOs, many of the multi-family buildings have community leaders who can be mobilized for communication and outreach during and after a disaster. A list of CBOs identified by the Committee that serve the Community is provided in Section 5-G: Appendix.

CBOs understand the Community at a local level, including its needs relative to religion, language, or vulnerability. Although these groups do not currently provide significant post-disaster assistance, the networks they have established present an opportunity to bring additional services to the Community. The Workers Justice Project, for example, is a non-profit group that provides assistance to low-wage immigrant workers, many of whom were active volunteers and workers in the cleanup efforts after Superstorm Sandy but are now underemployed or unemployed. Formally including these workers as potential CERT members or as first responders is an opportunity to tap into this existing network to better serve immigrant and vulnerable populations, and the Community as a whole.

An active network of civic associations and religious institutions can potentially facilitate improved communication between New York City agencies and local residents. This network can also be called upon to distribute localized disaster recovery educational materials and resources. NYC OEM has expressed a need for greater access to local community groups to augment its services and help provide information about its programs to a broader population. Many of the educational resources that the Community needs in order to increase resilience already exist. Rather than creating educational materials and programs from scratch, the Community simply needs to build upon and customize existing NYC OEM materials and use local outreach and distribution channels to make sure the resources are reaching populations in need.

An opportunity exists for the Community to work with NYC OEM to create a network of CBOs that can help with emergency response, coordination, and outreach. For example, the relationship between NYC OEM and the local CERT in Staten Island provides a model for how a community can expand the resilience efforts of CBOs with support from the City. In this case, NYC OEM has initiated a pilot program to support an existing CBO network known as Community Organizations Active in Disaster (COAD). COADs are networks of local organizations, but with an additional emphasis on providing training and recovery support services to help communities recover from disasters. A COAD in Gravesend and Bensonhurst could serve as a critical liaison, providing local residents and businesses with educational materials, training events, and recovery support services. A COAD could also serve as an advocate in addressing additional needs within the Community, coordinating with senior-services organizations to provide assistance to the elderly, distributing locally tailored NYC OEM educational materials, advocating for tenants and homeowners, and helping to supply and staff Resource and Recovery Centers in the aftermath of a disaster. Community leaders who best understand the needs of their communities should be involved in the COAD so that they can communicate with and disseminate educational materials in English, Spanish, Chinese, Russian and other languages for non-English speaking residents.

Emergency Response Capabilities: The Committee has recommended that the CERT be expanded throughout the Community so that they can better serve vulnerable populations

and immigrant communities. The Community has the opportunity to engage residents that live in Gravesend and Bensonhurst to involve them in the local CERT. As mentioned above, there is an opportunity to incorporate and train representatives from the immigrant workforce in the Community, who aided in the cleanup and rebuilding efforts after the storm. Community leaders who can speak different languages and best understand the needs of their communities should be involved in the so that they can communicate with and disseminate educational materials to residents in the Community.

Identifying a location for a Resource and Recovery Center would provide an opportunity to provide critical services to residents in the aftermath of major storms. This center would serve a different function from designated evacuation centers—rather than housing displaced residents, it would provide educational materials, training, charging stations, and basic needs when residents return to the area after an evacuation. A Resource and Recovery Center would be located in an existing facility, such as a library, church, community center, or school that is in operation year-round.

Section III

Reconstruction and Resiliency Strategies



SECTION III: RECONSTRUCTION AND RESILIENCY STRATEGIES

Based on input from the Gravesend and Bensonhurst NYRCR Program Planning Committee (Committee), feedback from Public Engagement Events, and background research, five key strategies were developed. These strategies were used to guide the development and evaluation of projects. This section provides

a description of each strategy along with its associated projects.

In addition to being evaluated for their support by the Gravesend and Bensonhurst NYRCR Community (Community), the projects have been quantitatively tested for their cost-benefit using the Coastal Hazard and Risk Assessment

Scenario tool. The tool helped the Committee understand each of the project's capacity to reduce immediate exposure to risk, serve multiple recovery functions, and support the larger recovery strategy. A more detailed description of the projects can be found in Section 4.

Strategy A: Develop a comprehensive resiliency approach to the waterfront

This strategy directly addresses the coastal surge and tidal impacts the Community has experienced during prior storms as well as the potential risks posed by future storms. During Superstorm Sandy and Hurricane Irene, storm surge flooded segments of the Belt Parkway, Shore Parkway, and Cropsey Avenue, along with portions of the Community inland to the north and east. As a result, the Belt Parkway was impassable, along with nearby roads, which disrupted vehicular travel and the delivery of emergency services. The vulnerability of the Parkway presents a critical risk in the event of future storm surge flooding. Back-door flooding through Coney Island Creek is another risk for the neighborhoods on both sides of the Creek. It is expected that in the future, tidal inundation risks will increase as a result of global climate change, which will increase sea levels and the frequency of extreme events such as high wind-induced surges.

This strategy recognizes that protecting the Belt Parkway, a regional infrastructure asset, can have the significant co-benefit of protecting the low-lying inland areas in

the Community. Coastal flooding could be mitigated by the construction of 4- to 6-foot berms or coastal defense structures adjacent to and underneath the Parkway. The success of this strategy will depend on ensuring that the shoreline improvements are continuous and comprehensive. The berm network would have to be linked to flood gates under the Parkway overpasses to be an effective buffer against tidal surge for the inland Community. Further, these strategies would need to coordinate with other coastal protection efforts, including those at the Coney Island MTA Rail Yard and at Coney Island Creek, as discussed below.

The Committee supports the New York City Economic Development Corporation's (NYC EDC) study to evaluate the feasibility of protection measures at Coney Island Creek. The Creek was a major source of inundation for Gravesend, Bensonhurst, and the Coney Island Peninsula, impacting local and regional critical facilities. This study will develop short- and long-term recommendations which may include wetlands enhancement, flood gates, shoreline revetments, new transportation connections,

and additional recreational opportunities. This strategy recognizes the need to support the study and engage the Community with NYC EDC's efforts so that its recommendations are consistent with the Community's vision presented in this Plan.

This strategy also recognizes the need to develop a plan for the waterfront that not only addresses coastal protection, but also transportation for all modes of transit (i.e., vehicular, pedestrian, bicyclist, and ferry), economic development, parks and open space, and streetscape character. Improvements along the Belt Parkway can provide physical protection while simultaneously promoting access and use of the waterfront and Shore Parkway commercial areas. There is a significant opportunity to use the landscaped area between the Belt and Shore Parkways for coastal protection measures. There may also be an opportunity to link these improvements with access improvements such as connecting the Shore Parkway Greenway bicycle path between Bensonhurst Park and Calvert Vaux Park. These measures will require extensive interagency coordination (i.e., NYC

Department of Transportation, NYC Department of Parks and Recreation, NYS Department of Transportation, NYC EDC).

The Committee recognizes that no infrastructure solution can wholly prevent flood risk, and that any infrastructure project developed on the basis of this strategy would take time to implement and would likely exceed the Committee’s funding allotment. With those considerations, this NYRCR Plan includes feasibility study and implementation projects that will activate

the process by identifying specific measures, funding sources, and partnerships that can be used to make the Community more resilient in the face of future extreme storms.

Strategy A projects, summarized in Table 3-1, address the recovery support functions of Economic Development, Infrastructure, and Natural and Cultural Resources.

Table 3-1: Strategy A Proposed and Featured Projects

No.	Project Name	Short Description	Estimated Cost	Proposed/Featured	Regional (Y/N)
A1	Develop a Comprehensive Waterfront Master Plan for Coastal Protection and Implementation of Coastal Defenses	Phase A1a: Comprehensive Waterfront Master Plan for Coastal Protection Develop a Comprehensive Waterfront Master Plan that provides a strategy for integrating recreation, access, and economic development while increasing coastal defenses. Plan would focus on the feasibility of a structural berm/seawall along the Belt Parkway connected to floodgates at vulnerable underpasses. Study will coordinate with scope and findings of the Coney Island Creek Feasibility Study.	\$500,000	Proposed	Y
		Phase A1b: Implementation of Coastal Defenses Detailed design and construction of selected recommendations of the Comprehensive Waterfront Master Plan.	\$33,000,000	Featured	Y
A2	Redevelopment of the Bensonhurst Park Tennis Center Site	Incentivize resiliency upgrades or redevelopment of the Tennis Center at Bensonhurst Park and the adjacent area along Bay Parkway in a way that will increase the resilience of the waterfront, encourage economic development, improve transportation connections and serve the greater needs of the community. Potential uses could include recreational amenities tied to the Park and Shore Parkway Bikeway and flexible space for community uses.	\$200,000	Proposed	N
A3	Study the feasibility of a Multi-purpose Pier with Resilient Dock	Project would analyze potential sites for multi-purpose ferry service, with the primary goal of emergency transportation during disaster events as well as year-round benefits such as commuter ferry service, economic development opportunities or recreational access to the waterfront.	\$150,000	Featured	Y

Strategy B: Protect the Community from flooding during significant rain events

The Committee recognizes that the Community is vulnerable to flooding both from coastal surge events and from stormwater flooding as was evidenced during Superstorm Sandy. Strategy B addresses this risk by identifying and reducing stormwater flooding, which occurs more frequently during smaller events such as tropical storms, nor'easters, and other "microburst" storms where heavy amounts of rainfall occur in short periods of time. Flooding from the storm sewers in low-lying areas can occur when the sewer network becomes overloaded with water from upland areas. The issue of the volume and speed at which stormwater enters the sewer network is exacerbated by the high degree of impervious surfaces in the Community such as street pavement, roofs, and paved driveways. In addition, the sewer system's ability to convey stormwater can be reduced due to clogged catch basins and other debris in the network. Coastal flooding during extreme high tides or storm surges can also worsen stormwater flooding by preventing stormwater from discharging through outfalls in Coney Island Creek and along Gravesend Bay. Under the worst conditions, tidal flows can back up into the sewer system, causing flooding and potentially sewer backups in low-lying areas.

These issues described above are systemic throughout the Community and aggravate flooding risks during extreme events. Mitigating stormwater flooding will have everyday benefits, while also limiting the risk posed by severe flooding due to inadequate coastal defenses and stormwater infrastructure. This strategy addresses three important needs: it

pinpoints necessary maintenance and repairs to reduce the risk from stormwater flooding; it identifies stormwater infrastructure upgrades such as increasing the capacity of stormwater infrastructure or installing check valves or catch basins to alleviate flooding "hotspots"; and it determines locations for upstream stormwater retention to reduce the amount of stormwater entering the system during significant rain events. A watershed-level Hydraulic and Hydrologic study will serve as an initial step toward determining the specific needs for stormwater infrastructure repairs and upgrades. A green infrastructure siting analysis and pilot project will seek to alleviate stormwater volumes in the combined sewer area upstream in the Community.

Community members have reported that the Belt Parkway regularly floods during heavy storm events. This is a critical issue, as the Parkway is a regional transportation asset. The Parkway regularly experiences traffic congestion, and even small flooding events can significantly exacerbate this problem. There may be opportunities to connect with other planned efforts to improve the parkway along neighboring sections of the right-of-way. Cropsey Avenue, especially between Bay 24th Street and Bay 49th Street, also experiences recurring flooding because the stormwater drainage system is not operating properly at lower elevations. Additional attention is required for both roadways to determine if the drainage system capacity is sufficient to handle current and future conditions, or if siltation of the pipes and recurring tidal flows have reduced the system's

ability to function at its intended capacity. Detailed drainage studies are proposed for both the Belt Parkway and Cropsey Avenue, with additional phases for implementation of the resulting recommendations to mitigate roadway flooding.

Strategy B projects, listed in Table 3-2, address the recovery support functions of Community Planning and Capacity Building, Infrastructure, and Natural and Cultural Resources. Proposed and Featured Projects within Strategy B contribute to community planning and capacity building by encouraging policy changes to improve stormwater management controls over future development, and by providing additional tools to educate the community about ways to reduce individual impacts on the stormwater system. Strategy B helps to improve infrastructure by addressing the intersection between green infrastructure and more traditional infrastructure such as the network of sewer lines and catch basins.

Table 3-2: Strategy B Proposed and Featured Projects					
No.	Project Name	Short Description	Estimated Cost	Proposed/Featured	Regional (Y/N)
B1	Analyze Hydrologic and Hydraulic Systems for Improved Stormwater Management	High-level analysis of the hydrologic and hydraulic (H&H) systems affecting drainage in the low-lying areas of the Community that experience recurring flooding. Study will analyze existing drainage patterns and whether the system is adequate to handle 2014 conditions and future conditions. The study will identify measures needed to ensure adequate stormwater management/capture such as storage basins, the use of green infrastructure, and upgrades to increase system capacity.	\$250,000	Proposed	Y
B2	Improve Stormwater Drainage along the Belt Parkway	B2a: Phase I - Belt Parkway Drainage Study Drainage study that identifies stormwater drainage issues and “hotspots” on the Belt Parkway from Ocean Parkway to Bay Parkway. Identified solutions may include expanding system capacity, raising the roadway above the 10-year flood level, and using green infrastructure.	\$400,000	Featured	Y
		B2b: Phase II - Belt Parkway Drainage Improvements Measures identified in the Belt Parkway Drainage Study would be implemented through this phase.	\$800,000	Featured	Y
B3	Improve Stormwater Drainage along Cropsey Avenue	B3a: Phase I - Cropsey Avenue Drainage Study Drainage study that identifies stormwater drainage issues at identified areas of recurring flooding along Cropsey Avenue from Bay 38th Street to Bay 49th Street. Identified solutions may include expanding system capacity, raising the roadway above the 10-year flood level, and using green infrastructure.	\$300,000	Proposed	N
		B3b: Phase II - Cropsey Avenue Drainage Improvements Pilot project to implement drainage improvement measures proposed in the Cropsey Avenue Drainage Study.	\$800,000	Proposed	N
B4	Implement Green Infrastructure Pilot Project in Combined Sewer Area	B4a: Project A – Green Infrastructure Siting Analysis in Combined Sewer Area Development of a green infrastructure implementation project on public property strategically located to intercept stormwater before it reaches the combined sewer system. Study would focus on the combined sewer area in the northwest portion of the Community.	\$200,000	Featured	N
		B4b: Project B – Green Infrastructure Pilot Project Implement a chosen green infrastructure project on roadways and/or public and non-profit property. Pilot project will demonstrate the application of green infrastructure in the Community.	\$700,000	Proposed	N

Strategy C: Provide resiliency assistance and education for homeowners, renters and business owners

To maintain property values and the existing neighborhood character, residents need strategies that help make their homes more resilient and reflective of Federal Emergency Management Agency (FEMA) requirements. As discussed in Section 2, the updated FEMA preliminary Flood Insurance Rate Map (FIRM) expected to be adopted in 2016 has added almost 9,300 units to Special Flood Hazard Areas (SFHA). This means that almost a quarter of the housing in the Community is vulnerable to flooding, and these homes may face additional flood insurance premiums. Participants expressed concern about potential dramatic increases to flood insurance premiums, the cost of basic repairs, and whether the burden of elevation and floodproofing might force them from their homes. Additionally, there are concerns that the increase in flood insurance premiums borne on these units could potentially

reduce property values and weaken the economic base of the Community, which is still recovering from Superstorm Sandy.

Strategy C identifies ways to strengthen the housing stock against future extreme weather events which will serve to protect residents from future storms and help to stabilize property values. Housing and residential neighborhoods are supported by projects that will provide residents with resources to help rebuild more resilient homes and businesses.

Strategy C places a strong emphasis on providing technical assistance and funding for building retrofits that support vulnerable populations, such as low- to moderate-income housing, nursing homes, and adult care facilities. According to HUD, approximately 30% of the Community is already considered

“rent-burdened,” and this strategy will identify means of assistance and funding to ensure that affordable housing remains in the Community. The program will proactively reach out to home and business owners in the updated SFHAs who may need technical assistance and education to upgrade their properties. It is important that guidance is disseminated in multiple languages so that residents with low English proficiency are included in the program.

Strategy C also provides funding assistance for resiliency upgrades for housing and small business. This may include gap funding for retrofitting homes and businesses that need to raise mechanicals and purchase backup generators. Strategy C projects, listed in Table 3-3, address the recovery support functions of Housing, Economic Development, and Community and Capacity Building.

Table 3-3: Strategy C Proposed and Featured Projects					
No.	Project Name	Short Description	Estimated Cost	Proposed/Featured	Regional (Y/N)
C1	Develop a Residential and Commercial Property Technical Assistance and Education Program	Provide homeowners and commercial property owners with information and technical assistance on flood insurance requirements, resiliency measures, guidance for grants and loans, building and zoning guidelines, green infrastructure practices, and other measures to reduce flooding risks. Information will be disseminated in multiple languages, with a focus on socially vulnerable populations.	\$1,000,000	Proposed	N
C2	Establish Housing Loan Program for Resiliency Retrofits	Provide homeowners with low-interest loans for resiliency retrofits such as the raising of mechanicals, elevation, and floodproofing. Program would focus on rent-burdened households and areas "new" to the Special Flood Hazard Area (SFHA). Program may partner with a Community Development Financial Institution (CDFI) to create revolving loan program.	\$500,000	Featured	N
C3	Establish Commercial Loan Program for Resiliency Retrofits	Provide commercial property owners with low-interest loans for resiliency retrofits such as the raising of mechanicals, elevation, and floodproofing. Program would focus on small businesses in areas "new" to the Special Flood Hazard Area (SFHA). Program may partner with a Community Development Financial Institution (CDFI) to create a revolving loan program.	\$500,000	Featured	N

Strategy D: Develop a coordinated community response plan during times of extreme weather

Many institutional and community-based organizations, ranging from fire departments to OEM's Community Emergency Response Teams (CERTs) to religions organizations, provided critical disaster recovery services in the immediate aftermath of Superstorm Sandy. The Committee recognizes that although many organizations were active after Superstorm Sandy, there were gaps in access to municipal services and storm-related information during and immediately after the storm. Superstorm Sandy revealed that there is a need to improve the capacity, communication ability, and coordination among emergency-response groups and the local Community Based Organizations (CBOs) in Gravesend and Bensonhurst.

Strategy D seeks to improve communication networks so that organizations are better positioned to disseminate critical information, identify and assist vulnerable populations, assist in rapid recovery efforts, and distribute emergency supplies. Improving redundancy in communications infrastructure is a significant component of Strategy D so that emergency response can remain intact even when hardline and cell phone coverage is disrupted. These actions are essential to support the community's longer-term recovery.

Proposed and Featured Projects under this Strategy strengthen the support infrastructure for socially vulnerable populations to help prepare these groups in advance of a potential disaster. The Committee recognizes that there is a large number of nursing, elder-care, and assisted-living facilities in the Community. Improved coordination is needed between these facilities and emergency responders to identify vulnerable populations who need assistance with emergency operations and response, improve evacuation protocols, and tailor methods to the extent possible to accommodate individuals with limited mobility. The Committee supports greater coordination between CBOs in order to effectively communicate and provide services to all populations. This can be achieved through the formation of a Community Organizations Active in Disaster (COAD) that can develop Community-specific coordinated disaster preparedness plans and coordinate activities among groups.

Superstorm Sandy exposed various community response challenges that the Community faces such as coordinating with regional emergency-management organizations and providing assistance to other neighborhoods that are more vulnerable to disaster risk. The Committee

expressed the need to encourage more people who live and/or work within the Community to join the CERT team. Expanding CERT to have more volunteers within the Community will improve Gravesend and Bensonhurst's local emergency-response capacity. Geographic diversity among CERT volunteers will also make the regional emergency-response capacity less vulnerable. This strategy recognizes that outreach for the CERT team needs to be proactive and continually engaged to increase membership and awareness about disaster preparedness. Information should be disseminated in multiple languages.

To have a more effective coordinated effort, Strategy D relies on creating formal connections between local organizations and the NYC Office of Emergency Management. Proposed projects will serve to enhance pre-existing programs to provide Community-specific education and awareness campaigns about disaster preparedness and emergency response.

Strategy D projects, listed in Table 3-4, address the recovery support functions of Community Planning and Capacity Building, Health and Social Services, and Infrastructure.

Table 3-4: Strategy D Proposed and Featured Projects					
No.	Project Name	Short Description	Estimated Cost	Proposed/Featured	Regional (Y/N)
D1	Create a Community Disaster Recovery Training and Workforce Development Program	Provides disaster-recovery workshops for local workers tailored to the needs of the Community. The workshops would develop trained laborers equipped to help the Community rebuild and recover from storm events. Training areas would include health and safety; mold remediation; sump pump operation and restoration; trap cleanouts; and electrical.	\$150,000	Proposed	N
D2	Development of a COAD to create a Community Disaster Recovery Plan	Develops a plan to create a Community Organizations Active in Disaster (COAD) among established Community Based Organizations. Plan will identify, network, coordinate and provide training for these not-for-profit and civic organizations.	\$200,000	Proposed	Y
D3	Expand Emergency Communications Network for First Responders	Provides radio repeaters at key locations to facilitate short-wave radio communication for first responders, CERT Team, and COAD members for use during disaster response and recovery.	\$250,000	Featured	Y
D4	Establish Resource and Recovery Center at an Existing Social Service Facility	Advocates for existing social services facilities to operate as a Resource and Recovery Center. In addition to being a site for the coordination of emergency and relief services during a disaster event, the sites may serve at other times as meeting space for the CERT and/or COAD, and could host representatives from government agencies providing disaster relief and recovery funding (i.e., grant/loan application center).	\$250,000	Featured	N

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Strategy E: Upgrade, maintain, and strengthen community infrastructure

As reported by the Committee and residents, the Community's power supply and telecommunications network are vulnerable to storms due to flooding and tree damage to overhead lines. During Superstorm Sandy, some buildings lost power for up to three weeks. Outages to these systems reportedly also occur during more frequent storm events. Superstorm Sandy also affected other infrastructure systems such as the roads and stormwater sewage network. After the storm, many streets were left in disrepair, and sewer pipes were clogged with debris. The Committee expressed a general need for maintenance and upgrades to the Community's aging and vulnerable infrastructure. Strategy E was developed as a broad measure to account for these diverse

infrastructure needs.

Risks to vulnerable populations are amplified during power outages that interrupt communications networks to critical support services and the need for electricity to power personal medical devices. Strategy E helps to mitigate those risks by providing backup power sources to prevent utility service interruptions. A redundant and more resilient power grid would allow critical community resources to operate in the event of a future disaster. It would also increase the Community's resiliency by stabilizing communication systems, improving operations at recovery shelters, and helping schools get back in service more quickly.

Proposed and Featured Projects in Strategy E address infrastructure by providing redundancy in electricity infrastructure and establishing alternative sources of energy by identifying critical facilities that would benefit from implementation of microgrids or resilient communication systems. Strategy E projects, listed in Table 3-5, address the Infrastructure recovery support function.

Table 3-5: Strategy E Proposed and Featured Projects

No.	Project Name	Short Description	Estimated Cost	Proposed/Featured	Regional (Y/N)
E1	Install Backup Power Supply for Critical Facilities and Infrastructure	Initiate a competitive process to install generators at critical facilities, potentially creating a microgrid network, to provide reliable power during and after major storm events. Critical facilities may include schools, senior centers and medical facilities	\$300,000	Proposed	N
E2	Expand Feasibility Study for Energy Resiliency for NYCHA and Mitchell-Lama Properties into Gravesend-Bensonhurst	This study builds on the Coney Island microgrid project proposed in the Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Plan. The feasibility study assesses the potential to connect the Marlboro Houses and other key facilities to a Coney Island microgrid, with the power supply generated at the Amalgamated-Warbase Houses.	\$50,000	Proposed	Y
E3	Develop a Wireless Mesh Network as a Backup Communications Network	Creation of a wireless network in the Community that provides backup and reliable internet connectivity during and after emergency situations. The system involves a wireless mesh network to be placed at strategic locations.	\$200,000	Proposed	N

Section IV

Proposed and Featured Project Profiles



SECTION IV: PROPOSED AND FEATURED PROJECT PROFILES

The NY Rising Community Reconstruction (NYRCR) Program has allotted up to \$3 million to fund eligible resiliency projects in the Gravesend and Bensonhurst NYRCR Community (Community). The funding is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. While developing projects and actions for inclusion in the NYRCR Plan, the Gravesend and Bensonhurst NYRCR Planning Committee (Committee) took into account a number of factors, including cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. The Committee also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. The projects and actions set forth in the NYRCR Plan are divided into three categories:

- Proposed Projects are projects recommended for funding through the Community’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 (see Section V-A) are projects and actions that the Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

The order in which projects and actions are listed in the NYRCR Plan does not necessarily indicate the Community’s identification of these projects and actions. The total estimated cost of Proposed Projects in the NYRCR Plan exceeds the Community’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 the NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in the NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG DR funding or that it will be implemented.

NYRCR Project Descriptions

This section provides an overview of each potential NYRCR project including the elements listed below:

- **Project Description:** a brief summary of the project including tasks, components or phases;
- **Cost Estimate:** high (more than \$1 million), medium (between \$500,000 and \$1 million), or low (less than \$500,000);
- **Benefit or Co-Benefits:** whether the project has local direct benefits within the Community or regional benefits, and whether those

benefits are primarily public or private;

- **Cost Benefit:** The following types of benefits were reviewed for the cost-benefit analysis: risk reduction benefits, economic benefits, environmental benefits, and health and social benefits;
- **Risk Reduction:** a description of the risk reduced to assets in the Community with the implemented project, including, but not limited to, reduced risk from tidal or stormwater flooding, sewer backups, and loss of revenue;
- **Timeframe for Implementation:** provides an anticipated timeframe required to implement the project. This is classified as immediate (can be completed in two years or less from start of project), intermediate (can be completed in two to five years from start of project), or long-range (will require more than five years to complete from start of project);
- **Regulatory Requirements:** consideration of whether a project is technically feasible, likely to face regulatory obstacles including issues with permits or other approvals, any real property constraints, and project readiness;
- **Jurisdiction:** The entity with jurisdiction over the project.

Adding up the Costs

The Committee worked with a team of cost estimators, engineers, architects, landscape architects, and planners (Consultant Team) to develop estimated costs for each proposed and featured project. All costs are preliminary and based on available data as well as the Consultant Team’s understanding of the issues learned through site visits, Committee member knowledge and feedback, and input from the Community. Local government entities and nonprofit organizations also provided input regarding project scope and estimated costs. As available, construction costs are based upon comparable projects that have been constructed within the New York City metropolitan area. Where applicable, actual construction cost quotes from vendors were used. Each phase within a project (design, construction, construction management, and other direct labor costs) includes a contingency factor, and costs are based on the level of detail available for each individual project at the time of the estimate.

Maximizing the Benefits

All Proposed and Featured Projects underwent a qualitative analysis of their anticipated costs and benefits, in accordance with NYRCR Program Guidance. The purpose of the cost-benefit analysis is to assist the Committee in improving these projects and to identify actions for implementation. The proposed implementation schedule developed by the Committee by utilizing this cost-benefit analysis aims to identify a comprehensive set of projects that are best able to achieve the greatest benefits at the least cost.

The following types of benefits were reviewed for the cost-benefit analysis, in accordance with NYRCR Program Guidance:

- Risk Reduction Benefits;
- Economic Benefits;
- Environmental Benefits; and,
- Health and Social Benefits.

For feasibility studies, action plans, or advocacy projects, the discussion of benefits is related to the potential benefits that would result from future implementation of the selected alternative or recommendations developed through the course of study or advocacy. In addition, some projects are scalable; the benefits of these projects are considered in their current state, and potential benefits that would result from development into regional or larger-scale projects are noted where appropriate.

A1: Develop a Comprehensive Waterfront Master Plan for Coastal Protection and Implementation of Coastal Defenses (Proposed)

Project Description

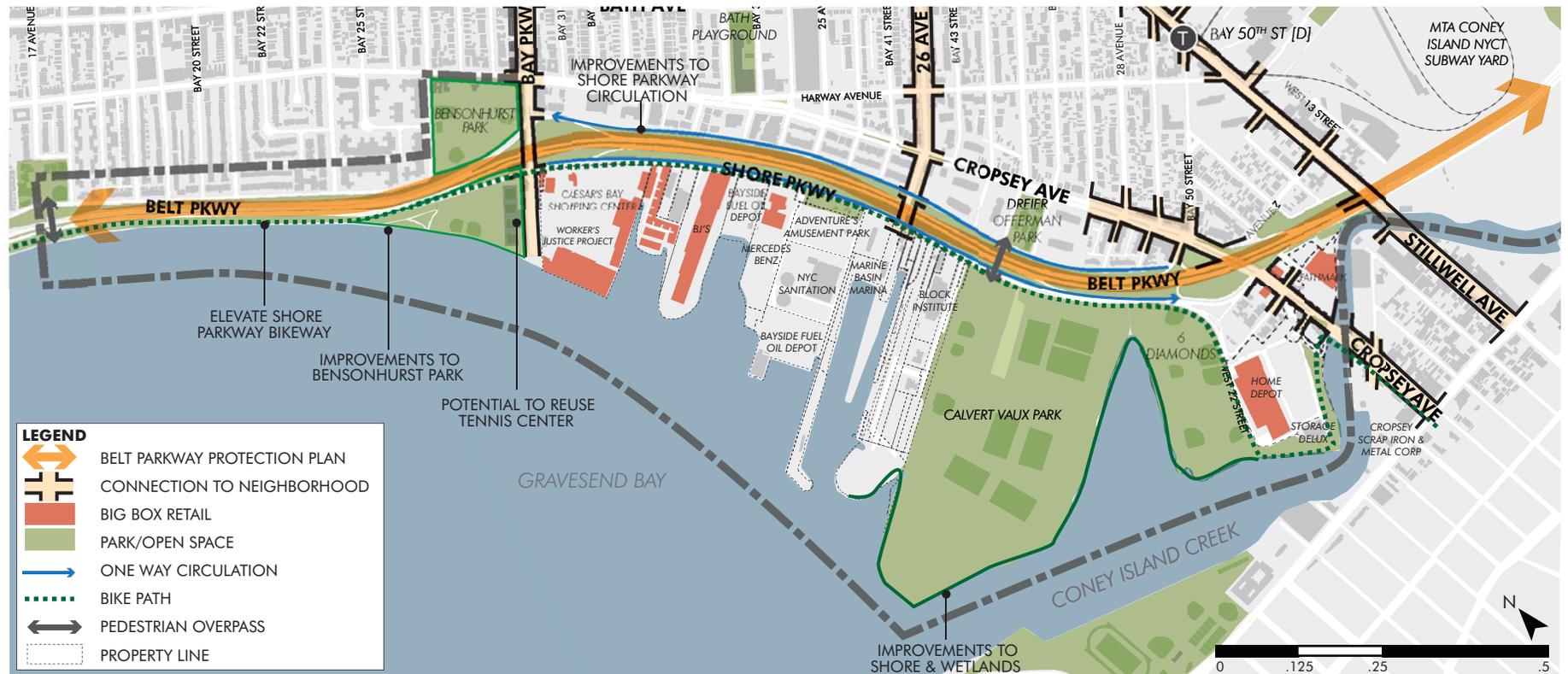
Phase A1a: Comprehensive Waterfront Master Plan for Coastal Protection (Proposed Project)

The Committee recognizes the need for a comprehensive master plan that would identify short- and long-term investments along the Belt Parkway south to Gravesend Bay and Coney Island Creek. A comprehensive plan could

provide opportunities for leveraging investments toward the goal of increasing the overall resiliency of the Gravesend and Bensonhurst Community.

This project would develop a Comprehensive Waterfront Master Plan that would outline a strategy for coastal resiliency investments integrating access, economic development, and recreation. The master plan would take into account the findings of the Coney Island Creek

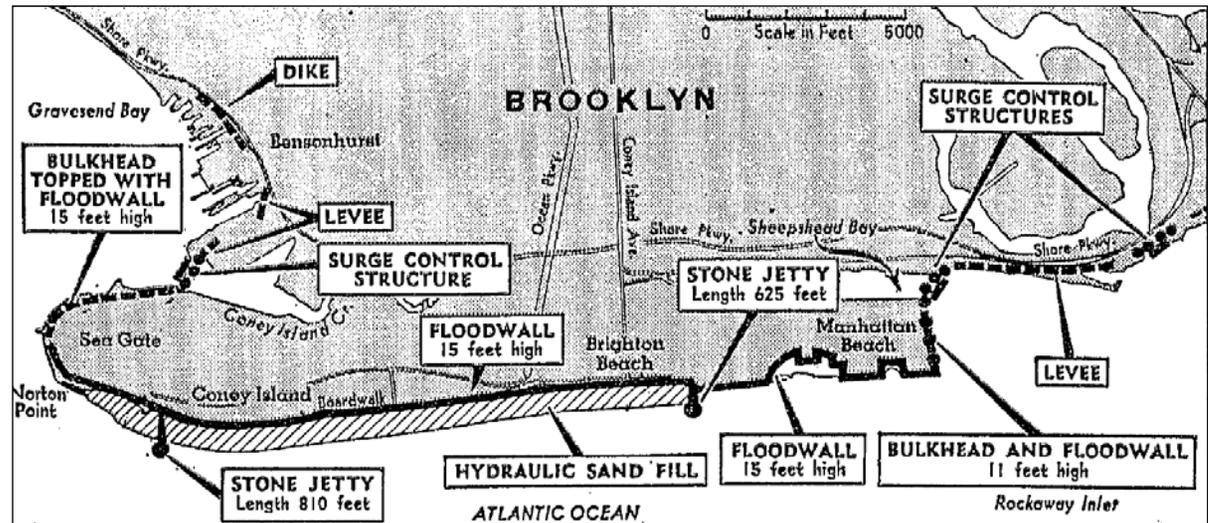
Figure 4-1: Potential Comprehensive Waterfront Master Plan study area



Feasibility Study currently underway by the New York City Economic Development Corporation (NYC EDC), design plans of the perimeter of the Metropolitan Transit Authority (MTA) Coney Island Rail Yard, and other plans and projects adjacent to this area. The measures to be studied include:

- Creating a structural berm or seawall along the Belt Parkway and constructing floodgates at vulnerable underpasses to serve as a defense against tidal flooding and storm surges (including an assessment of potential Federal Emergency Management Agency (FEMA) certification to reduce flood insurance premiums);
- Integrating shoreline protection with recreation by elevating the Shore Parkway Bikeway, installing stone revetments and wetlands to buffer tidal flow; and
- Transportation opportunities, including improving circulation patterns along Shore Parkway and the Belt Parkway, and shuttle or bus service for evacuation and post-disaster access to employment.

In 1972, the U.S. Army Corps of Engineers (USACE) proposed a plan for coastal protection that proposed grass-covered levees along part of Shore Parkway at a height of 15-18 feet, with a top width of 8 feet. The plan also included a 15-foot-high flood wall on Coney Island from Manhattan Beach to Sea Gate, with flood gates at Coney Island Creek, Gerritsen Inlet, and Sheepshead Bay.⁵¹ The Comprehensive Waterfront Master Plan for Coastal Protection is fundamentally different from the USACE plan in that its discreet scale is actually a benefit. The recommendation of the Comprehensive



Map showing a proposal by USACE to Protect the Brooklyn Shoreline 1972

Source: NYTimes,

Figure 4-2: Potential Tie-In to Proposed Regional Projects



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Waterfront Master Plan would focus on providing distinct fundable phases, increasing the feasibility of implementation. Project A1a is envisioned as a road map the Community can use to help guide decisions and prioritize projects. New York City and the Community can use the plan to help leverage these investments for greater benefits.

The scope of work for the study is broken into several baseline studies, including a review of existing information, topographic and geotechnical surveys, environmental site assessment and wetlands delineation, and tidal analysis. The Master Plan would develop conceptual designs and assess the feasibility of those designs for coastal flood defense measures. It would also assess the feasibility of a

range of alternatives that would protect retailers along Shore Parkway, the Belt Parkway, and the communities north of the Belt Parkway. The selected design could be worked into an overall conceptual plan for the waterfront, which would illustrate how these designs would protect the various assets discussed above.

Phase A1b: Implementation of Coastal Defenses (Featured)

Subsequent phases of this project could lead to the construction of selected recommendations of the Comprehensive Waterfront Master Plan. While the Comprehensive Waterfront Master Plan will inform what coastal protection measures could be constructed, a preliminary early phase candidate for implementation could be addressing the flooding conditions along the Belt Parkway or improvements to the shoreline. All coastal defenses would be designed to protect against a 100-year storm.

Included in this NYRCR Plan are conceptual designs for Belt Parkway defenses which could be constructed to protect the Belt Parkway and neighboring communities to the north from extreme storm events.

The Belt Parkway lies in the southern to western end of the Community and is an integral part of the regional highway network. The Belt Parkway was severely flooded and damaged during Superstorm Sandy, with several sections inaccessible and needing extensive repairs after the storm. During more frequent and less extreme storm events, the Belt Parkway also floods at low-lying points.

Coastal defenses along the Belt Parkway could include the construction of a linear

vegetated berm in the grassy area between Shore Parkway and the Belt Parkway, bounded

Figure 4-3: Area protected from 100-year floods with Belt Parkway berm implementation

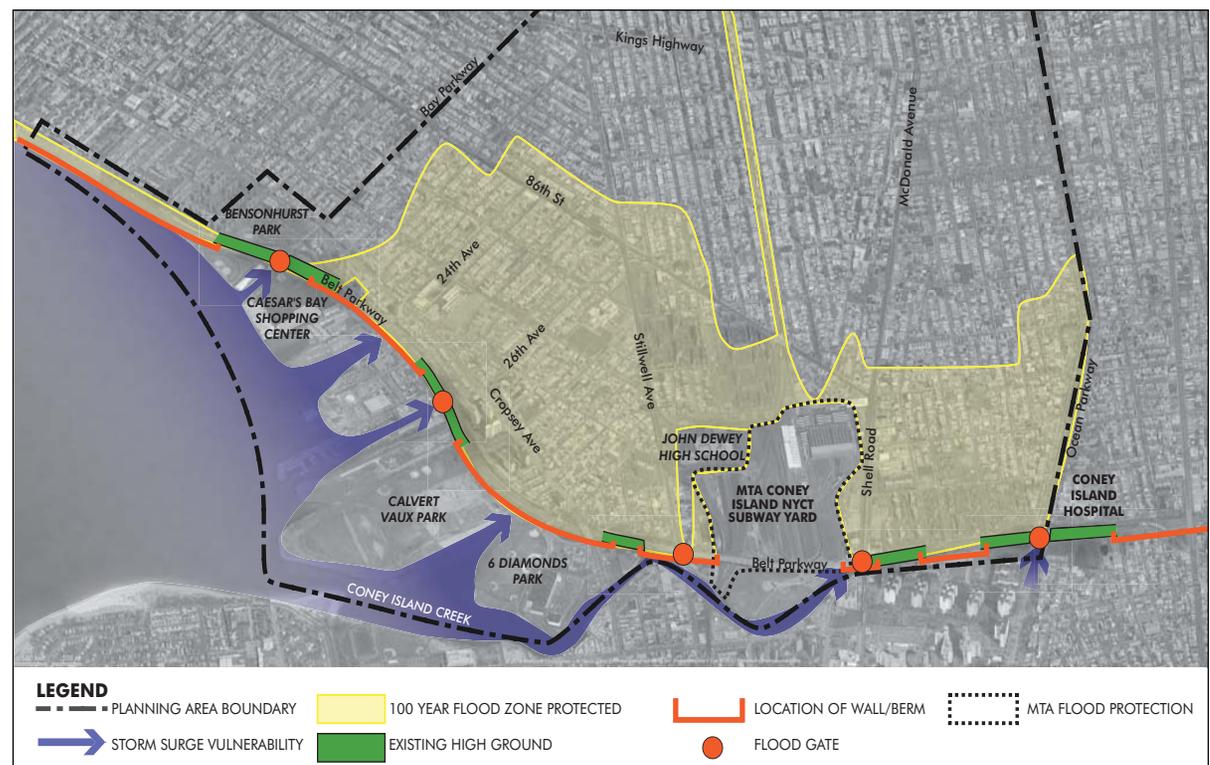


Figure 4-4: Illustration of potential measures along the Belt Parkway



by a series of floodgates at Bay Parkway and 26th Avenue underpasses that together form a continuous line of coastal protection. Potential coastal flooding protections along the waterfront could also include raising the Shore Parkway bikeway. The bikeway could potentially connect three parks in the Community: Bath Beach Park, Bensonhurst Park, and Calvert Vaux Park. Figure 4-2 illustrates potential tie-ins to the tidal barrier at Coney Island Creek (as proposed in the NYC EDC’s feasibility study), to a proposed

floodwall at MTA’s Coney Island Rail Yard, and to a proposed USACE regional floodwall around Coney Island.

While the Committee recognizes that a continuous line of coastal protection is necessary to provide the Community with complete protection against a 100-year storm, conceptual considerations for how this project could be phased or constructed have also been provided for illustrative purposes.

Cost Estimate

Phase A1a: \$500,000 (Proposed)

The first phase of this project (Phase A1a Comprehensive Waterfront Master Plan for Coastal Protection) is estimated to cost \$500,000 (low cost), which would include urban planning and design; recommendations for economic development; traffic, circulation, and waterfront access planning; conceptual engineering and designs of alternatives; and a feasibility and cost-benefit analysis, which will

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inform a preferred alternative. The estimate also includes the development of the conceptual plan and public engagement with outreach meetings and other materials. This phase is a study, and as such there is a low degree of uncertainty and there are no anticipated external costs.

Phase A1b: \$33,000,000 (Featured)

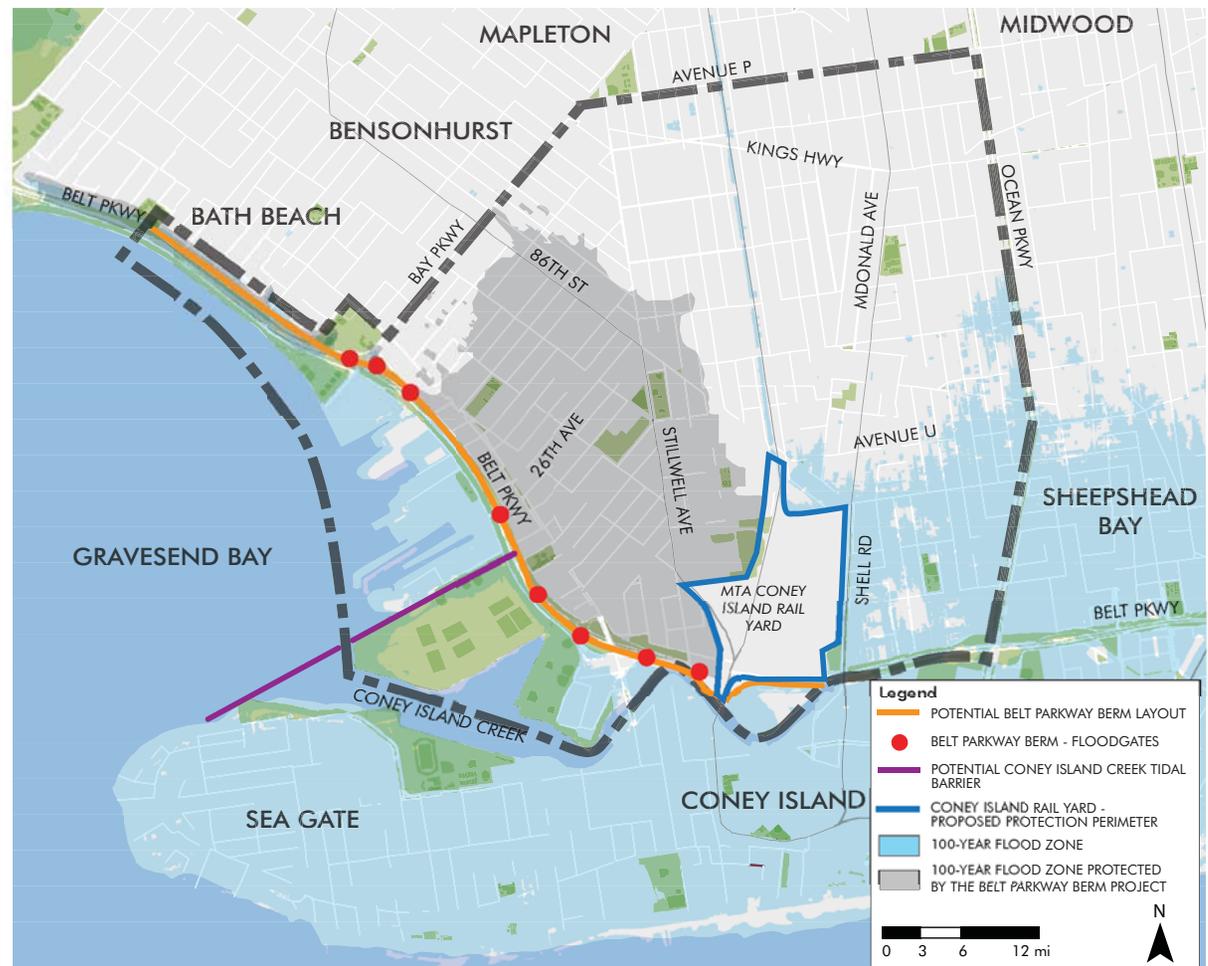
The second phase of this project (Phase b Implementation of Coastal Defenses along the Belt Parkway) is estimated to cost \$33,000,000 million, which has been separated into four potential sections of construction which would together protect the Community against a 100-year storm event. It should be noted that the tidal barrier at Coney Island Creek, flood protection at MTA Coney Island Rail Yard, and the USACE regional floodwall are not constructed through this project and are therefore not included in the cost estimate. The construction sections included in the project are described below and shown in Figure 4-2.

Section 1: Improvements from Bay 16th Street to Bay Parkway could include the raising of the Shore Parkway bikeway (see Figure 4-4).

Section 2: Installation of a linear vegetated berm in the grassy area between Shore Parkway and the Belt Parkway. This would be connected to floodgates at underpasses, including a 100-foot-wide floodgate at Bay Parkway, a 35-foot floodgate at 23rd Avenue, and 75-foot-wide floodgate at 26th Avenue. The berms and floodgates would form a continuous line of coastal protection.

Section 3: Continuation of the vegetated berm to Bay 49th Street, with a 40-foot floodgate at Bay

Figure 4-5: 100-year floodplain with and without Belt Parkway berm



46th Street and a 50-foot floodgate at Bay 49th Street. The linear berm would continue from Bay 49th Street to the MTA Coney Island Rail Yard, with a 30-foot floodgate at the off ramp from the Belt Parkway, a 20-foot floodgate at the on ramp to the Belt Parkway near west 22nd Street, and an 80-foot floodgate at Stillwell Avenue.

Section 4: Continuation of the berm network from the MTA Coney Island Rail Yard to the N Subway line.

Phase A1b would build on the studies, such as topographic and geotechnical surveys, completed in Phase A1a. The cost estimate

for this phase includes environmental site assessments for every section described above, the development of draft and final design documents, environmental review (including threatened and endangered species surveys, cultural resources surveys), permitting, and the development of draft and final construction plans and costs. Construction costs for each section above include mobilization, demobilization, a field office, real estate acquisition for right-of-way easements, earthwork and site preparation, maintenance and protection of traffic, and soil erosion and sediment control measures. This phase is highly uncertain because it is entirely dependent on the findings and recommendations of the Phase A1a master plan and feasibility assessment. For this reason, a standard 50% contingency is built into the cost for construction projects such as this.

Significant external costs would be anticipated with this phase of the project, including potential land acquisition along the right-of-way and temporary closures of Shore Parkway and roadways with proposed floodgates (i.e., Bay Parkway), all of which could result in significant economic impacts, as well as potential temporary construction-related impacts to public health such as increased air pollution from construction vehicles and noise.

Benefit or Co-Benefits

Environmental Benefits

Phase A1a of this project would recommend measures that achieve environmental benefits related to the improvement of recreational opportunities for the Community. This includes

ways to connect a network of recreational assets with the waterfront, such as Bensonhurst Park, Bath Playground, Dreier Offerman Park, Calvert Vaux Park, and Six Diamonds Park. It would also seek to improve access for pedestrians and cyclists to the waterfront by providing connections between existing bike paths such as the Shore Parkway Greenway and Ocean Parkway. Such improvements in non-vehicular transportation could have positive environmental benefits to air quality by reducing CO₂ emissions; for every 1,000 commuters that switch from driving to biking to work, over 250,000 lbs of CO₂ is reduced per year.⁵⁴ Native plantings would be incorporated into the vegetated berm, increasing the biodiversity in the area.

Phase A1b of this project could implement a series of Best Management Practices (BMPs) to protect the waterfront as recommended in Phase A1a, which could minimize pollution resulting from tidal surge that runs over impervious land and recedes back into the Bay or Creek, carrying pollutants. Environmental benefits would be significant because the project could avoid or minimize potential environmental impacts of flood damages to the 6,626 housing units and 130 commercial and mixed use parcels that would no longer experience flooding⁵⁵. Flooded homes present a number of environmental risks because of the release of hazardous materials. This may include home heating oil spills, where oil mixes with flood waters which can contaminate water bodies and adjacent properties;⁵⁶ flooded heating systems which can contain asbestos; and sheetrock which can contain lead paint.⁵⁷ By reducing common sources of water pollution following floods, this phase of the project could improve ecosystem

health in Gravesend Bay and Coney Island Creek, which provides an essential fish habitat for 19 federally managed species, including winter flounder, bluefish and black sea bass⁵⁸. The implementation of shoreline defenses would also reduce coastline erosion along the 15,924 linear feet of coastal erosion hazard areas within the Community.

Economic Benefits

Phase A1a would generate approximately five full-time equivalent jobs (FTEs)⁵⁹ and enable implementation of coastal protection measures as described in Phase A1b, which would support considerable economic benefits to the Community. Additionally, the recommendations developed in Phase A1a could provide recreational and aesthetic value to nearby property owners, increasing nearby property values. Increased amenities for residents would result from the project, including additional and connected bikeways, bioswales, and additional wetlands and vegetation. A 2011 Economic Snapshot performed by NYC EDC analyzed property values around three City parks, finding that land values of residential properties increase with proximity to parks, including the increase in land values over time for lower-priced properties, and noting that from 2003 to 2011, property values closest to the parks escalated at a faster rate in lower-priced areas.⁶⁰ Therefore, improving connections among parks and adding green space along the waterfront could increase property values. The bikeway would enhance the recreational value for residents and visitors of the area, and the bikeway could trigger additional visitor spending and economic activity in the area. The protection would also ensure continued and

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future commercial investments in the area. With improved coastal protection, existing businesses would remain in the area, providing jobs and income for the local economy.

Phase A1b, the implementation of selected coastal defense measures, would generate approximately 474 additional FTEs, supporting architectural and engineering, construction, planning, and other industry jobs, income, and additional economic activity in the area. Implementation of coastal protection measures would provide protection to 6,626 households, 130 commercial and mixed use parcels, and 7 industrial lots and avoid human deaths and injuries located within the mitigated floodplain. Regional expansion of the project would protect additional properties and areas within the Community. The project would result in the protection of an estimated \$1.26 billion in value⁹ of property in the mitigated floodplain.

Protected businesses are likely to reopen more quickly after a flood event, decreasing business disruptions, benefitting business revenues, local employees and income. In Kings County, each business generates an average of \$5,200 per day⁶². Without coastal protection, these sales would be lost due to temporary or permanent business closures. Implementation of the waterfront protection measures would result in significant reduction in costs by avoiding disruptions of services and damages to residential and commercial property. This would prevent the loss of jobs for employees that depend on these businesses for income.

Phase A1b would reduce or avoid damage to infrastructure, utilities, highways, and other commercial assets, consequently reducing or

avoiding the costs to repair these assets. Service and travel interruptions would be avoided with the implementation of this project, benefiting the Community as well as other users of the infrastructure, highways, and services.

Health and Social Benefits

In Phase A1a of the project, the Comprehensive Waterfront Master Plan for Coastal Protection would recommend measures for improving pedestrian safety and waterfront access, non-vehicular transportation, and recreation that would provide significant health and social benefits to quality-of-life in the Community. According to the New York Police Department (NYPD), 90 collisions occurred and nine people were injured in collisions on Shore Parkway in 2014, including two bicyclist.⁶³ The comprehensive master plan would provide recommendations for improving safety along Shore Parkway that could afford pedestrians and bicyclists safer access to the waterfront. It could also improve the network of bicycle amenities in the Community, resulting in public health benefits such as exercise opportunities (with associated health benefits) and lower incidence of respiratory diseases associated with improved air quality from reduced auto trips. A literature review prepared for the Department of City Planning's (DCP) Bike-Share Opportunities in New York City report found that those who did not cycle to work had a 39% higher mortality rate than those who did, while a 15-minute bicycle ride twice per day five times per week could burn the equivalent of 11 pounds in one year.⁶⁴ Open space and recreation benefits could include connecting several parks in the Community, as mentioned above, which would have significant benefits for improving livability and quality-of-life.

In Phase A1b, the entire population residing in the 100-year flood zone could directly benefit depending on the improvements developed in Phase A1a, totaling 18,163 (18.9% of Community). The proposed project would significantly benefit socially vulnerable populations in the area, including 3,440 low-income households, 1,217 households with one or more persons with a disability, 2,988 non-English-speaking residents, and 2,299 residents over the age of 65. Furthermore, the entire population of the Community, totaling 96,166⁷⁵, would indirectly benefit from the reduced occurrence of flooding and the protection of local critical health and social services assets, including those providing supportive services and housing to the socially vulnerable populations of the Gravesend and Bensonhurst Community. The project would minimize the vulnerability of key health and social service providers in the Community by reducing service interruptions to these critical services.

In addition, the proposed recommendations—such as an elevated walkway and bike path—could enhance existing community and regional environmental assets by providing expanded public access to the waterfront and connecting open space and recreational assets, including recreational and sightseeing areas along the waterfront. As noted with the first phase of this project, recreational areas could improve air and water quality by filtering air and water pollutants, which would have significant health benefits for the Community. It should also be noted that proposed walkways and bike paths would be ADA-compliant to ensure pedestrian safety and security.

Cost-Benefit Analysis

The most prominent benefit of the overall project is the coastal protection it offers the Community. The *Phase A1a* study has a \$500,000 (low) cost which can lead to exponentially greater benefits if its recommendations are implemented. *Phase A1b* has an uncertain and high cost of \$33 million, and yet could directly protect more than 12,000 residents and 6,626 housing units, nearly 44.5% of which are considered low-income. The full implementation of both phases of the project could protect 6,626 housing units, 130 commercial lots, and 7 industrial lots from 100-year floods at a total market value of more than \$1.26 billion.⁶⁶ In addition, the project would reduce and avoid damage to infrastructure, utilities, highways, and other commercial assets, consequently reducing or avoiding the costs to repair these assets. Service and travel interruptions would be avoided with the implementation of this project, benefiting the Community as well as other users of the infrastructure, highways, and services. These risk reduction benefits are compounded by the added value in quality-of-life resulting from increased waterfront access, pedestrian safety and bicycle amenities, and connectivity among open space and recreation assets. Furthermore, the avoided public health and environmental costs due to improved indoor air quality, water quality, and marine habitat, as well as the benefits to public health resulting from open space and non-vehicular travel, would contribute to the project's benefits. Increases in property values would also occur as a result of the implementation of the project.

Overall, the high costs of implementation of this project overshadow the high benefits that the project provides. The Planning Team however

recommends that the Phase A1a Study of this project be carried out to both provide the Community with a workable framework as well as to gain a deeper understanding of the feasible alternatives. The resulting cost-benefit analysis from the Phase A1a Study would better define the costs and benefits of Phase A1b, which would rationalize its implementation. The Phase A1a Study also includes funding for the public outreach of this project, which may increase awareness and sources of funding for Phase A1b.

Risk Reduction

While the Comprehensive Waterfront Master Plan for Coastal Protection proposed in Phase A1a does not have direct risk reduction benefits, it is a critical first step in accomplishing the risk reduction that could result from the Phase A1b implementation project. By enabling the design of a regional coastal flood protection system that could protect adjacent communities as well as a significant regional transportation asset, Phase A1a could result in indirect risk reduction benefits.

Implementation of the Phase A1a recommendations during Phase A1b would yield significant risk reductions for the southern part of the Community. Phase A1b of this project would protect the Community from a 100-year flood. Figure 4-3 represents the reach of the 100-year flood without the Belt Parkway Berm. In comparison, Figure 4-4 represents the 100-year flood with Sections A, B, C, and D of the project implemented. If the coastal flood protection system implemented in Phase A1b could be certified by FEMA, the project could potentially change FEMA's Flood Insurance Rate Map (FIRM), effectively removing 6,626 households, 130 commercial lots, and

7 industrial lots from the SFHA. Therefore, the implementation of this project would make the Community more resilient to storm surges and extreme high tide events.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

Phase A1a would not require permits; however coordination would be essential with the New York State Department of Transportation (NYS DOT), the New York City Department of Transportation (NYC DOT), the New York State Department of Environmental Conservation (NYS DEC), and the New York State Department of State (NYS DOS). Ongoing coordination between MTA and NYC EDC will help ensure coastal protections are continuous with other flood defense measures in the vicinity. Regulatory permits and approvals that would be required for the Phase A1b implementation include a Federal wetlands permit and approval from the aforementioned City and State agencies.

Jurisdiction

As this project is in the Borough of Brooklyn, the City of New York would have jurisdiction over the project. It is assumed that the recommended projects would be located on public property, under the jurisdiction of New York City (Department of Parks and Recreation and NYC DOT) and New York State (Department of Transportation), as Belt Parkway is a state highway.

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Figure 4-6: Comprehensive Waterfront Master Plan (Project A1): Integrating with a comprehensive coastal protection system for South Brooklyn

A2: Redevelopment of the Bensonhurst Park Tennis Center Site (Proposed)

Project Description

The Committee recognizes that the area around the Bensonhurst Park Tennis Center Site and adjacent areas along Bay Parkway is a significant location in the Community that is currently underutilized. It serves as an access point to the waterfront, Bensonhurst Park, and the Shore Parkway Greenway, and is also a key gateway to the Belt Parkway and the commercial areas along Shore Parkway. This project would provide CDBG-DR funds as an incentive for the City to consider redeveloping this important gateway in a way that will increase the resilience of the waterfront, encourage economic development, improve transportation connections, and serve the greater needs of the Community.

The 4.6-acre site consists of the Tennis Center at Bensonhurst Park and the adjacent parking area along Bay Parkway. The Tennis Center building itself was damaged by Superstorm Sandy and has not reopened. After the storm, the site served as a strategic location where local residents were picked up for transportation to work on reconstruction and recovery projects – and still serves as a meeting place for the local workforce.

The Committee is advocating that a Request for Expression of Interest (RFEI) process be considered for this site by the NYC Parks Department (NYC DPR). The RFEI would be an opportunity for interested groups to propose creative ideas for the long-term redevelopment of this site. It would also be a call for aspirational projects that both create a unique identity for



Bensonhurst Park Tennis Center



Bay Parkway Landing

Figure 4-7: Existing Condition: The Bensonhurst Park Tennis Site



Gravesend and Bensonhurst

Figure 4-8: Rendering of view from Belt Parkway toward Gravesend Bay showing concept



the community and embrace the waterfront as an asset while mitigating future flood risks. This project would commit funding contingent on a commitment of matching funds by private and/or public partners and for Community endorsed programming and uses.

Redevelopment of the Bensonhurst Park Tennis Center Site would create more amenities for residents and could stimulate economic development along the waterfront. By also

incorporating more resilient building design, the project could serve as a model for future waterfront development. The RFEI process would involve continued engagement from the Community in determining the future uses of the site, to ensure that those uses meet community needs. Potential uses could include recreational amenities tied to the Park and Shore Parkway Greenway, retail concessions, or other community uses such as a flexible meeting space and a recreation and/or wellness

center. Figure 4-8 shows a potential result of this project. The Committee suggested that the site incorporate flexible meeting spaces so that it could be a “one-stop” location for activities that would help the Community to recover, including job postings, training workshops, and community organizing. As such, this site could be a potential location for training as part of the Proposed Project: *Community Disaster Recovery Training and Workforce Development Program (D1)*. It could also be used as a central meeting

location for CERT teams and the COAD that could be developed in the proposed project: *Development of a COAD to Create a Community Disaster Recovery Plan (D2)*.

An equally important part of the project will be to identify other improvements at the Bay Parkway Landing. Opportunities may exist to make parking more efficient, and improve safety for drivers and pedestrians alike. There may be landscaping opportunities at the bay to help create a gateway to the waterfront and the adjacent amenities.

The site should also consider flexible areas that can be used for outdoor programming such as community events and green markets. Any redevelopment should incorporate resilient site and building design, which could serve as a model for future waterfront development. Bioswales, permeable pavers, and other green infrastructure should be considered for the site as well as along Bay Parkway. Planning and outreach for this project could be achieved in conjunction with the Proposed Project: *Comprehensive Waterfront Master Plan for Coastal Protection (A1a)* which would also look at recreation, economic, and transportation opportunities along the waterfront.

Cost Estimate

\$200,000

This project is estimated to cost \$200,000, which would serve as an initial investment that could be leveraged against other funding sources to catalyze redevelopment of the site. While this cost cannot be expressed in terms of specific

capital or construction line items, an investment of \$200,000 would be a relatively low cost to the Community yet substantial enough to solicit interested private and/or public partners in an open bidding process. The incentive allotment would come with stipulations that ensure community needs are met when uses are considered for the site.

This project is scalable through the competitive process, based on the responses from interested groups and their capacity to implement the project. While the cost of this incentive is certain, the associated benefits are highly variable depending on the RFEI responses. However, the RFEI process would require community participation and incorporation of resilient design standards as described in the project description above, which provides a baseline for the potential associated benefits described below.

Benefit or Co-Benefits

Environmental Benefits

The Bensonhurst Park Tennis Center building never reopened after Superstorm Sandy, and therefore remains in a damaged state that is potentially hazardous to the environment. Environmental threats could include mold and damaged property inside the building, as well as site contamination. Given the age of the building, lead and asbestos are also concerns. This project would redevelop the site in a manner compliant with all necessary health and safety protocols that would eradicate any mold, lead or asbestos, and other environmental contamination.

Depending on the RFEI responses and capacity to leverage the \$200,000 funding investment, the project could have various environmental benefits. By employing right-of-way bioswales and permeable pavers, the project would absorb stormwater, filtering out pollutants, such as phosphorous. Bioswales can reduce 40% of the phosphorous within the water that they absorb⁶⁷. Improving the quality of stormwater runoff by filtering it through green infrastructure would improve the health of Gravesend Bay, its marine habitat and the species it supports, including two endangered species, the green sea turtle and the leatherback sea turtle.⁵⁸ Vegetated green infrastructure would also benefit air quality, while cooling the surrounding area and reducing energy demand.

Economic Benefits

The funding itself would generate approximately two FTEs⁵⁹. Redevelopment of the Tennis Center and adjoining property would support construction jobs, generating income and economic activity. It would also stimulate economic development in the Community by providing a community space for workforce development. This project could work in conjunction with project D1, Community Disaster Recovery Training and Workforce Development Program, by providing a “one-stop” location for job postings, training workshops, and community organizing. Programs offered at the center could increase job opportunities for the low-wage workforce and other socially vulnerable populations, benefitting the Community’s 25,359 low-income households and 9.8% of workforce that is unemployed. The redeveloped Tennis

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Center could also serve as a resource to the COAD established in project D2, Development of a COAD to Create a Community Disaster Recovery Plan, providing the COAD with a central meeting location throughout the year where the organizations could host training workshops and distribute disaster preparedness information. These services would increase employment rates, which would improve the local economy. Reduced unemployment and higher earnings would increase household spending in the area, growing the economy. In addition to workforce development, the property could be revenue-generating for NYC Parks, through a partnership with a private operator or concessionaire.

Redevelopment of the Tennis Center and adjacent areas along Bay Parkway would provide a resilient, visually appealing community resource and waterfront development. Surrounding property values would increase from these recreation and community amenities and improved views. Increased amenities for residents include a community space, a model resilient waterfront development, additional and connected bikeways, bioswales, and additional wetlands and vegetation. A 2011 Economic Snapshot performed by NYC EDC analyzed property values around three City parks, finding that land values of residential properties increase with proximity to parks, including the increase in land values over time for lower-priced properties, and noting that from 2003 to 2011, property values closest to the parks escalated at a faster rate in lower-priced areas.⁶⁹ Therefore, improving connections among parks and adding green space along the waterfront could increase property values. Community

events, outdoor markets, and/or recreational activities may draw visitors, with increases in visitor spending and economic activity in the area. In addition, increases in private and commercial property values would benefit property tax receipts to local governments.

Health and Social Benefits

This project would have health and social benefits by increasing open space along the Community's shoreline, improving a locally significant recreation facility and providing social services as a community center. This project would benefit the entire population of Gravesend (96,166⁷⁵), as well other nearby neighborhoods that use Bensonhurst Park.

In addition, a potential workforce development and community center could offer programs in various languages to various age groups, and could serve socially vulnerable populations which includes 20,870 residents (23%) who speak English "not well" or "not at all," and approximately 16,145 residents (15.7%) who are over 65 years old⁴⁰. The facility would also be designed to be ADA-accessible, thereby benefitting the approximately 9,176 households (25.6%) with at least one disabled person.

The redeveloped Community use would tie into the Shore Parkway Bikeway and recreational resources at Bensonhurst Park to increase activity of youth and adults within the Community. Potential uses and community programming may also provide health and social benefits, such as a fitness programs with customized offerings for populations with disabilities, a "healthy kitchen," and wellness courses, which

could increase nutrition and fitness, reducing obesity rates.

Cost-Benefit Analysis

This project is a low-cost investment that would allow NYC Parks and/or a private operator to redevelop the site into a productive, revenue-generating facility. Further, this is a minimal investment that could meet dual needs for a resilient community center and hub for workforce development. The project would provide economic benefits through training and workforce development programs, resulting in fewer unemployed residents and a decrease in public assistance spending, benefitting the Community's 25,359 low-income households and 9.8% of workforce that is unemployed. Additional economic benefits of the project would include increased recreational amenities, visitor spending, and sales tax receipts to local and state governments, as well as increased property values within proximity to the watershed development. Direct environmental, health, and social services benefits would add to the positive cost-benefit ratio by improving air and water quality, with associated benefits to public health such as lower rates of respiratory illness, multiplied by the public health benefits of active recreation, health, and wellness programs.

In addition to these potential indirect benefits, this project aims to work in cooperation with other related proposed projects, including A1 Comprehensive Waterfront Master Plan for Coastal Protection and Implementation of Coastal Defenses, D1 Community Disaster Recovery Training and Workforce Development Program and D2 Development

of a COAD to Create a Community Disaster Recovery Plan. Therefore, the benefits noted above would be compounded by the benefits to these related projects.

Risk Reduction

Resiliency upgrades at the Tennis Center site, a locally significant NYC Parks asset, would reduce its vulnerability to future flood damage. Potential surge barriers incorporated in the upgrades to this site would plug the gaps to the western end of the adjoining retail center, thus providing additional protection to key Community assets.

In addition, the redeveloped Bensonhurst Tennis Park Center site could be used to assist in disaster recovery efforts. Resiliency upgrades to the site would make it a safer and more reliable meeting point for both the daily and disaster recovery workforce.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

Implementation of a design plan would require coordination and input from State and Federal agencies. Depending on the location and specifications of implementations recommended within the center, the project would be subject to a regulatory review from a number of City agencies, including the New York City Department of Environmental Protection (NYC DEP), the NYC DOT, and the NYC DCP.

Jurisdiction

As this project is in the Borough of Brooklyn, the City of New York would have jurisdiction over the project. The agency with jurisdiction over this project is NYC DPR, as the Tennis Center is within Bensonhurst Park, as well as the NYC DOT.

A3: Study the Feasibility of a Multi-purpose Pier with Resilient Dock (Featured)

Project Description

During Superstorm Sandy, the Community's transportation network was cut off by inundated roadways, flooding on the N subway line, and tree damage on the D subway line, leaving only the F subway line functioning. Nearby communities such as Red Hook in Brooklyn, the Rockaways in Queens, and Staten Island had emergency ferry service after Superstorm Sandy. Similar emergency ferry service would have increased transportation opportunities for Gravesend and Bensonhurst after the disaster to speed the Community's recovery.

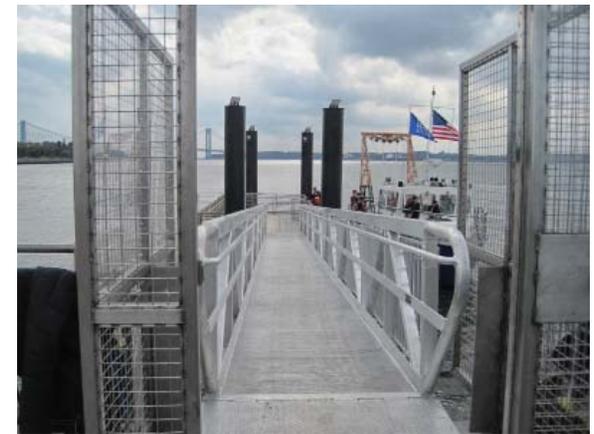
This project would analyze potential sites for multi-purpose ferry service, with the primary goal of emergency transportation during disaster events as well as year-round benefits such as commuter ferry service, economic development opportunities, or recreational access to the waterfront. This project could complement the Citywide Ferry Study Preliminary Report, published in 2013 by NYC EDC, which evaluated potential sites for fast ferry service.

One potential location for a resilient dock is the end of Bay Parkway, where storm surge entered the Community and the adjacent seawall was damaged during Superstorm Sandy. A dock at this location could be constructed in conjunction with a potential seawall-raising project to provide better protection to the upland areas. If feasible, this location near the Bensonhurst Park Tennis Center would also facilitate transportation of local workers after a disaster to other areas in the city.



Bay Ridge Eco-Dock
Source: <http://bayridgejournal.blogspot.com/>

The proposed resilient dock could be accessed by emergency vessels (including regular ferry boats) in the event that other forms of transportation access to affected areas are compromised during or after an emergency. The Community expressed interest in constructing a dock that could be used for recreation throughout the year, thereby increasing waterfront access. The emergency marine transportation service could be operated independently from any scheduled ferry service, but could also be combined with locations proposed for regular commuter or recreational ferry service.



Bay Ridge Eco-Dock
Source: <http://bayridgejournal.blogspot.com/>

Cost Estimate

\$150,000

The project has a low cost (approximately \$150,000). The costs of the project include the following:

- Site identification;
- Demand analysis;
- Alternatives analysis;
- Conceptual engineering and design;
- Conceptual feasibility report;
- Public outreach; and
- Review of potential approvals and permits.

If feasible, the siting, environmental review, design, and construction of a pier would require additional funds. Based on analysis provided in the Citywide Ferry Study, capital improvements for new infrastructure, including a two-slip barge, as well as upland amenities, such as encompass shelters, benches, bike racks and

ticketing machines, and the dock range from \$5 to \$11 million. Costs to operate the service would include fuel, labor, maintenance, lease or depreciation, and insurance administration, and overhead and are generally not solely covered by ridership revenues. External costs to subsidize the ferry service depend on the fare, ridership, and operating costs; viable ferry routes can require subsidies ranging from \$1 to \$4.3 million per year for weekday service. Fast-growing locations on the Brooklyn and Queens waterfront are forecast to generate significant ridership, and can potentially operate with modest public funding support⁷⁰.

Benefit or Co-Benefits

The study itself will only yield indirect economic benefits; however, if a multi-purpose pier is implemented, it will have several benefits for the Community, which could be tied back to the study funded by this project.

Environmental Benefits

Additional ferry service could serve as an alternative transit option for Gravesend and Bensonhurst residents, which could become a preferred mode of transit, reducing automobile use and air pollution. The Red Hook Dock, which provides ferry service from Pier 11 in downtown Manhattan to the IKEA in Brooklyn, provides trips for 387 riders during the weekday⁷⁰. The multi-purpose pier in this project could have a similar model to the Red Hook Dock and provide service to the big-box retail corridor along Shore Parkway. Thus, the ferry service provided by the pier could have comparable automobile diversions and air pollution reductions to the Red Hook ferry.

Economic Benefits

If a multi-purpose, resilient pier were to be implemented as a result of the study, the pier would have significant economic benefits. First, the pier would facilitate the disaster response and recovery process by providing redundancy to the City’s transit system. The pier would be able to provide ferry service soon after disaster events. Emergency ferry service in Staten Island, Red Hook, and the Rockaways helped alleviate the transit disruptions after Superstorm Sandy.⁷¹

Additionally, the ferry service, which would be implemented as a recommendation of this project’s study, would function as an additional transit option to other communities for work or recreation. The addition of an alternative transit mode could decrease travel costs and time for commuters that do not have access to cars or private vehicles. Also, the pier would attract residents and visitors to the waterfront and commercial area, increasing the waterfront’s recreational value and sales tax revenue for the Community.

Subsequent property value increases and waterfront investments could develop as a result of the multipurpose pier. The Citywide Ferry Study observed that residential properties within one-eighth of a mile from a ferry service increased by 8%. In addition, a 4.9% increase in residential and commercial lots was observed within a quarter of a mile from a ferry stop.

Lastly, the study funded by this project would generate three FTEs.⁵⁹ The construction of multi-purpose resilient pier, which may be recommended by the study, could generate 87 FTEs, assuming a project cost of \$8 million.⁵⁹

Health and Social Benefits

The implementation of a multi-purpose pier with a resilient dock would have significant health and social services benefits. During and after an event, the pier would provide waterborne access to resources such as health services and food from neighboring communities. In addition, recovery workers and emergency response personnel could access the Community through the multi-resilient pier. This would significantly benefit the socially vulnerable population in the Community, which includes 25,359 low-income households; 16,145 elderly persons; 21,460 children; and 20,870 non-English-speaking people⁷⁵. This project would provide socially vulnerable populations with an alternate transportation option to help them access to employment and other resources they depend on.

Cost-Benefit Analysis

This project’s study would identify a viable location (if one exists) and conceptual design for a multi-purpose pier, which would provide significant disaster response and recovery benefits as well as additional economic benefits. The benefits of the multi-purpose pier would be tied back to the study, since the study would be the catalyst for the development of the pier.

As noted above, the multi-purpose pier could provide ferry service similar to the Red Hook Dock, given the abundance of commercial activities on the Gravesend and Bensonhurst shoreline. For perspective, the Red Hook Dock provides service to 387 riders during the weekday, although ferries experienced more

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than double their ridership after Superstorm Sandy⁷¹. The multi-purpose pier would add redundancy to the City's transit system and would facilitate the disaster response and recovery process. Socially vulnerable populations would benefit from this redundancy with improved access to resources that they depend on. In addition, ferry service provided by the pier would divert automobile use, reducing air pollution. In addition, The Citywide Ferry Study has observed additional economic benefits with pier development and ferry service, including increased property values, commercial and residential development, and increased visitor spending and sales tax revenues in the area. Similar increases could be expected with the implementation of this study's multi-purpose pier.

Although this project has a low direct cost, the costs to develop the pier and capital investment in ferries and infrastructure (up to \$10 million), as well as the subsidies to operate the ferry service not covered by ridership revenues (could range from \$1 to \$4.3 million per year), would be substantial. It is uncertain if the economic, environmental, and health and safety benefits of the pier and the ferry service would outweigh these project costs.

Risk Reduction

Because this project is a study alone, it would not reduce risk. However, the implementation of a resilient pier—through the recommendation of this study—could reduce risk within Gravesend and Bensonhurst by providing emergency responders and disaster recovery workers access to waterborne transportation

after storm events. Recovery workers and response personnel would be able to access the Community even if other modes of transportation were not available. Finally, depending on where the dock is sited, the dock could tie into raised seawalls, preventing surge from entering into neighboring communities.

Timeframe for Implementation

Immediate (<2 Years)

Regulatory Requirements

No permits should be required for this study. Coordination with City, State and Federal agencies is, however, recommended to inform the recommendations that result from this study.

Jurisdiction

The proposed project would be in Brooklyn and would therefore fall under the jurisdiction of the City of New York.

B1: Analyze Hydrologic and Hydraulic Systems for Improved Stormwater Management (Proposed)

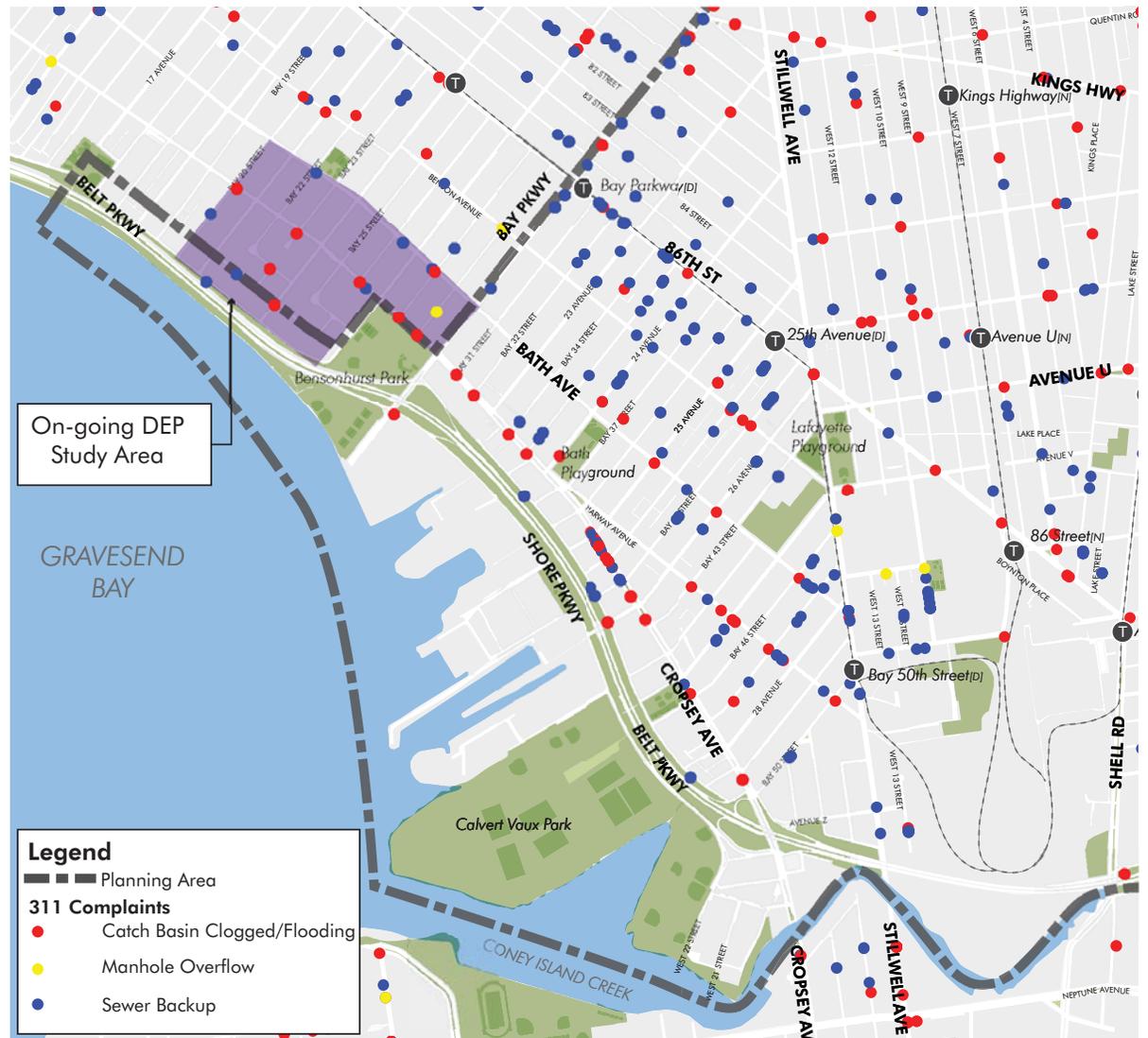
Project Description

The drainage system in Gravesend and Bensonhurst was severely compromised during Superstorm Sandy, causing low-lying residences to experience sewer overflows into their basements. Additionally, the stormwater and sewer systems experience sewer backups during frequent rainstorms and high tides.

This project would perform a high-level analysis of the hydrologic and hydraulic (H&H) systems affecting drainage in the low-lying areas of the Community that experience recurring flooding. The objective is to gain a watershed- and sewershed-level understanding that would provide feasible alternatives to address stormwater inadequacies. This will lead to well-informed stormwater management projects. The study would determine where the runoff is coming from, the amount of runoff, where it is going, and whether the current system is adequate to handle current and future conditions. The study also would identify necessary upgrades to increase system capacity, as well as specific measures to ensure adequate stormwater management and capture (i.e., catch basins, green infrastructure initiatives, etc).

The NYC DEP is performing a H&H study in the area outlined in Figure 4-9. However, the NYC DEP study area is outside the geographic scope of the Gravesend and Bensonhurst NYRCR Planning Area. In addition, NYC DEP previously conducted a water body and watershed facility

Figure 4-9: 311 Complaints regarding sewer backups and clogged catch basins



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Flooding along Belt Parkway

Source: www.bensonhurstbean.com

plan report, in which the Coney Island Creek sewershed was studied. This report, however, does not highlight stormwater drainage inadequacies and remedies. This NYRCR project would fill this gap.

The scope of work for the H&H study would begin with an existing conditions analysis that visually inspects stormwater catch basins, pipes, outfalls, and related infrastructure to assess conditions and elevations. Stormwater outfall flow monitoring would also be conducted. This analysis would be integrated into a watershed analysis that assesses impervious area, land cover, slopes, and soil characteristics as well as land use and ownership. Stormwater network mapping and watershed mapping would be

updated, including the delineation of drainage basins and parameters. This data would be input into a hydrologic model that incorporates long-term precipitation and tidal data to model future conditions including projected land use and sea level changes. An alternatives analysis would be performed to identify existing system deficiencies and recommend both stormwater and tidal-flow best management practices (BMPs), as necessary, to address these issues.

Cost Estimate

\$250,000

The cost of the study is low (approximately \$250,000). The cost of the study includes

a watershed analysis that would result in a stormwater network map; the construction and calibration of a model that would simulate stormwater flow; an alternatives analysis for solutions to solve drainage problems; and a review of potential regulatory approvals and permits.

The uncertainty associated with this project cost is minimal, and no external costs are expected. However, the study is intended to identify specific capital projects, programs, and actions that may be required to mitigate stormwater flooding issues in Gravesend and Bensonhurst. Additional funding would need to be secured for implementation of these recommendations.

Benefit or Co-Benefits

This study alone would not have direct environmental, health, or social benefits. However, the study is necessary to identify BMPs that could resolve flooding issues in the Community. The implementation of these BMPs would lead to benefits, which are therefore considered indirect benefits of the study.

Environmental Benefits

The reduction of stormwater flooding would improve the water quality in Gravesend Bay and Coney Island Creek. Stormwater flooding results in nonpoint-source pollution caused by runoff from roadways, sidewalks, parking lots, and other impervious surfaces.⁷² The 2009 Coney Island Creek Watershed Facility Plan acknowledges water quality impairment in Coney Island Creek and seeks to incorporate cost-effective engineering

solutions with demonstrable positive impacts on water quality, such as increased dissolved oxygen concentrations; decreased coliform concentrations; and expected reductions in the deleterious aesthetic consequences of CSO discharges such as sediment mounds, nuisance odors, and floatables. However, the plan does not cover the entire Community, and while it provides a comprehensive approach to improving water quality, it does not directly pair water quality improvements with reductions in peak stormwater flows. The goal of the Hydrologic and Hydraulic Analysis for Stormwater Management is to build on the recommendations of the Coney Island Creek Watershed plan, including adjacent watersheds, with a greater emphasis on green infrastructure BMPs for both water quality and water quantity benefits. The result would improve water quality in both Gravesend Bay and the Coney Island Creek through proper filtration of stormwater. In addition, the study's recommended BMPs would include green infrastructure, which could also improve air quality.

The H&H Study would also provide a complete understanding of the sewer system. For example, in the southwest region of the Community near Calvert Vaux Park, stormwater drains directly into Gravesend Bay. However, the exact configuration of these stormwater pipes is unknown. The Hydrologic and Hydraulic Analysis would provide insight on the layout of the sewer system, which would provide the framework for future capital projects that would improve the stormwater issues in the Community.

Economic Benefits

The study itself would generate three FTEs for one year. The projects that the study recommends would generate additional jobs through the construction, operations, and maintenance of the BMPs.

Properly designed and sited BMPs would increase the stormwater capacity and improve the stormwater drainage of the Community's sewer system. Improving the functionality of the sewer system and providing additional capacity through green infrastructure would decrease the damages to the sewer and wastewater treatment plant that would be incurred in a flood or storm event. Flood damage costs without any flood mitigation protection for the Coney Island wastewater treatment plant are estimated to be \$85 million with \$350 million in cumulative risks of damages avoided over 50 years.⁷³ These costs could be at least partially offset by this project.

The project would also reduce damages to residences, businesses, and infrastructure caused by flood events, reducing the cost of repairing these damages. By way of comparison, paid insurance claims by the National Flood Insurance Program (NFIP) for the New York City region for Superstorm Sandy through February 2013 were \$750 million, with the average payment of \$54,000.⁷⁴ An improvement to the stormwater drainage would benefit the 38,287 households and 5,378 businesses⁶⁵ within the Community's sewershed. Reduced disruptions to business would allow for continued operations, enabling economic activity, and continued sales, employment, and income generation. Businesses in Kings County generate \$1.9 million

in revenues per year, averaging to \$5,200 per day for each business.⁶² Without improvements in stormwater drainage, business disruptions during and after a flood event would incur lost sales for every day that businesses are closed.

In addition, risk-mitigation may help to offset any property value losses that may occur with the new requirements to obtain flood insurance. The property values of these households would also increase due to improved livability due to decreased flooding during storms, rainfall, and flood events. An increase in property values would result in an increase in property tax revenue for the City. In addition, traffic congestion due to flooding should also decline.

Health and Social Benefits

Stormwater BMPs recommended by this study would improve quality-of-life for the 96,166 people living in Gravesend and Bensonhurst. As stated above, the BMPs recommended by the project would reduce pollution in water bodies and surface water, leading to positive health impacts. Green infrastructure BMPs recommended by the plan would also have benefits on public health. By greatly decreasing the amount of such pollutants with Community-wide green infrastructure projects, health issues associated with poor air quality, such as asthma, would be reduced.⁸¹ By reducing potential damages from floods, the BMPs would also improve the quality of streets and recreational spaces—such as Shore Parkway Greenway, Bensonhurst Park, and Calvert Vaux Park.

The decreased severity and occurrence of stormwater flooding would benefit socially

Gravesend and Bensonhurst

vulnerable populations, who may not have the resources to repair flood damages or may rely heavily on income from businesses that are at risk of flooding. This includes 25,359 low-income households; 16,145 elderly residents; 21,460 children; and 20,870 non-English-speaking people.

Cost-Benefit Analysis

The H&H study would recommend a series of BMPs and green infrastructure solutions, which would yield economic, environmental, and health and social benefits for the Community. The study would highlight aspects of the Community's sewer system that are not well understood. The study would identify vulnerabilities within the Community's sewer system and offer recommendations for implementation projects that would address these vulnerabilities. Potential issues that would be addressed include sewer backups, combined sewer overflows (CSOs), and flooding during and after rain events. The results of the study can provide a framework for the implementation of stormwater infrastructure upgrades, or BMPs, which would mitigate the flooding of homes, businesses, infrastructure, and streets in the Community. The reduced incidences of flooding would reduce repair costs and disruptions for households and businesses, benefiting economic activity, business revenues, income, and employment in the Community. Property values could also increase as a result of the project. The recommended BMPs would also improve air and water quality within the Community, leading to various public health benefits and also provide benefits to socially vulnerable populations.

Although the costs of the recommended BMPs and other stormwater drainage solutions are not known at this time, the benefits that would result from the project, as described above, are also considerable. The results of the H&H study would be a catalyst for these BMPs that would address issues with the stormwater infrastructure system. At this time, it is not known if the benefits of the project would outweigh the cost of its implementation. However, the considerable environmental, economic, and health and social benefits of the project would indicate that the H&H study and analysis be undertaken at a relatively low cost of \$250,000.

Risk Reduction

The H&H study itself would not reduce risk. However, the analysis would provide a better understanding of the critical issues affecting the stormwater system, leading to projects that improve drainage of water during and after rain events. This project would reduce the risk of stormwater flood and sewer backups throughout the Community.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required for the H&H study. Recommendations that result from this study may be impacted by New York City's municipal storm sewer (MS4) permit requirements; therefore coordination is recommended with NYC DEP and the U.S. Environmental Protection Agency (EPA).

Jurisdiction

The proposed project would be in Brooklyn and would therefore fall under the jurisdiction of the City of New York.

B2: Improve Stormwater Drainage Along the Belt Parkway (Featured)

Project Description

Phase I: Belt Parkway Drainage Study

The Belt Parkway suffers from both tidal inundation, as occurred during Superstorm Sandy, and flooding due to rain events, such as during Hurricane Irene. Flooding during rainstorms likely results from inadequate drainage along the Belt Parkway, but a proper drainage study of existing conditions is required to determine exact deficiencies and needs. The drainage study would yield strategies and solutions to alleviate the flooding issues of the Belt Parkway while simultaneously allowing for safe access along this regional transportation corridor during extreme storm events.

This standalone project would conduct a detailed and site-specific drainage study to identify the stormwater drainage issues affecting key flooding “hotspots” on the Belt Parkway from Ocean Parkway to Bay Parkway. Known flooding areas include 21st Avenue to Bay Parkway, 35th Street to 25th Avenue, and Bay 46th Street to Cropsey Avenue. This proposed project would benefit from the implementation of Project B1 (Hydrologic and Hydraulic Analysis for Stormwater Management), which would provide information on the stormwater infrastructure in the Gravesend and Bensonhurst community and a drainage model of the sewer infrastructure.

Figure 4-10: Typical flood locations along the Belt Parkway



Gravesend and Bensonhurst

The scope of work for the study would include visual inspections of stormwater catch basins, pipes, outfalls; elevations and existing

conditions analysis of related infrastructure; and conducting stormwater outfall flow monitoring. A more detailed analysis of

sewer conditions through Closed Circuit Television (CCTV) pipe inspections would also be included as part of the scope.

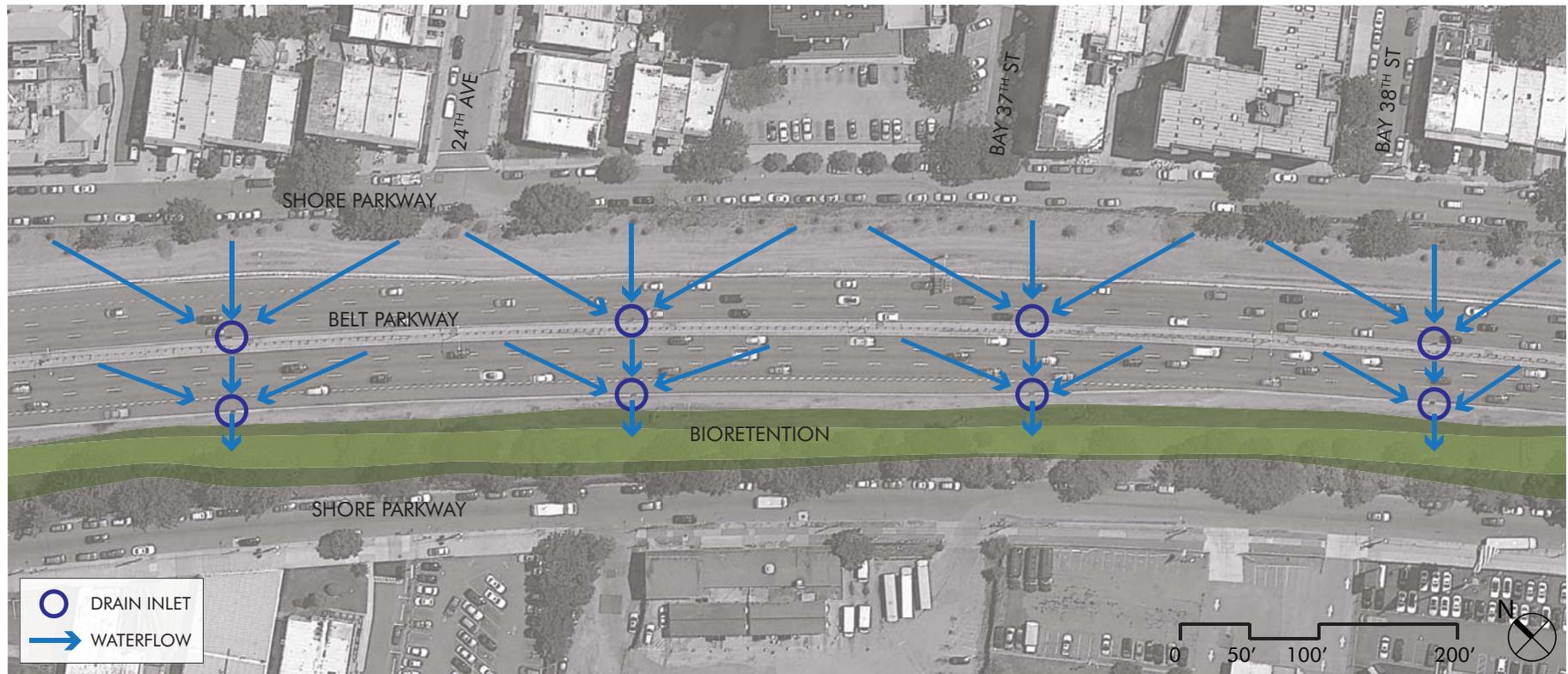
Phase II: Belt Parkway Drainage Improvements

Following the Phase I Belt Parkway Drainage Study, flooding solutions would be further developed and implemented. These may include expanding system capacity, raising the roadway above the 10-year flood level (7 ft. NAVD88), and green infrastructure. Measures identified in the Belt Parkway Drainage Study

would be implemented during this phase. Potential locations for implementation include 21st Avenue to Bay Parkway, 25th Street to 25th Avenue, and Bay 43rd Street to Cropsey Avenue. The scope of work for Phase II would include the preparation of construction documents, bidding and contracting, and construction.

A potential project for the implementation phase of this project is to construct 1,800 feet of vegetated bioswales in the green space between the Belt Parkway and Shore Parkway (see Figure 4-11). The site is an ideal location because of the frequent flooding experienced during and after typical rain events. The bioswales would retain water during these events, decreasing the strain on the drainage system.

Figure 4-11: Belt Parkway Drainage Improvements



NY Rising Community Reconstruction Plan

communities serviced by this key arterial. The projects would also result in benefits to properties along the Belt Parkway. The potential project shown in Figure 4-11 is referenced in the Cost, Benefit or Co-Benefits, and Cost-Benefit Analysis sections; however, a different drainage improvement may be recommended during the study phase of this project. Although the exact elements of the presented project is not guaranteed, it is referenced within the following sections to show the relative magnitude of this project's impacts.

Economic Benefits

The study phase (Phase I) of this project would generate four FTEs for a year. The implementation phase (Phase II) of this project would generate nine FTEs over the life of the project. The operations and maintenance of the potential implementation project would generate another nine FTEs over 25 years.⁵⁹

In addition to these direct economic benefits, the alleviation of street flooding during rain events would generate multiple economic benefits. Based on the proposed project specifications, the Phase II mitigation measures would prevent 0.29 million gallons of stormwater runoff per year from entering the sewer system, which represents 40% of the rainfall within the local drainage area.

By providing increased stormwater storage capacity, alleviating local street flooding, and reducing travel disruptions during storm events, the project would potentially:

- Allow businesses to continue uninterrupted operations, thereby benefiting business sales,



Flooding of Belt Parkway

Source: www.sun-tec.blogspot.com

Cost Estimate

Phase I: \$400,000

The cost of the Phase 1 study is \$400,000, which includes an existing condition analysis that investigates the stormwater infrastructure near and on the Belt Parkway, the development and calibration of a hydrology model, an alternatives analysis of various drainage improvements, and a review of potential regulatory approvals and permits. Uncertainty related to cost is relatively low for this project, which has limited external costs because it does not involve construction.

Phase II: \$800,000

The cost of implementing the potential project identified as Phase II above is moderate

(approximately \$800,000). This cost includes the preparation of construction documents, the construction of the potential project shown in Figure 4-11, and the receipt of regulatory approvals and permits. The construction of the drainage improvements would result in short-term air and noise impacts to residences and commercial properties in the surrounding area in addition to temporary traffic disruptions. The operations and maintenance of this project would cost \$800,000 over the span of 25 years.

Benefit or Co-Benefits

This study and subsequent implementation would result in local benefits to the Gravesend and Bensonhurst Community as well as public benefits to the Belt Parkway and other Brooklyn

Gravesend and Bensonhurst

income, and economic activity in the region;

- Improve the access for emergency responders, decreasing response times, reducing the costs of disaster response, and providing more services to individuals and households, including vulnerable populations;
- Reduce road repair costs from recurring flooding damages to the roadway;
- Mitigate traffic congestion along the Belt Parkway (the high-use road transports an average of 140,000 vehicles daily) that occurs when the road regularly floods thereby reducing social and economic impacts to the region; and
- Reduce flood damage and associated repair costs to nearby homeowners and businesses.

In addition, the project would capture a portion of the volume of debris and garbage that currently enters the sewer system, reducing the clogging of drain system and sewer maintenance cost.

The project would also capture sunlight, reducing the urban heat island effect that leads to higher temperatures in urban areas due to the lack of vegetative surface. The reduced temperatures would result in energy savings, including approximately \$2,000 in energy savings resulting from the 10,000 square feet of bioswales.⁷⁶

Additionally, the project would include bioswales, trees and vegetation, which could provide recreational and aesthetic value to nearby property owners, increasing nearby property values. The improved air and water quality, and mitigated floods due to the potential project could also lead to an increase in property

values near the project area. Property nearby green infrastructure is reported to increase by up to 5%.⁷⁷ For the potential implementation project, this would result in an approximate \$1.3 million increase in the total assessed value of commercial and residential properties near the project area.⁷⁸

Environmental Benefits

As stated in the Benefits section for Project B1, an understanding of the sewer system layout near Calvert Vaux Park, including a part of the Belt Parkway, is incomplete. The Phase I study of this project would provide detailed insight into the configuration of the stormwater system in this area. This insight would provide the framework for capital projects that would improve the drainage on Belt Parkway, such as green infrastructure implementations or sewer pipe expansions.

The implementation phase of the project would have significant environmental benefits. The implementation of a drainage project would mitigate stormwater floods along the Belt Parkway. The project would allow stormwater to collect pollutants from the street that would otherwise be discharged into Gravesend Bay. In addition, bioswales would reduce 40% of phosphorus within the water that they absorb, thus, improving the water quality in the nearby Gravesend Bay. The ecosystem within the bay would benefit from the improved water quality, including two endangered species, the green sea turtle and the leatherback sea turtle.⁵⁸

In addition, if included within the implemented project, green infrastructure would improve air quality. For example, the bioswales in the potential project would annually remove 2.36 pounds of ozone, 1.76 pounds of particulate matter with a diameter of 10 micrometers or less (PM-10), 1.71 pounds of nitrogen dioxide (NO₂), 0.97 pounds of sulfur dioxide, and 0.4 pounds of carbon monoxide (CO).⁷⁹

Health and Social Benefits

The implementation project would reduce the flood risks that lead to accidents and traffic congestion along the Belt Parkway.⁸⁰ Proper drainage and storm water management would improve air and water quality, also leading to significant health benefits such as reduced occurrences of asthma.⁸¹ In addition, the study would increase public awareness about stormwater flooding solutions within the Community, educating homeowners, business owners, and public officials in the process. As a pilot project that informs property owners and agencies on how to locally minimize the magnitude of flood damages, green infrastructure projects could be elevated in the Community. .

Cost-Benefit Analysis

The Belt Parkway drainage study (Phase I) would require approximately \$400,000 in funding. The implementation phase (Phase II) is a capital project that requires approximately \$800,000 in funding. Both projects will create 13 FTE jobs during the project duration, while the ongoing operations and maintenance of the project (not support by this funding) would

create nine FTE jobs. The construction and project implementation of Phase II would also cause temporary impacts to air quality, noise, and traffic, which would be considered an additional cost of the project.

While Phase I of the project will not have direct benefits, Phase II has considerable benefits and requires the study phase to be implemented prior to beginning phase II. The study will be a catalyst for the implementation of drainage improvements along the Belt Parkway by analyzing the feasibility and appropriateness of alternatives, modeling the benefits of the alternatives, and analyzing their cost-benefit to determine a recommended approach.

The benefits of the implementation phase would be the improvement of stormwater drainage and the increase of stormwater capacity along the Belt Parkway, mitigating flooding on the highway during heavy rain events. The mitigation of stormwater flooding would decrease traffic congestion, reduce road repair costs, and improve water quality in Gravesend Bay. The project could also reduce the risks of flooding to residences and businesses in the project area, reducing repair costs, evacuation costs, and reducing disruptions during and after storm or rainfall events. If green infrastructure is implemented, the project could have additional benefits, such as increased property values of nearby residential and commercial properties (\$1.3 million), improved air quality, and energy savings (\$2,000) as a result of the reduced urban heat island effect. Mitigating recurring flooding on the Belt Parkway would reduce the number of accidents and traffic disruptions, providing health and economic benefits for

travelers, homeowners, and businesses in the area. Emergency response times during disaster events could also benefit from this project.

This project's costs are likely outweighed by its many benefits. The Planning Team recommends that the Phase I study be conducted to gain an understanding of potential implementations for Phase II. This understanding will provide a more thorough cost-benefit analysis of the drainage improvements along the Belt Parkway.

Risk Reduction

The drainage study itself would not reduce risk. However, the implementation of the recommendations of the study would improve the drainage and stormwater capacity along the Belt Parkway, which would reduce the scale and quantity of floods during and after rain events. The Belt Parkway asset would have its vulnerability score reduced by 1, making it a safer and more reliable form of transportation. Having a safe and reliable transportation corridor would help emergency responders to function unhindered, allow Community members to efficiently move in and out of Gravesend and Bensonhurst, and reduce costs of infrastructure maintenance.

Timeframe for Implementation

Phase I: Immediate (< 2 years)

Phase II: Intermediate (2-5 years)

Regulatory Requirements

Phase I: No permits should be required for the Phase I study. Coordination with City, State and Federal agencies is, however, recommended to inform the recommendations that result from this study.

Phase II: Permits may be required by the NYS DOT, NYC DOT, NYC DEP and the NYS DEC.

Jurisdiction

The proposed projects would be in Brooklyn and would therefore fall under the jurisdiction of the City of New York. Various City and State entities may have jurisdiction over the projects.

B3: Improve Stormwater Drainage along Cropsey Avenue (Proposed)

Project Description

Phase I: Cropsey Avenue Drainage Study

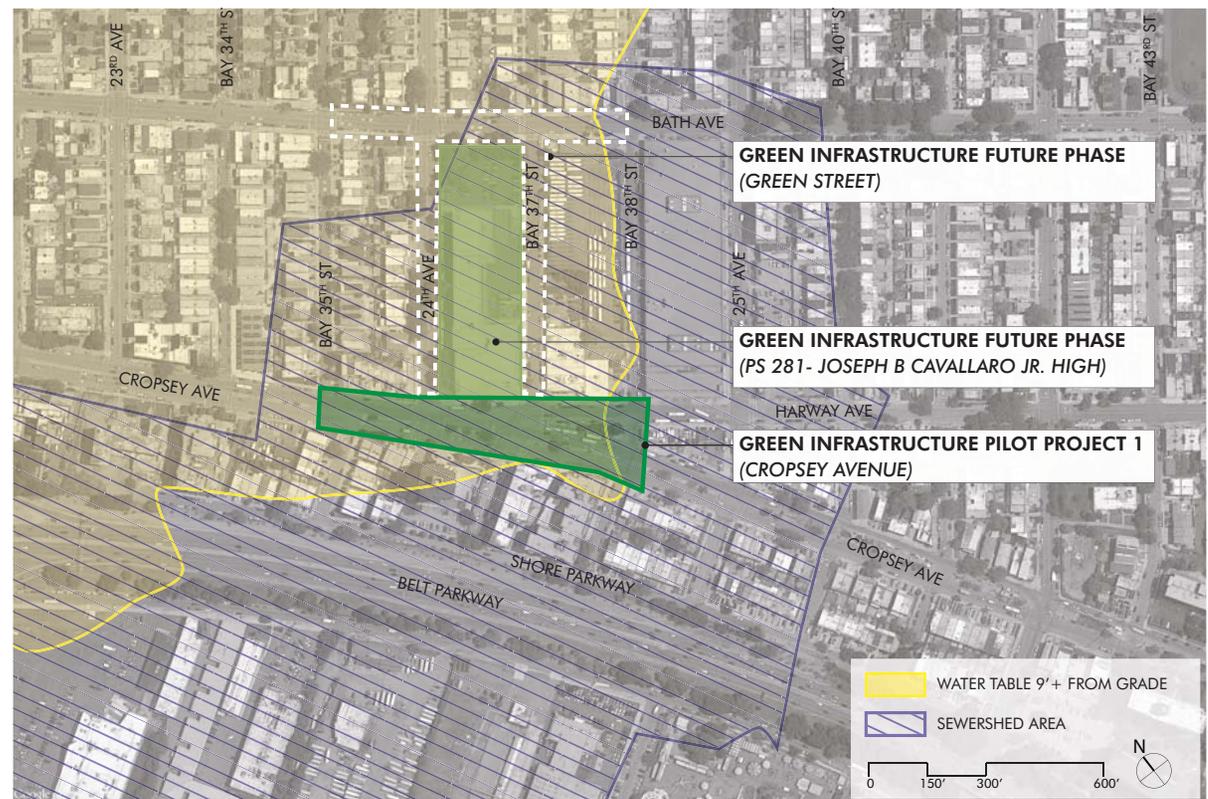
Cropsey Avenue suffers from both tidal inundation and flooding from stormwater runoff. Segments of the roadway were inundated during both Superstorm Sandy and Hurricane Irene, and experience recurring flooding during less extreme weather events. Since 2012, New York City’s 311 data shows that there have been numerous complaints of flooding along Cropsey Avenue from Bay 38th Street to Bay 49th Street, as well as clogged catch basins and sewer backups along the entire length of Cropsey Avenue. Flooding during rainstorms likely results from inadequate drainage or maintenance along Cropsey Avenue, but a proper study of existing drainage patterns is required to determine exact deficiencies and needs. This drainage study would identify ways to alleviate the flooding along Cropsey Avenue during rainstorms and lower the severity and frequency of sewer backups in the area.

This study would conduct a site-specific drainage study to identify the stormwater drainage issues affecting areas of recurring flooding along Cropsey Avenue from Bay 38th Street to Bay 49th Street. This project would benefit from the implementation of Project B1 (Hydrologic and Hydraulic Analysis for Stormwater Management), since Project B1 provides information on the stormwater infrastructure and a model that can simulate drainage.

The scope of work for the study would begin with an existing conditions analysis that visually inspects stormwater catch basins, pipes, outfalls, and related infrastructure to assess condition and elevations, and conducts stormwater outfall flow monitoring. It would also conduct a more

detailed analysis of sewer conditions through CCTV pipe inspections. This will be integrated into the watershed analysis performed in Project B1 that assesses impervious area, land cover, slopes, and soil characteristics as well as land use and ownership. Stormwater network

Figure 4-12: Green Infrastructure Siting Criteria and Options at Cropsey Avenue



mapping and watershed mapping will serve as inputs into the hydrologic model developed in Project B1 and calibrated to the existing conditions on Cropsey Avenue, then the model

will be run with long-term precipitation and tidal data to model future conditions. An alternatives analysis will be performed to identify existing system deficiencies and recommend both

stormwater and tidal-flow BMPs, as necessary, to address these issues.

Phase II: Cropsey Avenue Drainage Improvements Pilot Project

The Phase I Cropsey Avenue Drainage Study would evaluate potential solutions to chronic problems, such as expanding system capacity and employing green infrastructure BMPs. Measures identified in the drainage study will be implemented in Phase II.

One goal of the project would be to replace impervious pervious surfaces on Cropsey Avenue with green infrastructure improvements, which use a

natural-systems approach to manage stormwater, reduce flows, improve water quality, and enhance watershed health. Green infrastructure would absorb stormwater during rainstorms, relieving the pressure on the drainage system. This stormwater would then be slowly released back into the drainage system after the rainstorm. Cropsey Avenue is a wide street and has a raised median, factors which present opportunities for green infrastructure improvements.

While the Phase I study would determine the exact locations for system improvements, the NYRCR Plan provides a discreet potential project at the intersection of Cropsey Avenue and Harway Avenue (near Joseph B. Cavallaro Junior High School) for green streets improvements in order to illustrate potential costs and benefits. This is the location of several NYC Transit bus stops (#B3, B6, B82, X28, and X38) as well as an entrance to a nearby bus depot. As such,

Figure 4-13: Integrated Green Infrastructure for Stormwater Management

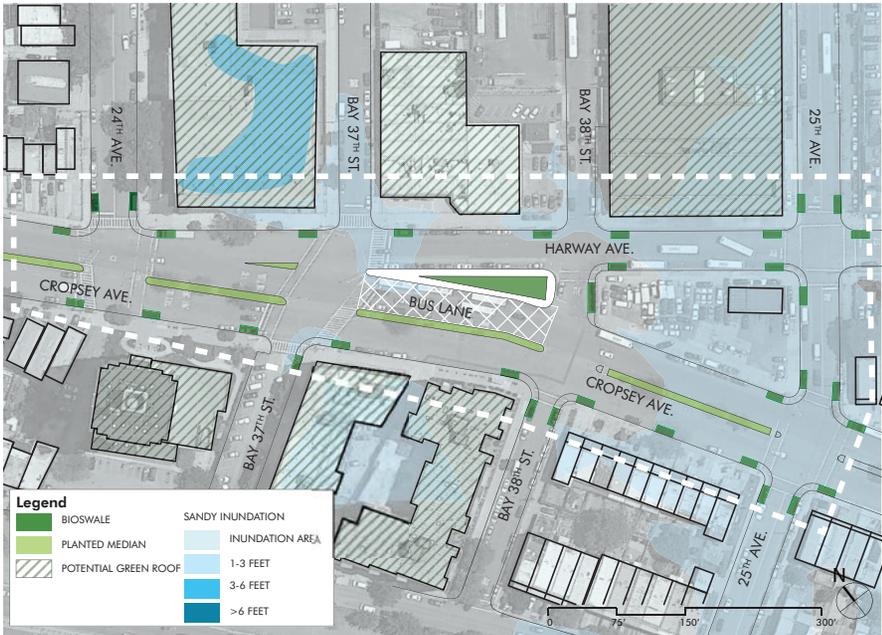


Figure 4-14: Potential Green Infrastructure Project at PS 281



Gravesend and Bensonhurst



Figure 4-15: Pilot Project - Green Infrastructure Improvements along Cropsey Avenue

addressing flooding in this location will have the co-benefit of improving access to transit.

A planted median at this location could be installed on the traffic island to capture stormwater from the adjacent sidewalk, and right-of-way bioswales (e.g., stormwater street trees and vegetated swales) could be installed along Cropsey Avenue and Harway Avenue.

Cost Estimate

Phase I: \$300,000

The cost of the study phase (Phase I) of the project is low (approximately \$300,000). This cost includes an existing condition analysis that investigates the stormwater infrastructure on Cropsey Avenue, the construction and calibration of a hydrology model, an alternatives analysis of various drainage improvements, and a review of potential regulatory approvals and permits.

Phase II: \$800,000

The cost of the implementation phase (Phase II) of the project is medium (approximately \$800,000). This cost includes the preparation of construction documents, the construction of the potential project shown in Figure 4-12, and the receipt of regulatory approvals and permits. The construction of the drainage improvements would result in short-term air and noise impacts to the surrounding area, which is occupied by residential and commercial tenants, as well as temporary traffic disruptions. The operation and maintenance of the project would cost approximately \$580,000 over the span of 25 years (not directly provided by the project funding).



Figure 4-16: Existing Condition at Cropsey Avenue



Cropsey Avenue Existing Conditions: Wide street with excessive impervious area

Gravesend and Bensonhurst

Benefit or Co-Benefits

Economic Benefits

The proposed study phase (Phase I) of this project would generate three FTEs. The implementation (Phase II) of this project would generate nine FTEs, while the operations and maintenance of the potential project would generate six additional FTEs over the span of 25 years.⁵⁹

The potential project would reduce the amount of stormwater from entering the sewer system, reducing the frequency and severity of flooding and sewer backups, reducing the cost of repairing these damages caused from these floods. The potential green street project would absorb 0.68 million gallons of rainfall runoff per year, which represents 5% of the rainfall within the local drainage area. The reduction of rainwater within the sewer system would reduce the occurrence and severity of stormwater floods on Cropsey Avenue. This would decrease traffic congestion and reduce road repair costs as a result of the floods. In addition, home repair costs and the loss of assets would decrease for the 427 residential units within the managed tributary area. Flooding risks would be reduced to the 427 residential housing units in the project area, with a market value estimated to be \$97.3 million.

Due to reduced flooding risks and improvements in aesthetics and viewsapes, property values near the project area are also likely to increase. Green infrastructure implementation was found to increase the values of nearby property by up to 5%.⁶⁹ This would lead to a maximum of a \$3 million increase in the total market values of nearby properties, which includes properties

outside the managed tributary area.¹⁰⁷

Environmental Benefits

The study phase (Phase I) of the project would provide insight into the stormwater infrastructure in the Cropsey Avenue area. The configuration of the stormwater system within the Community is not known, which limits the development of solutions for the Community's stormwater issues. The insight that the study provides would lay the foundation for implementable solutions, such as green infrastructure implementations or stormwater infrastructure upgrades.

The implementation phase (Phase I) of the project would also have significant environmental benefits. The proposed potential project, by using green infrastructure, would absorb stormwater, filtering out pollutants, such as phosphorus and nitrogen. Green infrastructure would remove phosphorus from stormwater runoff, which ultimately ends up in Gravesend Bay. Excess phosphorus is known to reduce oxygen levels in water bodies, harming the water body's ecosystem. The proposed sample project includes bioswales which would reduce total the phosphorus and nitrogen load by 5 percent.⁸² In addition, the project would reduce the effluent concentration of total phosphorus and nitrogen by an estimated 3 percent and 5 percent, respectively.⁶⁷ Thus, the implemented project would improve the water quality in Gravesend Bay, where stormwater from Cropsey Avenue is discharged. As a result of the improved water quality, the ecosystem within the bay would benefit as well. The bay includes two endangered species, the green sea turtle and the leatherback sea turtle.⁵⁸



*Flooding of Cropsey Avenue at 25th Avenue
Source: www.sheepsheadbites.com*

The green infrastructure would also improve air quality. For the potential implementation project, the green street would annually remove 0.86 pounds of ozone, 0.62 pounds of particulate matter with a diameter of 10 micrometers or less (PM-10), 0.61 pounds of nitrogen dioxide (NO₂), 0.34 pounds of sulfur dioxide, and 0.14 pounds of carbon monoxide (CO).⁷⁹ In addition, the reduced energy demand as a result of the green infrastructure would lead to air pollution reductions at the power plant.

Health and Social Benefits

As a result of the environmental benefits listed above, the health of Community members would improve. For example, green infrastructure is known to decrease the occurrence of asthma within nearby residents⁸¹ through the improvement of air quality. In addition, improving water quality within Gravesend Bay would reduce the health impacts of those that come into contact with the water.

In addition, the decrease in the occurrence and severity of stormwater floods would increase the livelihood of residents and decrease the interruption of service of businesses near Cropsey Avenue. This would benefit socially vulnerable populations, who may have limited access to repairing their home or rely heavily on these businesses for income. Within the Cropsey Avenue area, there are 1,122 low-income households, 843 elderly residents, and 517 non-English speaking individuals.⁴¹

Cost-Benefit Analysis

Phase I study of this project would require approximately \$300,000 in funding. Phase II implementation has a higher cost, requiring approximately \$800,000 in funding to carry out the drainage solutions. Both projects will create 12 FTE jobs during the project duration, while the ongoing operations and maintenance of the project (not supported by this funding) would create 6 FTE jobs. The construction and project implementation of Phase II would also cause temporary impacts to air quality, noise, and traffic, which would be considered an additional cost of the project.

While Phase I of the project will not have direct benefits, the benefits of the drainage solutions recommended for Phase II would be considerable. The benefits of Phase II include the mitigation of stormwater floods along Cropsey Avenue, reducing costs of road repairs and flood damages to nearby residential and commercial properties, decreasing traffic congestion in the area, supporting the economic growth of businesses near Cropsey Avenue. Flooding risks would be reduced to residential properties in the

project area, with a market value estimated at \$97.3 million. In addition, the implementation of green infrastructure would improve air quality in the Community, would improve the water quality in Gravesend Bay, lead to additional energy savings, and result in increased property values of surrounding properties.

The environmental, economic, and health and safety benefits of this project are considerable and likely outweigh the Phase I and Phase II costs. However, without a better understanding of the solutions recommended under Phase II (which will be developed in Phase I), it is difficult to quantify specific benefits. The Planning Team recommends that the Phase I study be conducted to gain an understanding of potential implementations for Phase II. This understanding will provide a more thorough cost-benefit analysis of the drainage improvements on Cropsey Avenue.

Risk Reduction

The drainage study itself will not reduce risk. However the implementation of the BMPs recommended in the study would improve drainage on Cropsey Avenue. Improved drainage would decrease the occurrences of sewer backups and floods during rain events on Cropsey Avenue. This would reduce a significant amount of risk since the street's low elevation makes it a hotspot for sewer backups.

Reducing the risk of sewer backups has the potential to benefit the 1,827 residential units and 64 commercial lots within the vicinity of Cropsey Avenue. In addition, businesses on Cropsey Avenue would experience decreases

in disruption of service. Cropsey is also an important transportation corridor as it connects the neighborhood to Coney Island. In 2012, average daily traffic was over 15,000 cars per day.⁸³ A reduction in sewer backups would improve transportation conditions and will reduce the damage to the roads that the backups cause.

Timeframe for Implementation

Phase I: Immediate (< 2 years)

Phase II: Intermediate (2-5 years)

Regulatory Requirements

Phase I: No permits should be required for the Phase I study. Coordination with City, State, and Federal agencies is, however, recommended to inform the recommendations that result from this study.

Phase II: Permits may be required by the NYC DOT, NYC DEP and NYS DEC.

Jurisdiction

The proposed projects would be in Brooklyn and would therefore fall under the jurisdiction of the City of New York. Various City and State entities may have jurisdiction over the projects.

B4: Implement Green Infrastructure Pilot Project in Combined Sewer Area (Featured and Proposed)

Project Description

B4a: Green Infrastructure Siting Analysis (Featured)

With a comprehensive approach to the combined sewer area, this project is intended to develop a framework as well as to site all potential locations for scalable green infrastructure implementation projects on public or non-profit property (i.e., school or library and public rights-of-way) strategically located to intercept stormwater before it reaches the combined sewer system. Green infrastructure BMPs to be employed may include right-of-way bioswales, green or blue roofs, rain gardens, or porous pavement. Site selection would correspond to the NYC DEP and NYC DOT guidelines for green infrastructure implementation in coordination with the most suitable sites as identified by geotechnical analysis, characteristics of the sewer system, and surrounding context.

The scope of work for Project A includes an existing information review and desktop siting analysis utilizing available GIS data and aerial photographs. Further site investigation will be conducted as necessary. Engineering and design plans would be developed for the recommended locations for green infrastructure best management practices.



PS 261 Brooklyn Green Infrastructure
Source: www.siteworkscm.com



Green Roof at Sidwell Friendship School Washington DC
Source: www.asla.org

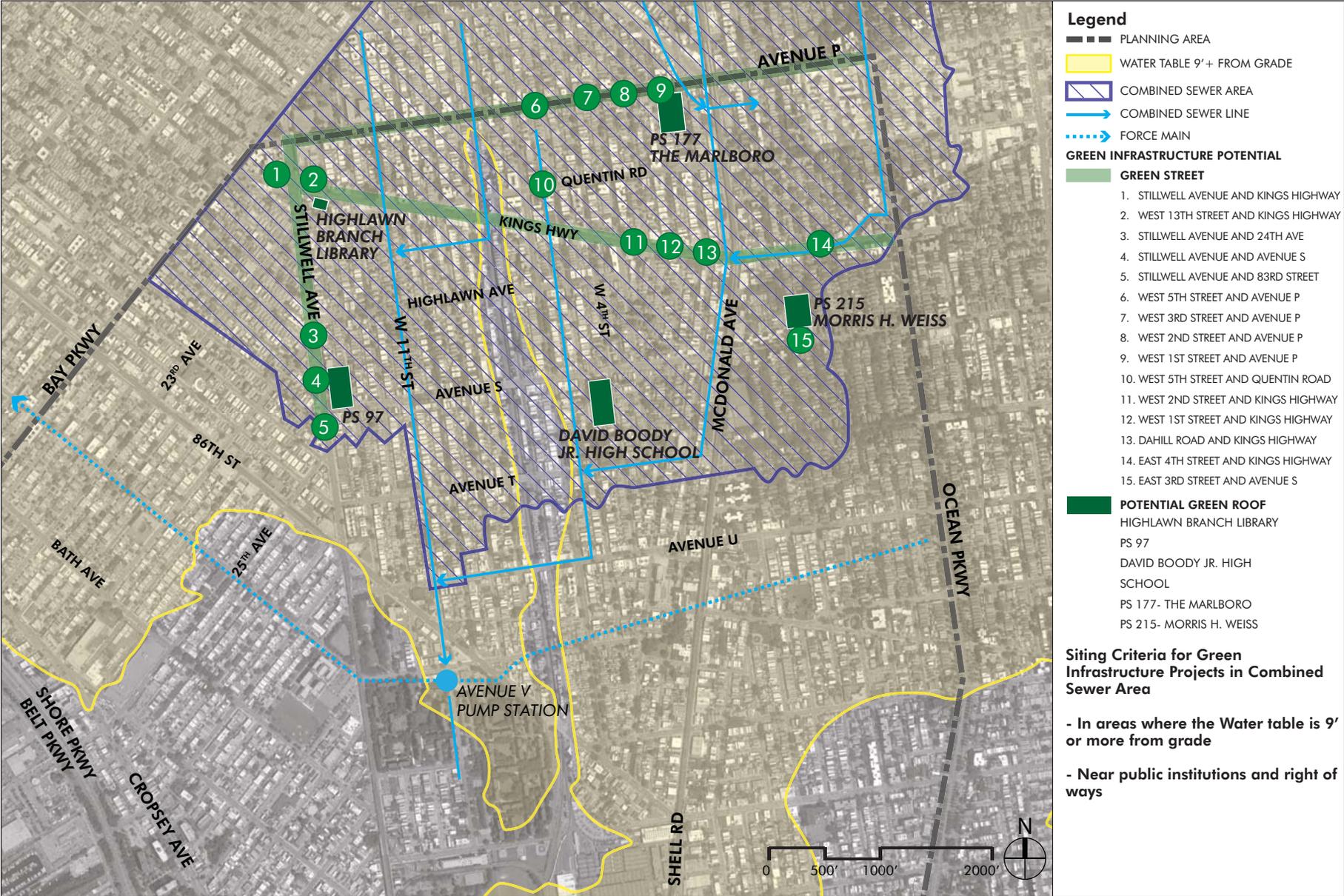


Edible Schoolyard at PS 216
Source: www.inhabitat.com



Bioswale (New York City)
Source: NYC DEPh

Figure 4-17: Potential Green Infrastructure Locations in Combined Sewer Area



Gravesend and Bensonhurst

B4b: Green Infrastructure Pilot Project in Combined Sewer Area (Proposed)

Project B4b (Pilot Project) would implement a chosen green infrastructure pilot project on roadways and/or public and non-profit property, to demonstrate the application of green infrastructure in the Community. This project would focus on the combined sewer area in the northwest portion of the Community, to reduce stormwater entering the combined system north of the Avenue V Pumping Station. As part of the NYRCR Program, a preliminary field investigation was conducted for pilot project locations within the combined sewer area along 10 roadways. Figure 4-16 below identifies these potential locations for right-of-way bioswales.

Figure 4-18 includes a graphic for a sample pilot project at PS 97. The project features a 3,000-square-foot green roof, 8,500 square feet of permeable pavement, and 3,500 square feet of bioswales. The green roof could also serve as an educational opportunity for the students. Overall, this combination of green infrastructure would provide a cost-efficient stormwater management project. The goal of the project would be to decrease the amount of stormwater that enters into the sewer, mitigating stormwater floods and combined sewer overflows (CSOs) into Coney Island Creek.

This pilot project could be closely monitored, testing the effectiveness of green infrastructure projects within the Community. Success of the pilot project would encourage stakeholders and property owners to implement additional green infrastructure projects throughout the Community.

Figure 4-18: Green Infrastructure Pilot Project at PS 97 on Stillwell Avenue



Cost Estimate

B4a (Study): \$200,000

Project A would have a low cost (approximately \$200,000). The project would include an existing condition analysis of various green infrastructure sites, the development of engineering and design conceptual plans, an analysis on the conceptual alternatives, and the review of any potential regulatory approvals and permits.

B4b (Pilot Project): \$700,000

The pilot project would have a medium cost

(approximately \$700,000). It should be noted that the cost of B4b would differ depending on the green infrastructure implemented. Thus, a project differing from the sample project described above may have a different cost. The operations and maintenance of the sample project (not included in this project's funding) would cost \$1,000,000 over the span of 25 years. The project would include the preparation of construction documents, the receipt of regulatory approvals and permits, and construction of the green infrastructure. It should be noted that this project is scalable and any of the green infrastructure elements can be reduced or increased in size to manipulate

the cost of the project as necessary. The construction of green infrastructure would have short-term air, noise, and traffic impacts on the surrounding area.

Benefit or Co-Benefits

Economic Benefits

B4a (Study):

This project would generate two FTEs. In addition, the siting analysis would provide the framework for the development of a green infrastructure project, which would have additional economic benefits. These economic benefits will be equivalent to those provided in Project B.

B4b (Pilot Project):

The sample project would generate 11 FTEs, and the operations and maintenance of the green infrastructure would generate an additional 11 FTEs⁵⁹ over the span of 25 years. The resulting green infrastructure system would reduce the amount of stormwater runoff ultimately entering the sewer system. The potential project shown above would decrease the annual runoff by 0.47 million gallons (MG), which represents 29% of the rainfall within the project area. Reducing the amount of stormwater that enters the sewers would decrease the occurrences and severity of stormwater floods and sewer backups—since wastewater and stormwater sewer pipes are combined within the project area. This would reduce the cost of maintaining and capital costs of upgrading the sewer system. Flood damage costs without any flood mitigation protection for

the Coney Island wastewater treatment plant are estimated to be \$85 million with \$350 million in cumulative risks of damages avoided over 50 years.³² These costs could be at least partially offset by this project. In addition, the cost of repairing roads damaged from the floods and cleaning after sewer backups would be reduced.

Improving the functionality of the sewer system and providing additional stormwater capacity through green infrastructure would decrease the damage to residences, businesses, and infrastructure caused by flood and storm events, reducing the cost of repairing these damages. By way of comparison, paid insurance claims by the NFIP for the New York City region for Superstorm Sandy through February 2013 were \$750 million, with the average payment of \$54,000.⁹⁰ The project would reduce the flooding risks to 54 residential units and 7 commercial and mixed use parcels commercial in the project area, with an estimated market value of \$7.4 million.

Green infrastructure would also increase the property values of surrounding properties. Green infrastructure is known to have a 5% increase on parcels surrounding the green infrastructure site. For the sample project, the green infrastructure results in a maximum of \$1.68 million increase in market value⁸⁴. Increases in property values would also increase property tax revenue for the City.

In addition, the implementation of green infrastructure would reduce the urban heat island effect. The decrease in temperature due to the green infrastructure in the potential project could lead to \$2,900 in energy savings.⁵⁷

Environmental Benefits

B4a (Study):

The project would not have environmental benefits. However, this project would site and design green infrastructure projects, which would encourage stakeholders to implement the designed projects. Once implemented, the potential green infrastructure project would have environmental benefits equivalent to those provided in Project B.

B4b (Pilot Project):

As stated above, the project is within the CSO sewershed, in which the wastewater and stormwater sewer pipes are combined and ultimately discharge into Coney Island Creek during CSO events. The CSO is discharged at outfall OH-021, which is located just west of the Stillwell Avenue-Coney Island Creek Bridge. This 240-inch outfall discharges approximately 261.3 MG of CSO per year. CSO events in the Coney Island Creek have impaired its aquatic health and recreational use.⁸⁵ Currently, Coney Island Creek is not classified as an appropriate bathing water body because of its water quality.⁸⁶ The green infrastructure in this project would reduce the amount of stormwater runoff at the project site, decreasing CSOs at Coney Island Creek. Reducing CSOs at Coney Island Creek would improve the health of its ecosystem and improve its recreational use. Coney Island Creek is connected to Gravesend Bay, which includes two endangered species, the green sea turtle and the leatherback sea turtle, that will benefit from the reduced CSOs.⁶⁸

Gravesend and Bensonhurst

In addition, green infrastructure projects reduce the amount of phosphorus—that cause reduced oxygen levels—entering Coney Island Creek. The runoff from the pollutant-generating portions⁸⁷ of the site would have a reduced total phosphorus and total nitrogen concentration by 25 and 39 percent, respectively.^{79,82}

This project would also improve the air quality in the surrounding area. The sample project would annually remove 9.69 pounds of ozone, 5.2 pounds of particulate matter with a diameter of 10 micrometers or less (PM-10), 3.83 pounds of nitrogen dioxide (NO₂), 7.08 pounds of sulfur dioxide, and 2.78 pounds of carbon monoxide (CO). The green infrastructure would also reduce the urban heat island effect, resulting in a decreased energy demand and associated air pollution reductions.

Health and Social Benefits

B4a (Study):

Project A would not have any direct health and social benefits. However, the project would provide the framework for a green infrastructure project that would provide health and social benefits equivalent to those described for Project B below.

B4b (Pilot Project):

The elements of green infrastructure within Project B would have several health and social benefits. By improving water quality within Coney Island Creek, health impacts for those that come into contact with the water would be reduced. Improved air quality would benefit those living near the green infrastructure

project. Improved air quality is known to reduce health risks, such as asthma.⁸¹ The project would provide educational benefits, curricula and learning opportunities about stormwater management through green infrastructure, such as green or blue roofs or rain gardens in schools and parks.

In addition, the reduction of sewer backups and stormwater flooding would improve the livelihood of those living or working within the sewershed. The affected sewershed includes both the combined sewershed and the separated sewershed, for a total of 3.22 square miles and a population of 135,176. Socially vulnerable populations would benefit from the project, since they have limited access to home repairs and heavy reliance on income from the affected area. Within the affected areas, there are 33,764 low-income households, 20,731 elderly individuals, 27,365 non-English-speaking individuals.⁴¹

Cost-Benefit Analysis

B4a (Study):

The project would provide the site and design for a green infrastructure project that would facilitate the implementation of this project's recommendations. The project recommendations would have considerable economic, environmental, and health and social benefits equivalent to that of Project B4b. The project's relatively low cost of \$200,000 is small relative to the resulting benefits that it would provide to the Community.

B4b (Pilot Project):

Project B would reduce stormwater runoff, decrease sewer backups, reduce associated repair costs for residences, business, and infrastructure, avoid damage costs, and alleviate traffic congestion. The need to upgrade and maintain the sewer system would also be reduced, since the green infrastructure would add water capacity to the system. The project could at least partially offset future flood damage costs for the Coney Island wastewater treatment plant, estimated to be \$85 million in a flood event. The project would reduce the flooding risks to residential properties in the project area, with an estimated market value of \$7.4 million. The green infrastructure in this project would improve air quality within the Community and water quality in Coney Island Creek, thus, reducing these adverse health impacts. In addition, socially vulnerable populations would benefit from the reduced flooding risks to homes and businesses, improved air and water quality, and reduced home repair costs in a flood or storm event.

This project would also serve as an educational model. The project results—such as stormwater capture, energy-saving costs for the building, occurrences of flooding during rain events—would be transparent, providing the Community with an example of the benefits of green infrastructure. The success of the pilot project would encourage the implementation of additional green infrastructure project. In addition, the sample project would provide opportunities for the students at PS 97 to learn about vegetation growth and maintenance and the effectiveness of green infrastructure on

stormwater management.

Due to the considerable project benefits, the costs of project A and B (\$950,000) are likely outweighed by the benefits. When choosing a green infrastructure project, it is important to note the differences between various green infrastructure options. Permeable pavement provides the most cost-effective method for absorbing stormwater into the ground. However, green roofs provide the largest improvement to air and water quality based on their cost. With respect to cost effectiveness, bioswales are in between stormwater and green roofs. The sample project includes all three implementations in an effort to provide the implementation that would provide a high air quality and water quality improvement with the most stormwater runoff reduction at the lowest cost.

Risk Reduction

In 2013, there were 1,169 confirmed sewer backups in Brooklyn.⁸⁸ Sewer backups could occur in the basements of homes and businesses through private sewer lines and on streets through catch basins and manholes. Sewer backups in basements cause damage to the assets of residents and business owners and property owners incur the cost of repairing the damage. Sewer backups on streets cause unsafe and unsanitary conditions, reducing the livelihood of the Community. Green infrastructure would reduce the occurrence of these sewer backups, reducing the financial and health risk posed to residents, business owners, and commuters.

In addition, green infrastructure would reduce the occurrence and amount of CSOs in Coney Island Creek. Stormwater and sewage—together known as combined sewage—that is collected in the northern part of the Community is sent to Owls Head Water Pollution Control Plant (WPCP) through force mains powered by the Avenue V Pump Station. When the sewer system is overloaded, some combined sewage must be sent to the CSO outfalls in Coney Island Creek. Thus, reducing the amount of water in the sewer system would reduce the amount of combined sewage that bypasses the Avenue V Pump Station and discharges into Coney Island Creek. CSOs pose environmental and health risks to the area surrounding Coney Island Creek.

Timeframe for Implementation

B4a (Study): Immediate (< 2 years)

B4b (Pilot Project): Intermediate (2-5 years)

Regulatory Requirements

B4a (Study): No permits should be required for the Phase I study. Coordination with City, State, and Federal agencies is, however, recommended to inform the recommendations that result from this study.

B4b (Pilot Project): Permits may be required by the NYC DOT, NYC DEP and the NYS DEC.

Jurisdiction

The projects would be in Brooklyn and would therefore fall under the jurisdiction of the City of New York. Various City and State entities may have jurisdiction over the projects.

C1: Develop a Residential and Commercial Property Technical Assistance and Education Program (Proposed)

Project Description

This program will provide educational materials and technical assistance to residential and commercial property owners in the Community interested in improving the resiliency of their buildings. According to the FEMA Preliminary Flood Insurance Rate Maps (FIRM), approximately 9,249 new residential housing units will be added to the Special Flood Hazard Area (SFHA) in the Community when the maps become effective. This amounts to 26% of the residential units in the Community and significant increase from the previous SFHA area. Additionally, 150 new commercial and mixed use parcels been added to the SFHA area.

Many residential and commercial property owners will face new requirements and financial challenges when the Preliminary FIRMs are adopted. The Committee has identified the need to provide information and assistance to property owners to help them understand flood insurance options and requirements, and to provide them with practical and concrete steps to increase their building’s resiliency and to potentially reduce the financial burden of flood insurance premiums.

The objective of this program would be to educate property owners on effective measures of flood damage mitigation, the impact on flood insurance rates, and potential resources for financial assistance. Education and technical assistance would be delivered through two different strategies:

Figure 4-19: FEMA Preliminary FIRM- Additions to Special Flood Hazard Area



NY Rising Community Reconstruction Plan

- *Education:* resource center, educational campaigns, workshops and outreach
- *Technical Assistance:* Home Resiliency Needs Assessments/Business Continuity Audits and Counseling

Workshops and audits would be conducted by trained staff that could to answer technical questions as well as identify resiliency needs and improvements. The program would seek to hire Section 3 qualified workers or businesses.

Table 4-1: Parcels Added to the SFHA in the Preliminary FIRM⁸⁹

Land Use	Parcels	Units
1-2 Family	1,683	3,051
Multi-Family: Walk-up	768	2,825
Multi-Family: Elevator	29	2,908
Mixed-use	93	465
Total Residential	2,573	9,249
Commercial	150	NA
Other land uses	324	NA
Total parcels	2,897	9,249

Education and Outreach

The program will include an office located in the community, which would ideally co-locate with an existing institution or not-for-profit organization. The office will have education materials, as well as trained staff to answer resiliency improvement and other related questions. The program would also link residential and commercial property owners with case managers to assess their resiliency needs. The Community may partner with other

organizations and NY Rising Communities that have been working on similar educational and technical assistance programs.

The educational portion of the program will provide guidance on flood insurance, flood risk, and resiliency measures property owners can take to floodproof their buildings. The NYC DCP's report, *Retrofitting Buildings for Flood Risk* (October, 2014), is a resource that should be utilized to help property owners understand how they can adapt their buildings for flood resiliency. The report provides a step-by-step approach to an adaptation project with a range of retrofit solutions for various property types. It also provides building professionals with a guide to inform architectural and construction decision-making. An illustrative retrofit strategy for semi-detached homes, a common residential building type in the Community, is shown in Project C2. Local strategies which pertain to the housing stock and unique risks of Gravesend and Bensonhurst would be made available through this project.

Other topics of education provided by the resource center could include information about changes to FEMA's FIRMs; flood insurance requirements; how to obtain flood insurance; and guidance for grants, loans, legal support, and financial planning. Additionally, guidance will be provided on best practices for building retrofits and various physical resiliency measures including installation of backflow preventers in waste water service lines; prevention of basement flooding through flood barriers placed on driveways; proper disposal of fats, oil, and grease; increasing the amount of permeable surfaces; and implementing other



Beach Haven Apartments



Counseling and On-site Building Audits
Source: www.fema.gov

green infrastructure measures.

Outreach is an important part of the education program, as some Community members may be unaware of their options for insurance and resiliency retrofits. The program's outreach efforts would focus on vulnerable populations. Information would be provided in multiple languages to make sure that residents and business owners are aware of the services offered. An online clearinghouse will also be developed to supplement the outreach program.

Gravesend and Bensonhurst

Technical Assistance

The Technical Assistance strategy of the program would provide counseling and on-site building audits performed by case managers and professional experts. Housing counseling and audits would be available to low- and moderate-income (LMI) households, including potential home buyers, to assist them with resiliency retrofit measures. These services could also be offered to commercial property owners, including buildings owned by non-profit organizations. Specific topics covered may include storm-related repairs, flood insurance, flood risk, rebuilding and resiliency retrofits, and assistance with finding organizations to complete retrofits. Examples of retrofit options to be discussed include building flood-proofing measures, installation of backup power generators, and elevation of mechanics for mid- to high-rise buildings.

A report will be provided to the property owner after an audit is performed. Case managers will discuss the report with the owner, the specific steps they can take to become more resilient, and potential methods for reducing their flood insurance costs. Recommendations for short-, medium-, and long-term actions may be provided.

Cost Estimate

\$1,000,000

The project would have a high cost (approximately \$1,000,000), which includes audits for approximately 225 properties (which would be a mix of residences and businesses), the development and maintenance of an online clearinghouse for technical assistance and educational materials, and the hiring of an outreach coordinator for 18 months. This cost estimates a home resiliency audit at approximately \$2,000 per single-family home and \$4,000 per multi-family residential building, or \$2,000 for a business continuity audit (for a weighted average of \$3,000 per audit). Operations and maintenance costs would be those associated with maintaining the website and providing technical support for members of the public that utilize the website, estimated at \$12,000 per year.

This project would give homeowners and business owners the knowledge and technical assistance to retrofit buildings and undertake flood damage mitigation measures. Therefore, the indirect costs of the project would include the future costs of mitigation and floodproofing construction activities (undertaken through projects C2: *Residential Loan Program for Resiliency Retrofits* and C3: *Commercial Loan Program for Resiliency Retrofits*) as well as external costs associated with these future activities, such as potential impacts to noise and air quality, and potential temporary business closures during construction activity.

Benefit or Co-Benefits

Environmental Benefits

Environmental benefits of floodproofing homes could be considerable, especially if many residents and businesses take part in the workshops and training, technical assistance programs, and housing and counseling audits. Flood damage mitigation measures would avoid or minimize the potential environmental impacts of flood damages, such as home heating oil spills, which can mix with flood waters and contaminate nearby wells, water bodies, and adjacent homes or businesses;⁵⁷ flood damaged homes which could contain hazardous materials; flooded heating systems which can contain asbestos; and sheetrock which can contain lead paint.⁵⁷

Economic Benefits

This project would generate a total of 11 full-time equivalent jobs (FTEs) for 1 year⁵⁹, hired as auditors and an outreach coordinator within the technical assistance program.

Based on the Preliminary FIRM maps, 9,279 housing units and 155 total commercial and mixed use parcels would be in the updated SFHA. Almost all of the residential (9,249 units) would be new to the 100-year flood zone and would need to obtain flood insurance. The total market value of residential and commercial properties within the flood zone is estimated to be \$1.67 billion.⁸⁴ An estimated 225 audits would be performed on residential and commercial properties, many of which would undertake flood damage mitigation measures. Construction and activities to mitigate flood

risks will generate economic activity in the area, benefiting local jobs and income.

While floodproofing and small-scale resiliency retrofits may not necessarily reduce National Flood Insurance Program (NFIP) premiums, property owners would save money through the lower repair costs of these structures that would have otherwise been damaged. These could include the costs of pumping water or removing mold from homes, structural damage to buildings, and loss of personal or business property within buildings. Property audits through the technical assistance program would identify cost-effective resiliency retrofits and necessary improvements that would reduce potential damage to property from future flood events. This project would reduce the risk of flooding for approximately 225 properties, which would reduce the risk to property and the resulting insurance claims after a flood event. By way of comparison, paid insurance claims by the NFIP for the New York City region were \$750 million, with the average payment of \$54,000.⁷⁴ Claims include the cost of pumping water or removing mold from homes, structural damage to buildings, and loss of personal or business contents within buildings.

Providing education and technical assistance on flood mitigation measures could lead to the implementation of flood protection measures, which could reduce insurance premiums.⁹⁶ In addition, risk-mitigation measures may help to offset any property value losses that may occur with the new requirements to obtain flood insurance. Renters may also benefit if insurance premiums are lowered because the financial burden of a property owner is often

transferred to a renter through rent payments. Approximately 50% of housing units within the SFHA on the preliminary FIRM maps are occupied by renters.⁶⁵ 34% to 37% of Community households are considered “rent-burdened,” meaning they spend more than 30% of their monthly income on rent (including heat and electricity).⁴⁵

Floodproofed businesses are likely to reopen more quickly after a flood event, decreasing business disruptions, avoiding losses to business revenues, and income for local employees. With \$1.9 million in revenues generated per business, in the updated 100-year flood zone, which translates to \$5,200 in sales per day generated for each business.⁶² Without the implementation of flood mitigation measures, business disruptions in the Community during and after a flood event would incur lost sales of \$5,200 per business per day. In addition, businesses will have reduced financial strain, leading to a lower likelihood of furloughs or permanent layoffs after a flood event.

The 9,279 total housing units and 155 total commercial and mixed use parcels in the updated SFHA for Gravesend and Bensonhurst represents a 266% increase in housing units and a 1,577% increase in businesses that would require their owners to purchase flood insurance. While floodproofing and small-scale resiliency retrofits may not necessarily reduce National Flood Insurance Program (NFIP) premiums, property owners could save money through decreased flood insurance premiums if a schedule of premium reductions for different structure types and risk-mitigation measures were reflected in NFIP premiums⁹².

Health and Social Benefits

The technical assistance program would provide home and business owners with the guidance necessary to implement floodproofing measures, which will in turn, after a flood event, decrease the strain on social programs that provide disaster recovery services. The online clearinghouse would be open to the Community and the entire population (96,166 people) could benefit from its educational materials. In addition, 25,359 low-income households; 16,145 elderly individuals; 21,460 children; and 20,870 non-English-speaking people would also benefit from the clearinghouse and technical assistance. As part of HUD’s Section 3 Program, the program would seek to hire and train low-income residents to conduct the audits.

Reducing the risk of repeated flooding will have positive impacts on public health. According to the World Health Organization (WHO), the main health impacts associated with flooding are fatalities, injuries, and mental health illnesses during the flood event itself and during the restoration process.⁹³ Hypothermia, electrocution, burns, and carbon monoxide poisoning are also associated with recovery and rebuilding efforts. Mold caused by flood damage can trigger respiratory illnesses, especially among children and the elderly. The audits and educational materials provided to the Community and its vulnerable populations through this program will provide residents with the information they need to make resiliency retrofits that would reduce their vulnerability to flooding and the associated public health risks.

Gravesend and Bensonhurst

Cost-Benefit Analysis

Through the program, property owners would obtain the appropriate information to make their businesses or residences less vulnerable to flood damage through technical assistance, outreach, and audits. Once these retrofit and flood mitigation measures have been undertaken, property owners would experience a decrease in the cost of repairs, restoration, and disruptions after a flood event. In addition, potential resiliency improvements could include raising the first floor of a structure above the base flood elevation, which would allow a property owner to potentially reduce their insurance rate increases or decrease their premiums. Other important economic benefits to businesses after a flood event include continued service and the ability to reopen more quickly after a flood event, which would support continued business operations and revenues, local employment and income generation. Risk mitigation measures may help to offset any property value losses that may occur with the new requirements to obtain flood insurance. Renters may also benefit if insurance premiums are lowered because the financial burden of a property owner is often transferred to a renter through rent payments. Although these benefits are tied to the resiliency retrofits, the technical assistance program is a necessary first step to assist property owners with their building retrofits. In addition to the benefits listed above, the project has environmental and public health and social services co-benefits. These economic, environmental, and health and safety benefits are likely to be greater than the direct costs of the technical assistance, support, outreach, and audits (\$1 million) as well as the indirect costs of constructing the retrofits and

mitigation projects, which could be as low as \$11,000 per property.¹⁰⁶

Risk Reduction

This project would help property owners understand actionable flood mitigation measures they can take to reduce their property's vulnerability to flooding. Although this project would not provide the funding required for installing resiliency measures, the reduced risk to flood damage associated with such measures would be attributed to this project. Reduced risk of flood damage would also include the health risks associated with flooding, including fatalities, injuries, and mental health illnesses.

In addition to reducing risk for property owners, this program would reduce the risk of lost economic activity throughout the Community. Effective resiliency measures would mitigate flood damages to a business, preventing temporary closures that lead to the loss of sales generated by that business (\$5,200 per day for businesses in Kings County). In addition, employees would face a reduced risk of furloughs or permanent layoffs due to the financial strain on a business caused by flood damage.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

This project would have to comply with the New York City Building Code.

Jurisdiction

The proposed project would be in Brooklyn. The technical assistance program will not require jurisdiction from a particular agency.

C2: Establish Housing Loan Program for Resiliency Retrofits (Featured)

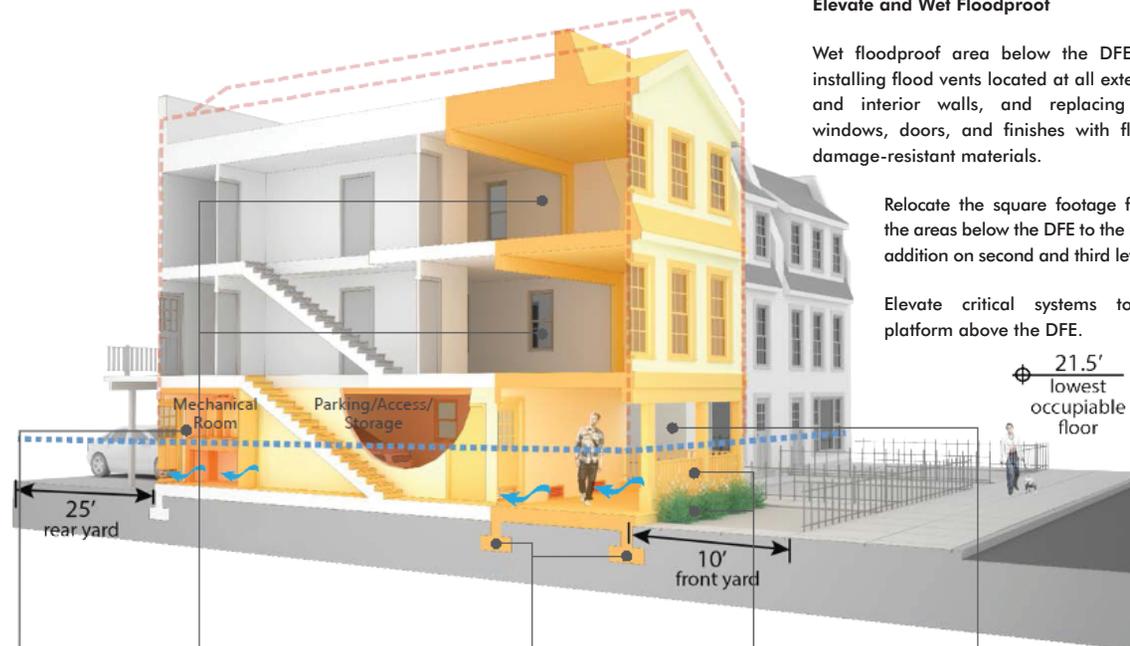
Project Description

This project would provide residential property owners with low-interest loans for resiliency retrofits. These retrofits may include home elevations, raising of utility systems, or other similar home modifications. This project would look to partner with a Community Development Financial Institution (CDFI) to create a revolving loan program. Two programs would be developed:

- Loan program for 1-4 family unit residential property owners which would provide gap funding focusing on households with financial hardship and property owners newly added to the Special Flood Hazard Area (SFHA); and
- Loan program for multifamily property owners which would provide gap funding to help multi-family buildings perform resiliency retrofits.



2-3 Family Homws in Gravesend



Elevate and Wet Floodproof

Wet floodproof area below the DFE by installing flood vents located at all exterior and interior walls, and replacing all windows, doors, and finishes with flood damage-resistant materials.

Relocate the square footage from the areas below the DFE to the new addition on second and third level.

Elevate critical systems to a platform above the DFE.

21.5'
lowest occupiable floor

CRITICAL SYSTEMS

Elevate systems on a platform above the DFE within the existing mechanical room. Replace existing systems to fit within limited height clearance, as required.

USE

Per Zoning, wet floodproofing the ground floor allows the lost floor area below the DFE to be relocated within the building bulk envelope to the new addition on the second and third levels. There is a total loss of 180 s.f.
Relocate the front yard parking to the rear and convert the partial interior floor area below the DFE to a garage and storage. The mechanical room remains. A new porch is added at grade below the addition.
If zoning regulations require the streetwall to align with adjacent buildings, a BSA special permit may be required.

STRUCTURAL SYSTEMS

Add a new foundation system to support the addition.
Reinforce the party-wall and the associated foundation system as required.
Slab reinforcement may be required at the new garage if scour is a potential issue.
Locating parking within the building requires new fire-rated wall and ceiling assemblies.

STREETSCAPE

Due to the construction of a new streetwall, where the lowest occupiable floor is over 9' above the sidewalk grade, the Zoning Resolution requires two streetscape mitigations be implemented. These enhancements can be selected from a list of options specified in the Zoning Resolution. Here plantings, and a covered porch fulfill the requirements.

ACCESS

New porch below the new addition provides access at grade to existing front entrance.
At rear, existing entrance to remain with the addition of new entry point at the garage door.

Retrofit Strategy for Semi-detached Buildings

Source: Retrofitting Buildings for Flood Risk, NYC DCP

Gravesend and Bensonhurst

More than 9,000 new housing units have been added to the Special Flood Hazard Area (SFHA) in the Community, including 1,683 1-2 family parcels, 768 multi-family walk-up parcels, 29 in elevator parcels, and 93 mixed-use parcels (Table 4-1). The objective of this project is to provide assistance to low- to moderate-income (LMI) residential property owners in Gravesend and Bensonhurst who were previously in or have been newly added to the SFHA, as well as owners of multi-family buildings, to make their buildings more resilient to future storm events. Affording these retrofits would be especially burdensome for vulnerable populations, such as the elderly, families with young children, or families with employment concerns or short-term financial crises. Higher flood insurance premiums or flood insurance requirements for newly added homes in the SFHA will likely increase the number of rent-burdened households in the Community. The goal of this program is to provide gap funding for resiliency costs not covered by either traditional lending practices or government assistance.

This project would create a loan-processing program with an existing or newly created Community Development Funding Institution (CDFI) having an Article XI Corporation (i.e., Housing Development Fund Corporation ["HDFC"]) component as a "Resiliency Lender." The CDFI would be eligible to accept and lend public funds, while the HDFC would generate options for mitigating transaction costs and facilitating long-term affordability.

The loan fund, which could provide low-interest loans to ensure greater affordability

to homeowners who have difficulty accessing credit. Additionally, the loan will provide a long-term benefit by being "revolving," meaning that loans and interest are paid back into the fund, creating the opportunity to issue other loans to new property owners. Given the program's focus on low- to moderate-income (LMI) households, there is the potential to obtain additional funding from banks or other institutions that need to fulfill their Community Reinvestment Act (CRA) requirements. It should be noted that residents who receive Federal benefits for building improvements are then required to carry flood insurance, even if they own their building. If CDBG-DR funds are not used (i.e., private banks exclusively fund the loan), Federal requirements are not applicable.

Cost Estimate

\$500,000

The total cost of this project is estimated at \$500,000. Each loan would cover the cost of a range of resiliency retrofits for one building. While the costs of resiliency retrofits will vary by building, the following average costs were utilized for the purposes of cost estimating:

- Wet floodproofing up to 6 feet: average cost of \$11,000-\$20,000 per building,
- Dry floodproofing up to 6 feet: average cost of \$16,500-\$21,000 building, and
- Sump pump or check valve: average cost of \$1,385.

Table 4-2 itemizes the costs of various floodproofing measures according to cost

Table 4-2: Average Floodproofing Costs in New York City⁵²

Typical wet floodproofing measures:	Costs are expressed per	Costs in US\$
Basement (up to 8 feet above basement or LAG*)	SF of building footprint 8 ft. above basement or LAG	\$17.00
Crawlspace (up to 4 feet above basement or LAG*)	SF of building footprint 4 ft. above basement or LAG	\$5.60
Typical dry floodproofing measures:	Costs are expressed per	Costs in US\$
Sprayed-on cement (above grade)	LF of wall covered	\$16.80
Waterproof membrane (above grade)	LF of wall covered	\$5.70
Asphalt (two coats on foundation up to 2 feet below grade)	LF of wall covered	\$12.00
Drainage line around perimeter of the house	LF	\$31.00
Plumbing check valve	EA	\$1,060.00
Sump and sump pump (with backup battery)	LS	\$1,710.00
Metal flood shield	LF of shield surface	\$375.00
Wooden flood shield	LF of shield surface	\$117.00

* LAG stands for Lowest Adjacent Grade, or the elevation of the lowest ground surface that touches any of the exterior walls of a building.

estimates for flood resilience and protection strategies in New York City, published by The New York Academy of Sciences.⁵² The average building cost estimates for dry and wet floodproofing provided above would vary depending on building size and the necessary improvements; however, the costs provided in Table 4-2 illustrate estimates with a higher degree of certainty as they are based on building area or linear foot.

Because the funds are provided as a loan to homeowners, the project capital is considered a revolving fund, meaning that the initial capital investment of \$500,000 would be returned to the fund, and could be used for future resiliency retrofits. Therefore, it is recommended that small loans of approximately \$2,000 each, which would cover the purchase and installation of a sump pump or check valve, be provided first. The smaller the loan, the quicker it would be repaid back into the revolving loan fund, in turn providing additional loans and increasing the population that could benefit from the project.

Although these low interest loans provide benefits to homeowners, the loan funds would rely on ongoing operating subsidies for below-market financing from various sources, including Federal and state governments, foundations, and private financial institutions. These are external costs that may be borne by taxpayers if Federal or state subsidies support these programs.

The improvements listed above would be a minor inconvenience to residents and would not result in the need for homeowners to temporarily relocate. However, construction activity could result in temporary noise and air quality nuisances, as well as temporary traffic disruptions.

Benefit or Co-Benefits

Environmental Benefits

Environmental benefits of floodproofing homes could be considerable. Flood damage mitigation measures would avoid or minimize the potential environmental impacts of flood damages, such as home heating oil spills, which can mix with flood waters and contaminate nearby wells, water bodies, and adjacent homes or businesses; flood damaged homes which could contain hazardous materials; flooded heating systems which can contain asbestos; and sheetrock which can contain lead paint.⁵⁶

Economic Benefits

This project would create an estimated five full-time equivalent jobs⁵⁹ (FTEs) for a year created through the construction activity of the floodproofing measures, which would be paid for by the project low-interest loans, providing cost savings for undertaking the flood proofing measures. Up to 361 buildings in the flood-prone area would benefit through low-interest loans for retrofits and flood risk mitigation improvements. CDFIs are certified by the U.S. Department of Treasury's CDFI fund, providing low-interest loans for those eligible. The current prime rate, a widely used rate in setting home and commercial equity lines of credit and credit card rates, is 3.25 percent.⁹⁴ Depending on the credit of the borrower and the terms and length of the loan, the market rate of a home improvement loan will vary, from 4% and upwards and is typically benchmarked off of the prime rate. Although there is not a standard low-interest rate for the CDFI loans, they are likely to be considerably

lower than market rates, especially if the borrower has marginal credit. CDFI loans have ranged from less than 1 percent to upwards of 6 percent.⁹⁵ Assuming a low difference of 2 percent annual interest and a high difference of 10 percent on \$500,000 in loans, this program would save homeowners between \$10,000 and \$50,000 per year. If an average loan is \$11,000, the savings for the low-interest loan for the homeowner would range from \$220 to \$1,100 per year. By way of comparison, paid insurance claims by the NFIP for the New York City region were \$750 million, with an average payment of \$54,000.⁹⁰ With the implementation of these flood mitigation measures, damage costs would be reduced and avoided after a flood event. The market value of all residential housing units in the 100-year flood area of \$3.9 billion and the average market value of a residential housing unit is \$418,000.⁶¹ Therefore, retrofit and flood risk mitigation measures on 361 residential units would protect up to \$151 million in market value. Although, it should be noted that each resiliency retrofit measure would offer varying degrees of flood protection.

In addition, the program would also fund resiliency retrofits that would have otherwise not been afforded by some homeowners, with priority for low-income residents. This would lead to an increase in the mitigated property damage during flood events. If every loan recipient is a low-income property owner, then at least 1,444 residents in single-family low-income households could benefit (assuming an average household size of four). However, given that 31% of eligible housing is two- to four-family units, and 34% of eligible housing is mixed-use, this minimum benefit would be compounded

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depending on the number of dwelling units in the selected buildings.

Implementation of flood protection measures could reduce insurance premiums.⁹¹ In addition, risk-mitigation may help to offset any property value losses that may occur with the new requirements to obtain flood insurance. Renters may also benefit if insurance premiums are lowered because the financial burden of a property owner is often transferred to a renter through rent payments. Approximately 50% of housing units within the SFHA on the preliminary FIRM are occupied by renters.

Health and Social Benefits

Retrofits incentivized by this program would ensure housing would be more resilient against extreme weather events that may occur in the future. Up to 361 buildings would benefit from this program, with priority given to low- to moderate-income populations. This program could potentially benefit approximately 3,440 low-income households; 2,299 elderly individuals; 2,955 children; and 2,988 non-English-speaking people that live within the Preliminary FIRM SFHA. Additionally, this program would provide greater financial stability to an underserved population that may not have access to traditional loans and grants.

As stated in the benefits for the Residential and Commercial Property Technical Assistance and Education Program, flooding of residential properties has lasting public health impacts such as fatalities, injuries, and mental health illnesses suffered during the flood event and through the restoration process.⁹³ Hypothermia, electrocution,

burns, and carbon monoxide poisoning are all associated with the use of equipment to recover from flooding in poorly ventilated areas indoors, while mold caused by flood damage can trigger respiratory illnesses, especially among children and the elderly. This program would benefit the health of homeowners and disaster recovery workers by decreasing the occurrence and severity of flooding of residential properties.

Cost-Benefit Analysis

The intent of this program is to provide low-interest loans to low-income households and other homeowners who would not be able to pay for the resiliency retrofits or secure a loan from a traditional lender. Ultimately, providing the loans will save homeowners money on flood damage costs and interest payments. With interest savings of between 2 to 10% for \$500,000 in loans, this program would save homeowners between \$10,000 and \$50,000 per year. Potential resiliency improvements could include wet floodproofing, dry floodproofing, and installation of other resiliency retrofits, such as sump pumps and check valves. In addition, risk mitigation measures may help to offset any property value losses that may occur with the new requirements to obtain flood insurance.

While \$500,000 could initially provide loans for up to 361 building resiliency retrofits, the project's development as a revolving loan fund would allow money repaid to the pool to be utilized by other homeowners. Therefore, more residents will be able to benefit from the project. Additionally, the funding amount is intended to serve as seed money to attract CDFIs to

contribute funds to the pool, which would further increase the benefit of this project. Overall, the economic, environmental, and health and safety benefits are likely to considerably outweigh the costs of the project.

Risk Reduction

Through this loan program, homeowners will be able to implement resiliency measures at their property. The project would increase the number of residential buildings that would be flood proofed, reducing the risk of damage that floods may cause to homes. These damages may include damage to utilities, the homeowner's assets, and the structural components of the home. Homeowners would also experience a reduced risk of the health impacts caused by floods, including fatalities, injuries, and mental illnesses.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required.

Jurisdiction

The project would be in Brooklyn. An existing or newly created CDFI would assist with implementation of this project.

C3: Establish Commercial Loan Program for Resiliency Retrofits (Featured)

Project Description

This project would provide commercial property owners in the Community with low-interest loans for resiliency retrofits. This may include elevation of utilities as well as floodproofing measures for ground-level storefronts. This project would look to partner with a CDFI to create a revolving loan program focusing on commercial properties that serve small businesses. One-hundred and fifty new commercial parcels have been added to the SFHA in the Preliminary FIRM. The objective of this project is to provide assistance to commercial property owners in Gravesend and Bensonhurst who were previously in or newly added to the SFHA to make their buildings more resilient to future storm events. Affording these retrofits would be especially burdensome for small business owners who generally have fewer resources and are less able to sustain periods of closure than are larger

businesses. The goal of this program is to provide gap funding for resiliency costs not covered by either traditional lending practices or government assistance. The program would provide loans as a last resort funding source to business owners who may have trouble borrowing money otherwise.

Loans will provide a long-term benefit to the Community by being “revolving,” meaning that loans and interest are paid back into the fund, creating the opportunity to issue other loans to commercial property owners. Additional funding opportunities may be available from organizations focused on small businesses and economic development, including the NYC EDC and New York City Department of Small Business Services (SBS).

This program would support the vitality of the business community in the Gravesend and

Bensonhurst area, allowing businesses to avoid damage from flooding and re-open more quickly. In turn, this allows residents to maintain access to critical goods, and minimizes periods of wage and revenue loss for employees and businesses.



Commercial Buildings on Bath Avenue

Full NFIP premium reduction

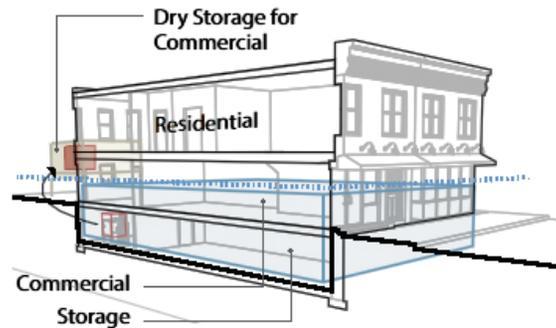
Dry floodproof commercial space, wet floodproof residential lobby; fill the cellar to lowest adjacent grade; relocate critical systems to the roof.



Retrofit Strategy for Mixed Use Semi-detached Buildings

No or partial reduction in NFIP premiums.

The structure is not filled to the lowest adjacent grade. Wet floodproofing is not permitted at commercial use.



No or partial reduction in NFIP premiums.

The critical systems remain located below the DFE (BFE +1 foot) and the structure is not filled to the lowest adjacent grade. Dry floodproofing below the lowest adjacent grade is not recognized



Source: Retrofitting Buildings for Flood Risk, NYC DCP

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Cost Estimate

\$500,000

The total cost of this program is estimated at \$500,000 and would fund the various flood damage mitigation and resiliency measures outlined below over an average repayment period. While the costs of resiliency retrofits will vary by building, the following average costs were utilized for the purposes of cost estimating:

- Wet floodproofing up to 6 feet: average cost of \$11,000-\$20,000 per building,
- Dry floodproofing up to 6 feet: average cost of \$16,500-\$21,000 per building, and
- Sump pump or check valve: average cost of \$1,385.

Table 4-3 illustrates the costs of various floodproofing measures according to Cost estimates for flood resilience and protection strategies in New York City, published by The New York Academy of Sciences. The average building cost estimates for dry and wet floodproofing provided above would vary depending on building size and the necessary improvements, however the costs provided in Table 4-3 below illustrate estimates with a higher degree of certainty as they are based on building area or linear foot.

As stated in C2 Residential Loan Program for Resiliency Retrofits, smaller loans would have a shorter repayment period than larger loans. Smaller loans—of approximately \$2,000 or less—would be able to cover the purchase and installation of a sump pump or check valve. Larger sized loans—such as those near the \$25,000 limit—would allow dry and wet floodproofing measures to be implemented.

Providing smaller value loans to businesses would allow more businesses to participate in the program, since the funds would be repaid earlier and available for distribution to additional borrowers, increasing the population that could benefit from this project.

These improvements are not expected to result in the need for businesses to temporarily relocate, however they may require businesses to close temporarily (potentially 1-2 days) while the improvements are completed, resulting in the external cost of a one-time cost of a temporary business closure. Construction activity could also result in temporary noise and air quality impacts, as well as potential temporary traffic disruptions.

Although these low interest loans provide benefits to business owners, the loan funds would rely on ongoing operating subsidies for below-market financing from various sources, including Federal and state governments, foundations, and private financial institutions. These are external costs that may be borne by taxpayers if Federal or state subsidies support these programs.

Benefit or Co-Benefits

Environmental Benefits

Environmental benefits of floodproofing businesses could be considerable. Flood damage mitigation measures would avoid or

Table 4-3: Average Floodproofing Costs in New York City⁵²

Typical wet floodproofing measures:	Costs are expressed per	Costs in US\$
Basement (up to 8 feet above basement or LAG*)	SF of building footprint 8 ft. above basement or LAG	\$17.00
Crawlspace (up to 4 feet above basement or LAG*)	SF of building footprint 4 ft. above basement or LAG	\$5.60
Typical dry floodproofing measures:	Costs are expressed per	Costs in US\$
Sprayed-on cement (above grade)	LF of wall covered	\$16.80
Waterproof membrane (above grade)	LF of wall covered	\$5.70
Asphalt (two coats on foundation up to 2 feet below grade)	LF of wall covered	\$12.00
Drainage line around perimeter of the house	LF	\$31.00
Plumbing check valve	EA	\$1,060
Sump and sump pump (with backup battery)	LS	\$1,710
Metal flood shield	LF of shield surface	\$375
Wooden flood shield	LF of shield surface	\$117

* LAG stands for Lowest Adjacent Grade, or the elevation of the lowest ground surface that touches any of the exterior walls of a building.

minimize the potential environmental impacts of flood damages, such as building heating oil spills, which can mix with flood waters and contaminate nearby wells, water bodies, and adjacent homes or businesses;⁷⁴ flood damaged buildings which could contain hazardous materials; flooded heating systems which can contain asbestos; and sheetrock which can contain lead paint.⁵⁷

Economic Benefits

This project would create an estimated five full-time equivalent jobs (FTEs) for one year created through the construction activity of the floodproofing measures, which would be paid for by the project low-interest loans, providing cost savings for undertaking the floodproofing measures.

The low-interest CDFI loans provided to business owners in this program are identical to the loans provided to homeowners in *C2 Residential Loan Program for Resiliency Retrofits*. To summarize, previous CDFI loans have ranged from less than 1% to upwards of 6%⁹⁷, while the market rate of loans for commercial or business loans are higher than home improvement loans and would vary from 6% and upwards, depending on a number of factors including the duration and size of the loan, the credit and financial history of the business, and the type of lending institution. Based on an average loan size of \$11,000, business owners would save \$220 to \$1,100 per year by utilizing CDFI loans over traditional small business loans. With the implementation of these flood mitigation measures, damage costs would be reduced and avoided after a flood event. The risks

of flooding would be reduced for up to 361 commercial properties.

Additionally, these retrofits would reduce future flood damages for business owners. Public and local government expenditures on resiliency upgrades and damage costs would decrease as individual business owners will have undertaken appropriate floodproofing measures. Hurricane Sandy caused \$4.5 billion in damages to businesses throughout New York City.⁹⁹ Thus, providing immediate funds to implement resiliency retrofits for businesses would reduce the cost of repairing floods for business owners.

Floodproofed businesses are likely to reopen more quickly after a flood event, decreasing business disruptions, benefitting business revenues, local employees and income. Each business in Kings County generated \$1.9 million in sales generated or \$5,200 in sales per day.⁶² Without the flood risk measures for businesses, these sales would be lost due to temporary or permanent business closures. In New York City, an estimated \$5.7 billion of gross product was lost due to Hurricane Sandy. In addition, Business owners would face reduced financial strain, leading to a lower likelihood of furloughs or permanent layoffs for employees. This would significantly impact the 25,359 low-income households in the Community. Lastly, this program would increase financial stability in the community through the above benefits.

Implementation of flood protection measures could reduce flood insurance premiums.^{54,55} Risk-mitigation measures may also help to offset any property value losses that may occur with the new requirements to obtain flood insurance.

Health and Social Benefits

Retrofits funded through this loan program would mitigate flood damages to businesses, reducing potential health impacts. As stated in the benefits for Residential and Commercial Property Technical Assistance and Education Program, a myriad of health impacts may occur during flood events and during the repair of flood damages. These impacts range from fatalities, injuries, mental health illnesses, hypothermia, electrocution, burns, and carbon monoxide poisoning.⁹³

In addition, the loan program would provide benefits to the low-income populations within the Community. The funds would provide a lower interest rate than traditional loans, allowing the low-income population with businesses to afford the installation of resiliency retrofit measures. Low-income employees would also benefit from the decreased risk of furloughs and layoffs.

The entire Community (96,166 people) would benefit from shorter business closures with significant benefits to the Community's socially vulnerable population, which includes approximately 25,359 low-income households; 16,145 elderly individuals; 21,460 children; and 20,870 non-English-speaking people.

Cost-Benefit Analysis

The intent of this program is to provide low-interest loans to small businesses who would not be able to pay for resiliency retrofits or secure a loan from a traditional lender. Ultimately, providing the loans will save businesses money on flood damage costs and interest payments. With interest savings of between 2 to 10%

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for \$500,000 in loans, this program would save business owners between \$10,000 and \$50,000 per year. In addition, risk mitigation measures may help to offset any property value losses that may occur with the new requirements to obtain flood insurance.

While \$500,000 could initially provide loans for up to 361 building resiliency retrofits, the project's development as a revolving loan fund would allow money repaid to the pool to be utilized by other businesses. Therefore, more businesses will be able to benefit from the project. Additionally, the funding amount is intended to serve as seed money to attract CDFIs to contribute funds to the pool, which would further increase the benefit of this project. Overall, the economic, environmental, and health and safety benefits are likely to considerably outweigh the costs of the project.

Risk Reduction

This loan program would provide commercial property owners with funds to make their buildings more resilient to flooding with wet or dry floodproofing measures, sump pumps, or check valves. With these resiliency measures implemented, businesses would face a reduced vulnerability to flood damage. The risk of losing gross product due to forced closures would also decrease. In addition, with businesses made more resilient and less flood damages to repair, business owners would experience reduced financial strain. Subsequently, employees of these businesses would face a reduced risk of lost income generation, furloughs or permanent layoffs.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required.

Jurisdiction

The project would be in Brooklyn. An existing or newly created CDFI would assist with implementation of this project.

D1: Create a Community Disaster Recovery Training and Workforce Development Program (Proposed)

Project Description

In the aftermath of Superstorm Sandy, many residents in Gravesend and Bensonhurst that were previously unemployed found work in the cleanup and rebuilding efforts. These residents were very active both within the Community and in other areas impacted by the storm. Often, workers were exposed to dangerous situations in the post-disaster cleanup, which included tearing down and rebuilding homes, handling exposed wires in flooded areas, disposing of hazardous chemicals, and working in unsafe building conditions. Many of the workers were also ill-equipped to deal with issues such as mold remediation and refuse disposal. In addition to these issues, there are still many workers in the Community that are unemployed, as the temporary jobs did not transition into full-time employment after the immediate rebuilding efforts subsided. This unemployment undermines the economic resiliency of the Community.

This project would provide disaster-recovery workshops for local workers tailored to the needs of the Community. The workshops would provide laborers with the environmental and health safety (EHS) training and the skills needed to help the Community and surrounding areas rebuild and recover from storm events. Specific areas of training requested by the Community include:

- Health and Safety Training,
- Mold remediation,

- Sump pump operation and restoration,
- Trap cleanouts,
- Electrical work,
- Green infrastructure installation and maintenance, and
- Resiliency construction.

The workforce development program would primarily be targeted toward low-income individuals with limited employment experience and/or education. The classes would be structured to be as accessible as possible for these residents. Classes would be held over a multi-week period and would be offered on nights and weekends in a convenient location within the Community. To reflect the demographics of the Community, instruction could be provided in English, Spanish, Chinese (Mandarin/Cantonese), and Russian.

In addition, the program would focus on connecting workers to employment opportunities related to the construction of resilient infrastructure or building improvements. By providing training in the resilient building and construction trades, Community residents can gain access to work that may continue to be in high demand, increase their wages, and improve opportunities for career advancement.

From a community resiliency standpoint, there is a benefit of growing a skilled workforce capable of implementing the resiliency improvements



Workforce Training
Source: www.familyhandyman.com

needed in the Community. This project aligns with the recommendations of the New York City Regional Economic Development Council's Strategic Plan and FEMA Hurricane Sandy After-Action Report which both recommend the training of a disaster recovery workforce as a key action item in preparing for the next disaster event.

Cost Estimate

\$150,000

The capital cost of the project is low (approximately \$150,000). The project would fund instructors for four health and safety training workshops, four mold remediation workshops, two sump pump operation and restoration workshops, two trap cleanout workshops, four electrical work workshops, four resiliency improvement workshops, the

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facility fees and insurance associated with these workshops, and an outreach coordinator.

The cost estimate of \$150,000 has a low degree of uncertainty, as well as a 25% contingency, and no operations and maintenance or external costs are anticipated with this project.

Benefit or Co-Benefits

Economic Benefits

The funding for this project would generate two full-time equivalent jobs⁵⁹ (FTE) for the workshop and outreach coordinators. The workshops provided by the project would improve knowledge and skills primarily for the low-wage workforce and other socially vulnerable populations, which would improve employment prospects for some of the Community's 25,359 low-income households and 9.8% of the workforce that is unemployed. Training would enable low-income and unskilled workers to advance in careers in disaster recovery and the construction, development, and home repair industry. In addition, the project could increase local employment rates, which would improve the local economy.

The training program would improve the likelihood that the local workforce could meet the demand for employees who are able to work in disaster recovery efforts. Increasing the availability of a locally trained disaster recovery workforce may decrease the cost of disaster efforts by avoiding the need to bring temporary workers in from outside the area in addition to potentially decreasing unemployment in the Community.

Health and Social Benefits

Educational workshops would be open to the entire Community, but would be targeted toward the Community's low-income households (25,359 households), as well as its non-English-speaking population (20,870 people). Further, the program would seek to hire Section 3 businesses to conduct the workshops and audits.

Increasing workforce education will help reduce the health risk to workers involved in recovery efforts. According to the WHO, the main health impacts associated with flooding are fatalities, injuries, and mental health illnesses during the flood event itself and during the restoration process.¹⁰⁰ Hypothermia, electrocution, burns, and carbon monoxide poisoning are all associated with the use of equipment to recover from flooding in poorly ventilated areas indoors, while mold caused by flood damage can trigger respiratory illnesses. There are 16,145 elderly residents and 21,460 children living in the Community who are at risk from these health illnesses.

Through this program, disaster recovery workers will learn the proper procedures for handling hazardous materials, such as mold, and working in dangerous environments, such as a flooded basement.

This project aligns with the recommendations of the New York City Regional Economic Development Council's Strategic Plan and FEMA Hurricane Sandy After-Action Report. The project would be an investment in the local labor force, which should benefit the Community through increased employment and lower disaster costs. In addition, the training of a disaster recovery

workforce is a key action item in preparing for the next disaster event.

Risk Reduction

While this project would not result in the direct reduction of risk of damage to physical infrastructure, proper training in the areas mentioned above would lead to the reduction of risk of health impacts to the Community and the workers themselves. Additionally, a local skilled workforce that is prepared to help with recovery post-disaster events increase overall Community resiliency, and enable the Community to respond faster after a disaster. Thus, this project would expedite the disaster recovery process, reducing the health risk to disaster workers and potentially residents associated with a delayed disaster recovery effort.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

There are no applicable regulatory requirements for the workshops, aside from securing the required insurance certificates for the location hosting the workshops. Regulatory requirements do apply for the subject matter that would be discussed at the workshops (i.e., Occupational Health and Safety Act, licensed electrical contractor must be present for electrical work).

Jurisdiction

The proposed project would be in Brooklyn.

D2: Development of a COAD to Create a Community Disaster Recovery Plan (Proposed)

Project Description

Many of the Community's not-for-profit organizations provided services and support to the thousands of individuals in the area who needed assistance after Superstorm Sandy impacted the Community. These services ranged from helping residents find temporary housing, recovery supplies, food, locating medical assistance, and accessing post-disaster financial assistance. These organizations have also helped with the long-term recovery efforts which are still ongoing in the Community. The Committee recognizes the distinct need to improve the internal capacity of the Community to respond to future crises and improve communication between Community Based Organizations (CBOs) and the Community.

This project would create a Community Organizations Active in Disaster (COAD), which is a network of organizations that are committed to allotting resources to address the unmet human needs in disaster recovery. These organizations may include CBOs, such as faith based and non-profit organizations, as well as neighborhood representatives, schools, businesses and government agencies. The COAD would build upon established networks of CBOs within Gravesend and Bensonhurst as well as the neighboring communities in South Brooklyn. Creating stronger ties between these neighborhoods will help to strengthen the regional social infrastructure and improve their capacity to recover from a disaster event.

This project would provide resources and guidance to CBOs interested in forming a COAD as part of their efforts to meet the needs of citizens during the response and recovery phases of a disaster. The COAD would be charged with responding to future crises in the Community by coordinating participating CBOs. This local coordination will maximize the efficiency of participating organizations, prevent the duplication of services, and speed recovery.

The proposed COAD is not meant to replace or duplicate city sponsored efforts such as those of the NYC Office of Emergency Management (NYC OEM) Community Emergency Response Teams (CERT). Instead, the COAD would fill the gap in response to human needs and coordination of non-profit organizations on the ground post-disaster, continuing the long-term recovery when first responders and other agencies leave the Community. The COAD would be an autonomous operation and would still work closely with other agencies to coordinate response efforts.

The COAD would be organized around the FEMA model for Voluntary Agency Liaisons (VALs) that has been implemented throughout the nation. Through this proposed project, the COAD would:

- Provide training that would improve the capacity of participating non-profit organizations to provide critical service and support during disaster events;

- Develop relationships with citywide and regional agencies and officials to ensure appropriate communications and interaction in times of crisis;
- Identify the assets and vulnerabilities of local not-for-profit organizations and define their roles and responsibilities in disaster recovery;



Prepare Seniors for Extreme Weather
Source: www.fema.gov

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Develop Disaster Preparedness Plan
Source: /www.army.mil/

- Develop coordinated disaster preparedness plans that are unique to each individual nonprofit organization that coordinate activities among and between groups;
- Liaise with local CERT teams; and
- Work with local nonprofits and city agencies such as NYC OEM to produce and distribute education materials, with an emphasis placed on preparing senior citizens for extreme weather.

The COAD would focus on increasing communications and outreach to the elderly, disabled, rent-burdened, and residents with limited English proficiency. This communication may include expanding outreach to other channels such as social media, email and other technologies such as Notify NYC. The COAD would create a voluntary registry of elderly residents for use by Naturally Occurring Retirement Communities (NORCs), CERT, and the COAD to provide evacuation assistance, medical supplies during power outages, and check on vulnerable residents after disasters.

The regular activities of the COAD would

include training sessions, organizational assessments, regional planning coordination with neighboring COADs and CERTs, and the creation of relationships with citywide and regional agencies and officials that would facilitate appropriate communications and interaction in times of crisis. The year-long proposed COAD project would identify and possibly fund a training component designed to bring high quality training opportunities to the not-for-profit and civic organizations in the Community. The training will address a collection of pre-determined responses to potential crises that might occur in our Community, as drawn from the New York City OEM Hazard Mitigation Plan. The training sessions could also include those offered in the *Community Disaster Recovery Training and Workforce Development Program (D1)*. For each potential crisis, the COAD member organizations will identify their assets and vulnerabilities and the roles that they would be responsible for filling. All roles would be clearly outlined in the “Disaster Recovery Plan” deliverable at the end of the one-year duration of the project.

Cost Estimate

\$200,000

The cost of this project is low (approximately \$200,000). The funding would include costs for the establishment of a COAD and public outreach for 1 year. Tasks for establishing a COAD include:

- Development of a COAD structure;
- Recruitment of COAD members;
- Establishment of COAD roles and responsibilities;

- COAD member training;
 - Determining protocols for effective communication with city agencies; and
 - Writing and production of “Disaster Recovery Plan.”

In addition, to successfully implement the COAD project, it is necessary to secure the services of a Project Manager who commits a small amount of time to administering the project.

Benefit or Co-Benefits

Economic Benefits

This project would create an estimated two full-time equivalent jobs⁵⁹ (FTE) that will account for management of the COAD. In addition to increasing the capacity of the disaster preparation and response groups and increasing the productivity of volunteer labor, the COAD can qualify for a variety of funding sources that would not be available to government agencies. The COAD can also provide assistance in areas where the government may not be as well-suited, mostly because they have a better understanding of the localized needs of the Community, and especially its vulnerable populations. CBOs would be trained to coordinate with local organizations and regional emergency agencies, which will help to save money, resources and time in the recovery effort.

In addition, the COAD would expedite and facilitate disaster preparation which could result in a more effective disaster recovery response. COAD would have a greater understanding of the specific Community needs during disaster events and coordinate the response

to those needs in a more effective, timely fashion. This program could reduce the costs of disaster response and potential providing more services to individuals and households, including vulnerable populations. A streamlined recovery process could also result in decreased administrative costs for agencies involved in disaster recovery, as the COAD would be able to assume some responsibility for disseminating information to the Community.

Health and Social Benefits

Social and health benefits provided by CBOs and relevant agencies would improve due to improved coordination, efficiency, and productivity made possible by the COAD. Ultimately, this program may increase the availability of disaster services provided to individuals and households throughout the community including vulnerable populations. These services are important to avoiding or minimizing diminishing quality of life impacts due to loss of infrastructure or other lifelines (e.g., power, sewage, or water).¹⁰¹ These services may also result in lower incidents of illness and morbidity associated with disaster situations.¹¹⁷ This will benefit the entire population of Gravesend (96,166) and particularly the socially vulnerable population. Gravesend and Bensonhurst has approximately 20,870 residents (23%) that speak English “not well” or “not at all”; approximately 9,176 households (25.6%) with at least one disabled person¹⁰²; and approximately 16,145 residents (16.78%) that are over 65 years old.⁶⁵ The COAD would identify the needs of these residents and facilitate communication between public agencies and the CBOs that represent these vulnerable

populations, leading to more efficient and reliable disaster preparation and recovery efforts. For example, the COAD will be able to work with CBOs to identify and locate disabled people that need assistance in the evacuation process. The COAD can then communicate this information to local agencies that are equipped with the tools to assist the identified vulnerable populations.

Cost-Benefit Analysis

The total proposed project cost of \$200,000 is a cost-effective way to improve the disaster preparation and recovery efforts of public agencies and CBOs. The COAD will facilitate the communication and coordination between these organizations, leading to a quicker, safer, and less costly disaster response effort. Through the training offered by COAD, local CBOs will have a larger part in responding against flood events. In addition, the COAD would act as a communication bridge for public agencies and local CBOs, decreasing repeated or conflicting work between the organizations. Increased communication will benefit vulnerable populations, who may require additional assistance or commutation during disaster response efforts. Furthermore, this project would build upon the capacity and local knowledge of existing CBOs. The project would also help to reduce government expenditures for emergency recovery services during future storm events. For a low cost, these significant benefits would increase the capacity of CBOs and government agencies to respond during future storm events, increasing the project’s benefit to cost ratio.

Risk Reduction

While the project would not directly reduce risk to assets, it would foster a more resilient community by coordinating and facilitating the recovery efforts of different groups. This project is expected to provide a reduction of risk to all residents living in the Community by providing increased response capability among non-profits. As such, the vulnerability of the Community and assets within the Community would be reduced and recovery times would also be expected to decrease.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required.

Jurisdiction

This project is in the Borough of Brooklyn. A non-profit organization or community group would implement the proposed project, potentially with the assistance of NYC OEM.

D3: Expand Emergency Communications Network for First Responders (Featured)

Project Description

Superstorm Sandy disrupted telecommunications networks, including 911 emergency services¹⁰³ in the Community. First responders struggled to communicate and were often unable to receive messages from the City, Community Emergency Response Teams (CERTs), and disaster relief organizations. Furthermore, public feedback indicates that telecommunications networks in the Community have been generally unreliable

during smaller storm events in addition to more significant events.

Reliable communications networks are essential for immediate disaster recovery, especially for first responders and facilities that serve vulnerable populations, such as nursing homes, schools and facilities for the developmentally disabled. The Block Institute, a non-profit

organization serving people with disabilities and their families, currently has a network of radio repeaters to connect its facilities in the area. This network could be used as a model or expanded as part of a community-wide network for emergency response.

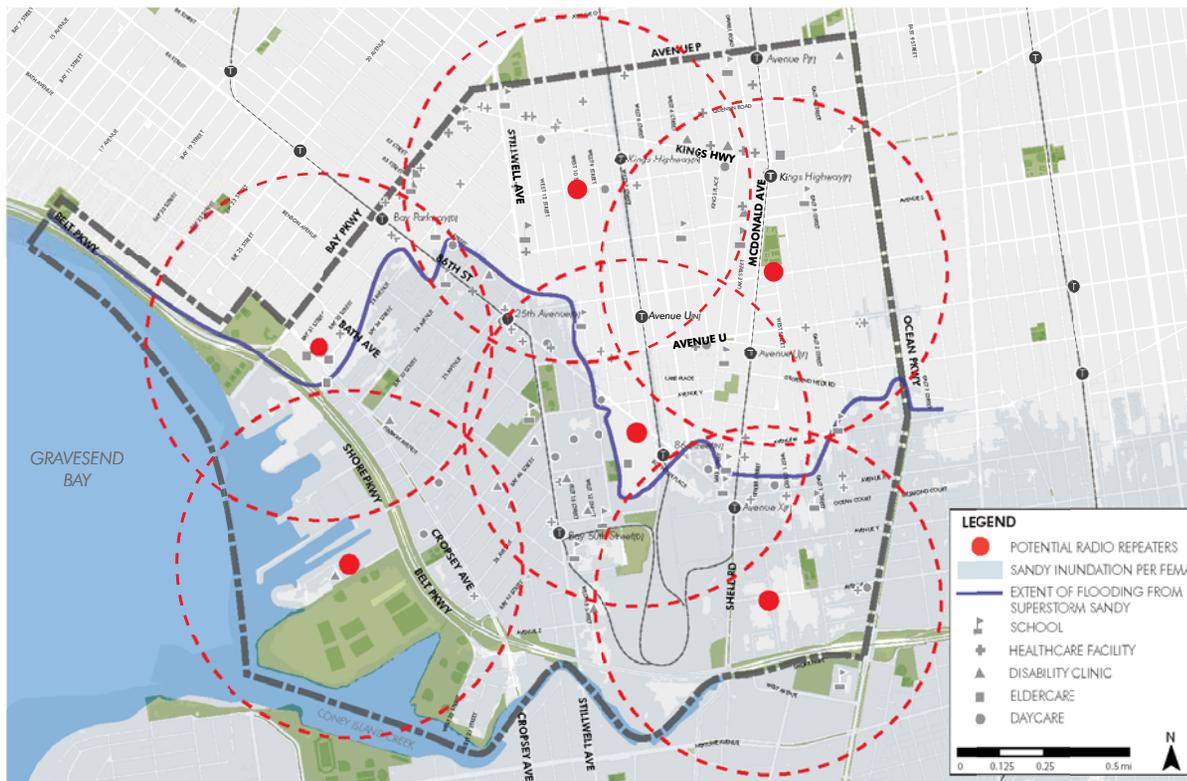
This project would fund improvements to the emergency communications network and would include the installation of radio repeaters. Radio repeaters are fixed communications devices that transmit signals at a much higher wattage than typical portable radios, allowing for a much larger coverage area. Transmissions are received from portable two way radios by the repeater and then are broadcast at a much higher wattage on a different frequency. Base stations connect to external antennas and provide more power than typical portable radios. They are not mobile, so they should only be used in environments where they can be used from a fixed location.

Cost Estimate

\$250,000

The cost of this project is low (approximately \$250,000). This covers the cost of equipment and installation of two radio repeaters and antennas. Operations and maintenance of the radio repeaters (which is not included in the funding of this project) would cost \$320,000 over the approximate 25 year life span of the equipment.

Figure 4-20: Conceptual Layout for Emergency Communication Network



This cost estimate has a low level of uncertainty regarding equipment and installation cost, however defined facilities that would host the radio repeaters are unknown. The cost estimate includes a standard 25% contingency to account this uncertainty. External costs are not anticipated for this project.

Benefit or Co-Benefits

Economic Benefits

An expanded communication network for emergency responders will generate three full-time equivalent jobs (FTEs) for the installation of the network. The operations and maintenance of the communication network would generate three FTEs over the span of 25 years. Further, the project would seek to hire a Section 3 firm for the installation of the radio repeaters.¹⁰⁴

The communication network would also avoid certain costs for local utilities to upgrade and harden the existing communication network to facilitate emergency response operations.

Similar to the *Development of a COAD to create a Community Disaster Recovery Plan (Project D2)*, this project would expedite and facilitate disaster response and recovery efforts. An improved communication system can reduce the costs of disaster response and potentially support the provision of services to more individuals and households, including vulnerable populations, in a more effective manner. This could either reduce the costs of disaster response in the Community or provide disaster relief services to more households or individuals.

Health and Social Benefits

The radio repeaters would benefit the entire population of the Community of 96,166⁷⁵ by improving communication and responsive service during or after a disaster. First responders and disaster response teams would have enhanced communication capabilities, thus increasing efficiency, reducing duplicative efforts, facilitating tasks that require multiple teams, and assisting data sharing between agencies and CBOs. These services are important to avoiding or minimizing diminishing quality of life impacts due to loss of infrastructure (e.g., power, sewage, or water)¹⁰¹ and other health risks associated with disaster situations.

This project has significant benefits to vulnerable populations including 25,359 low income households; 20,870 residents that do not speak English proficiently; 9,176 households with at least one person with a disability; and 16,145 residents over 65 years old.¹⁰⁶ By tying into the Block Institute's existing network, the radio repeater network would build on the assets in the community that already exist. It would also expand communications with vulnerable populations associated with the Institute at their schools and group homes.

Cost-Benefit Analysis

The project has a low cost (\$250,000) that is outweighed by the economic and health and social benefits provided to the entire Community. The project would facilitate the efforts of emergency responders and disaster recovery teams by providing an additional communication network that could be used

when traditional networks go down. This reliable communication network would facilitate a more efficient and effective disaster recovery effort and will have direct benefits to vulnerable populations. The project would increase the capacity of first responders to respond in multiple future storm events, improving the project's benefit to cost ratio.

Risk Reduction

Communications deficiencies between vulnerable populations and first responders can have many risks during a disaster. This project reduces risk to vulnerable populations by providing a reliable means of communication to facilities which serve this population.. The project would also reduce the risk to the general population by helping to spread critical information during and after disaster events, such as the status of roadways, evacuation centers, healthcare facilities, and first responders.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

The installation of radio repeaters would require building permits.

Jurisdiction

This project is in the Borough of Brooklyn. NYC OEM, a non-profit organization or community group could implement the proposed project.

D4: Establish Resource and Recovery Center at an Existing Social Service Facility (Featured)

Project Description

Superstorm Sandy highlighted the need for a safe and central location for Community members to obtain information and emergency supplies. This project would create a resource and recovery center which would be a site for the coordination of emergency and relief services after a disaster event for a period up to a year. Similar centers are already being planned in nearby communities through the NY Rising program. After a disaster event, this center could serve as a hub for recovery agencies, and local organizations to administer disaster recovery programs. In addition, the site would serve the residents as a distribution location, and would provide relief services such as access to food, water, power and phone charging stations, supplies, medical services, information, and special services for vulnerable populations.

While not in use post-disaster, the facility may serve the following functions that would strengthen the community's capacity to respond following a disaster:

- Provide meeting space for the Community Emergency Response Team (CERT) and/or Community Organizations Active in Disaster (COAD, see Project D2);
- Host representatives from government agencies providing disaster relief and recovery funding (i.e., grant/loan application center),
- Storage for CERT equipment;

- Provide training space for CERT teams as well as meeting space for community preparedness; and
- Provide residents with a one-stop location for resources, such as post-disaster financial assistance.

Funding from this project could go towards hardening the selected facility, such as purchasing a backup generator to continue full operations during power outages. The intent of this project is that the facility would be maintained by a non-profit organization. Ideally, the resilient facility would be affiliated with the Gravesend and Bensonhurst COAD, which may be established as a part of Project D2.

Cost Estimate

\$250,000

The project would have a medium cost (approximately \$250,000). The project would include assessment of potential sites, fixed communications equipment, and a backup generator. The estimated cost of \$250,000 could provide a resource and recovery center with the installation of approximately a 100 kW backup generator (similar to the grants provided in *Project E1 Install Backup Power Supply for Critical Facilities and Infrastructure*), as well as fixed short-wave radio equipment. The cost estimate includes a standard 25% contingency to account this uncertainty.



Resource & Recovery Center after Superstorm Sandy



Distributing Goods at a Resource & Recovery Center

Operations and maintenance costs total approximately \$480,000 for the generator, and would include the cost of natural gas needed to run the generators, general cleaning, periodic emissions testing, and periodic part replacements for an average operating life of approximately 25 years. As the NY Rising Center would be located in an existing social services facility, it is assumed that costs to operate the

NY Rising Center would not differ from the cost of daily operations at the existing facility.

Also similar to project E1, external costs associated with this project would vary depending on the backup power source and facilities selected. A natural gas generator is anticipated to have negligible air quality impacts, emitting pollutants such as carbon dioxide, carbon monoxide, nitrogen oxide, and particulate matter.¹⁰⁵ Any form of backup power installation may require the temporary closure of the building. Additional costs for setting up the resource and recovery center (which are not covered by this project's funding) include programming, identification of ancillary funding sources, community outreach, coordination with disaster officials, and, if applicable, design and construction of a new facility.

Benefit or Co-Benefits

Economic Benefits

The project could create an estimated three full-time equivalent jobs. Additional jobs would be generated through the operation and maintenance of the Resource Center.

The resource and recovery center would reduce disaster recovery costs by consolidating multiple social service and emergency response functions under one roof. The center would also save costs on communication during the disaster recovery phase. Community members would know beforehand that the Resource Center is the central location for recovery resources such as food and water, information on recovery efforts as well as assistance programs. In addition to

lowering costs, this project could potentially provide more services to individuals and households, including vulnerable populations. The establishment of a Resource Center as the first stop for community members would minimize the confusion with disaster recovery, decreasing recovery cost and time.

Health and Social Benefits

This project would benefit the Community by providing a central location for disaster recovery information and the distribution of disaster relief supplies. This project would benefit the entire population of Gravesend and Bensonhurst (96,166 people⁷⁵) and its socially vulnerable populations. The socially vulnerable populations will experience a significant benefit by having a central location to obtain the resources on which they may depend.

Cost-Benefit Analysis

The total proposed project cost of \$250,000 is a modest investment that can yield high returns by improving the efficiency of emergency response operations, reducing government expenditures for future storm events, and providing a central location for disaster recovery information and supplies. This would provide health and social benefits to the entire population of the Community (96,166 residents) and especially socially vulnerable populations. The facility would increase the capacity of first emergency responders to respond in multiple future storm events, increasing the project's benefit to cost ratio.

Risk Reduction

The project will provide a reduction of risk to all residents in the Community by providing a central location where residents can obtain recovery resources following a disaster and get education and disaster preparedness resources year-round. Although the project would not reduce the risk of assets from flooding and storm activity, it would reduce the vulnerability of residents by enabling them to access information and services and thus recover faster from a storm event.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required.

Jurisdiction

This project is in the Borough of Brooklyn and the City of New York would have jurisdiction. The Governor's Office of Storm Recovery (GOSR), New York State Division of Homeland Security and Emergency Services (DHSES), nonprofit organizations or community groups could assist with implementation.

E1: Install Backup Power Supply for Critical Facilities and Infrastructure (Proposed)

Project Description

During Superstorm Sandy, the electrical infrastructure was compromised which led to the failure of power to critical institutional and non-profit facilities, as well as facilities that serve vulnerable populations, such as the elderly and the disabled. In addition, unreliable power or complete power failure at these locations impeded the use of critical facilities after the storm, which endangered vulnerable populations and slowed disaster recovery. Ensuring that there is power redundancy at critical facilities throughout the Community would benefit the entire community before, during, and after storm events. For example, schools with reliable power would not need to temporarily transfer their students, as was the case after Superstorm Sandy, which led to overcrowding in Gravesend and Bensonhurst schools. Senior housing would also not need to evacuate their residents as was reported during Superstorm Sandy when residents from Sons of Italy Senior Housing were displaced for over 30 days due to power failure.

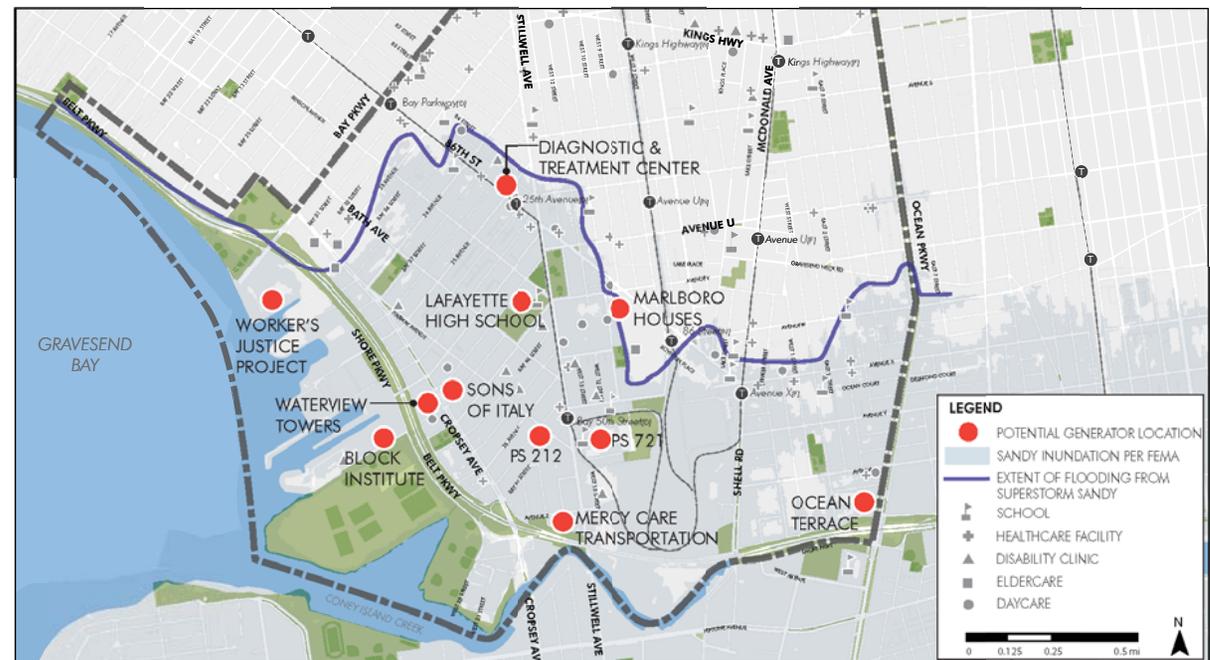
This project seeks to provide funding, in the form of grants, for fixed generators for critical facilities or those which serve vulnerable populations located within the Community such as schools, senior centers, social service providers, medical facilities, residential buildings serving vulnerable populations, and public administration buildings. In total, approximately 125 facilities within the Community would be eligible to submit a grant application for a generator.¹⁰⁷ The generators would allow these facilities to

function during and after storm events when the surrounding power infrastructure fails. As part of the grant application, applicants would need to identify a suitable location for the generator, which would be elevated out of the 100-year flood zone. Applicants could also elect to provide matching funds to construct or improve a suitable location for the backup power supply at their facility.

The project allots \$300,000 in funds provided exclusively for the backup power supply

systems, including installation. Funding for necessary site preparation, including elevation of the power supply, constructing or hardening the structure where the generator would be located, etc. would be secured separately by the respondents. Although the grant funding may not be sufficient in all cases to pay for the entire improvement, it would provide enough of an incentive to provide the matching contributions to complete the critical infrastructure upgrades.

Figure 4-21: Potential locations for backup power



Cost Estimate

\$300,000

The cost of this grant program is approximately \$300,000, which could be allotted to up to six grants. The cost for each generator would depend on site specific constraints such as where the generator would be located, as well as the energy demand for the areas of the facility that would be powered by the generator. For the purposes of estimating costs associated with this project, three grants of approximately \$100,000 each would afford for each facility to install a 80 kW natural gas generator capable of powering approximately 10,000 sq. ft. (with HVAC systems) or specific critical building areas (i.e., elevators, lighting in stairwells). This cost does not include costs for installation, operation and maintenance. The recipient of the grant would need to provide the balance of funds to install and maintain the generator.

The grant would require applicants to identify a suitable location for the generator (elevated out of the 100-year flood zone) as well determine the energy demand for the areas of the facility which would be powered by the generator. Grant applicants would need to include a

site analysis and cost estimate to install the generator on site.

Operations and maintenance costs total approximately \$1,440,000 for all three generators (total), depending on the generator size, and would include the cost of natural gas or other fuel needed to run the generators, general cleaning, periodic emissions testing, and periodic part replacements for an average operating life of approximately 25 years.

External costs associated with this project would vary depending on the backup power source and facilities selected. A 80 kW natural gas generator is anticipated to have negligible air quality impacts, well within acceptable thresholds.¹⁰⁵ Any form of backup power installation may require the temporary closure of the building.

The cost of natural gas generator may vary, depending on the needs and size of the facility. Table 4-4 shows the facilities and needs that various natural gas generators can accommodate.

Benefit or Co-Benefits

Table 4-4: Facilities and Needs that Various Generators can Accommodate

Floor size of building (sq. ft)	Needs accommodated	Generator Size (kW)	Generator cost
5,000	Lighting	20 kW	\$32,000
5,000	Lighting and air circulation*	40 kW	\$53,000
10,000	Lighting	40 kW	\$53,000
10,000	Lighting and air circulation*	80 kW	\$88,000
40,000	Lighting	160 kW	\$250,000
40,000	Lighting, cooking, and air circulation*	250 kW	\$280,000

*If the building is heated by natural gas, air circulation will distributing heating throughout the building

Environmental Benefits

Environmental benefits would vary depending on the backup power supply source utilized for each facility. A natural gas backup power supply would not have direct environmental benefits, but would have several social and health benefits.

Economic Benefits

This program would create three FTEs for a year through the procurement and installation of the generators.⁵⁹ The operations and maintenance of the generators (not funded by this project, to be provided as a match by the selected recipients) would create sixteen (16) FTEs over the span of 25 years. Backup power at critical facilities would decrease costs associated with power outages following disasters by reducing the risk to critical and locally significant facilities during disaster events. For example, low-income housing residents living in a housing complex with redundant power may not have to evacuate after a disaster. The evacuation of a 1,000-unit housing facility could cost up to \$275,000 for a Category 3 storm.¹⁰⁸ Should power be interrupted during or after a disaster event, facilities with backup power could also serve as resource, charging stations, or warming/cooling centers. This would effectively increase the efficiency of disaster response operations by reducing the cost and time of local residents and business owners who would have otherwise traveled further distances outside of the community for supplies and information.

Health and Social Benefits

Health and social services benefits could be

Gravesend and Bensonhurst

significant but they cannot be readily quantified. Installation of a backup power supply would ensure uninterrupted functionality at critical facilities during community-wide power failures. This would benefit vulnerable populations that rely on critical facilities for social and medical services. Medical facilities with backup power would be able to remain operable to serve patients in need. In addition, uninterrupted power supply would facilitate the disaster recovery process by allowing efforts to focus on other fronts. As a scalable program, greater than 125 facilities in the Community, 44% of which provide health care services, may be eligible to participate.¹⁰⁷

Backup power would also reduce the vulnerability of residential facilities. For example, many high rise buildings that flooded during Superstorm Sandy lost their elevator service and residents had to evacuate. While complete data for this Community is not available, city-wide information indicates that approximately 80,000 residents in NYCHA facilities were affected by power failure.¹⁰⁹ Some residents had to relocate to shelters and nursing homes outside the community.¹¹⁰ In the case of the Waterview Towers during Superstorm Sandy, backup power supply would have powered the elevators, preventing a situation where disabled and elderly residents were stranded because of inoperable elevators. Backup power would also facilitate the ease of evacuation should it be necessary.

Cost-Benefit Analysis

Through this project, the Community would be able to gain reliable power at approximately three

institutional or non-profit facilities through the installation of backup generators. The economic benefits include three full time equivalent jobs for a year and reduced costs associated with power outages, such as decreased evacuation and disaster response costs. The health and social benefits would include preventing the displacement of populations, including socially vulnerable population, during disaster events. These economic, social, and health benefits would outweigh the capital investments of \$300,000.

While this cost estimate would fund an average of three locations for back up power generation at, it is conceivable that certain locations would require less or greater funds to install backup power, due to the size of the space and building systems (i.e., lighting, heating) to be powered by the supply, existing natural gas connection, and the organization's ability to match funding from other sources. Therefore, a competitive solicitation process would determine the facilities that would directly benefit from this project and could scale the project accordingly. For example, a competitive solicitation could determine that a backup power supply system at one school would cost \$100,000 for lighting, while a smaller social services organization may only require \$40,000 each to provide backup power for every elevator in a facility. Therefore, this project is scalable through the competitive process, based on the needs and capacity of organizations to implement the project. Likewise, the project's cost benefit-analysis is scalable, becoming even more beneficial depending on the outcome of the competitive process.

Risk Reduction

A backup generator would significantly reduce the vulnerability of a critical asset, reducing its risk to a residual level. This project would also reduce risk for socially vulnerable populations that rely on the facility or infrastructure powered by the backup supply. For example, if a healthcare facility were to have a backup power supply installed, patients would experience a reduce risk of losing access to the healthcare facility and the services it provides. These populations cannot be quantified as the exact locations where generators would be installed are unknown. However, the grant process would prioritize facilities that service vulnerable populations such as assisted living homes, shelters and schools.

Timeframe for Implementation

Immediate (< 2 years)

Regulatory Requirements

This project would have to comply with the New York City Building Code. Because it would be used for backup operation only and would operate less than 500 hours per year, the natural gas backup generator is classified as "exempt" from NYSDEC air permitting requirements at a non-Title V facility (6 NYCRR §201-3.2).

Jurisdiction

This project is in the Borough of Brooklyn and the City of New York would have jurisdiction. Nonprofit organizations or community groups could assist with implementation through a competitive process.

E2: Expand Feasibility Study for Energy Resiliency for NYCHA and Mitchell-Lama Properties into Gravesend and Bensonhurst (Proposed)

Project Description

Widespread power outages following Super-storm Sandy put many lives at risk – especially vulnerable populations - revealing the need for a reliable, independent power supply network. Additionally, power outages impacted residents and business owners, slowing commercial activity and the pace of recovery and putting first responders at risk.

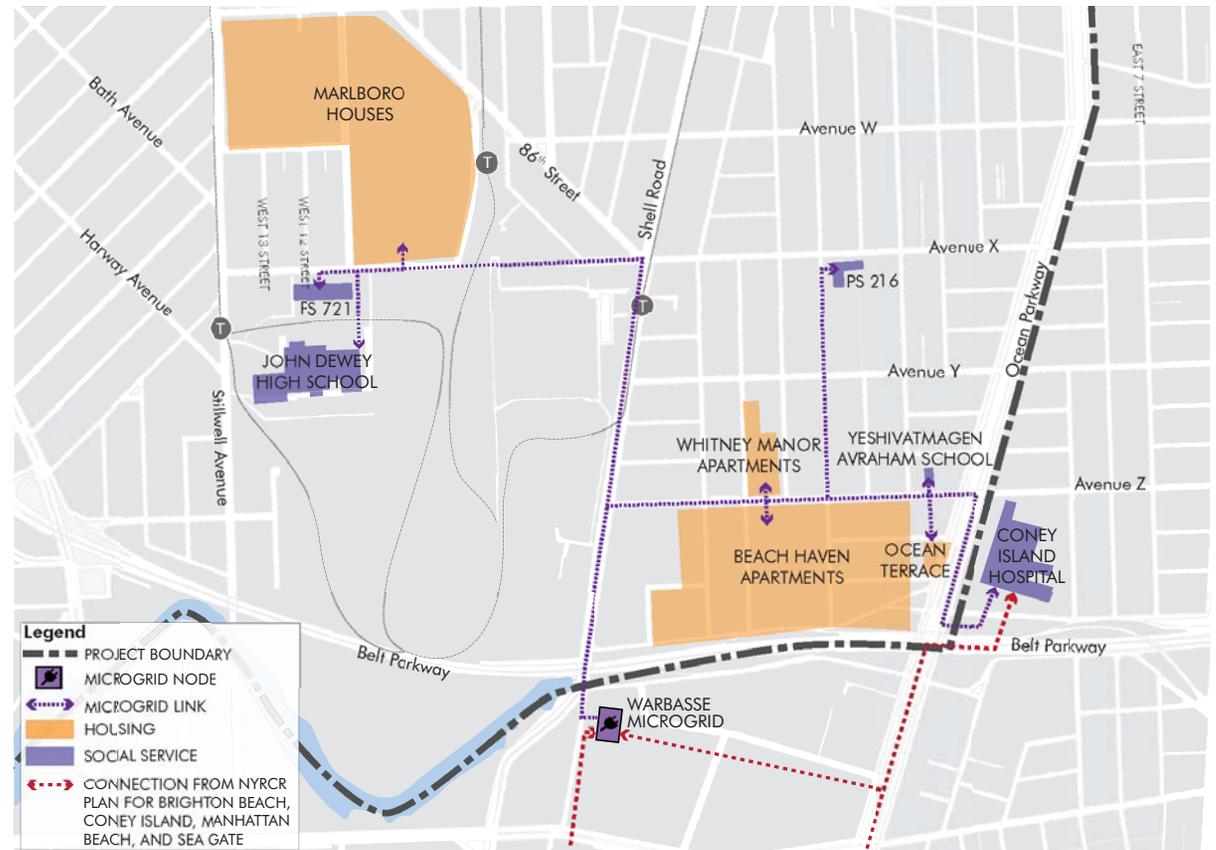
As part of the discussion of various methods to improve reliable power in the Community, the Committee identified the possibility of developing a microgrid network north of the Belt Parkway to link key facilities to each other as a way to make them more resilient and less susceptible to loss of power during severe weather events. A microgrid ties together multiple energy sources that can generate electricity locally, and can function independently from the regular power grid. These can be conventional energy sources such as diesel or natural gas as well as fuel cells or renewable energy such as solar, wind and other sources. During normal conditions, the microgrid can provide electricity back into the traditional power grid, helping to reduce peak electricity demands. If the regular grid fails during an emergency, the micro-grid would continue to supply power to those facilities connected to it.

Rather than a project to develop a new microgrid network, the Committee proposes to leverage existing efforts to create a microgrid in Southern

Brooklyn. This project would augment funding to expand the scope of a feasibility study of a microgrid network on the Coney Island Peninsula with a power hub located at the Amalgamated

Warbasse Houses. This study was initiated by the Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Committee.

Figure 4-22: Conceptual layout for microgrid expansion



Gravesend and Bensonhurst

The original central power plant at the Amalgamated Warbasse Houses was constructed in the 1960s with three boilers, five absorption refrigeration machines and two 3-megawatt steam turbines. In the 1980s it was upgraded with a 10 megawatt cogeneration plant that utilized gas turbine/generators with exhaust heat recovery boilers. The facility supplies steam heat, hot water, chilled water and electricity to the 8,000 residents of the nearby Amalgamated Warbasse Housing complex.¹¹¹ The cogeneration plant heats the Warbasse Houses via a network of underground dual-temperature pipelines that distribute hot water during the heating season and chilled water during the cooling season.¹¹² Warbasse entered into an innovative financing deal in the 1980s with an independent power producer that enabled these upgrades and expanded the facility's capacity and efficiency with five 4.5 MW turbine/heat recovery steam generators. As a result, a connection was established with Con Edison's electric grid, providing an emergency backup power source and supplying 20 MW of power to the utility.¹¹³ The plant sustained damage during Superstorm Sandy when the electrical equipment in the basement of the plant was damaged as the Warbasse basements were flooded with salt water. The Plant may be able to be upgraded with improved efficiency and resilient design standards to serve as the primary source of power for a microgrid network.

The contribution of funds also expands the scope of the existing feasibility study to include the NYCHA Marlboro Houses and other housing developments, such as Waterview Towers and Sons of Italy senior housing, as part of the Coney Island microgrid network.



Amalgamated Warbasse Houses

Source: Google Maps

The expansion of the feasibility study would also evaluate the incremental implementation of microgrids at strategic locations to supply critical facilities that already have backup power systems (i.e., Coney Island Hospital, the Block Institutes) and critical facilities identified in Project E1 for the implementation of backup power systems.

Cost Estimate

\$50,000

The funding amount allotted to support the expansion of the existing microgrid feasibility study would be \$50,000. The expanded study would increase the geographic scope of the Coney Island studies to identify potential locations for microgrid nodes in Gravesend-Bensonhurst, and would verify with field surveys both the suitability of potential sites and the feasibility of connecting them as a microgrid.

Economic Benefits

The expanded feasibility study would create an estimated 1 full-time equivalent job⁵⁹ (FTE). If a microgrid were to be implemented as a result of the study, additional jobs would be generated through the design, construction, and maintenance of the microgrid.

A microgrid would also generate cost savings for the Community. The Community could rely on the microgrid for a portion of its power, decreasing the amount and cost of power purchased from Con Edison. More specifically, the Community would be able to maximize the contribution from the microgrid during the day when utility rates and demands are high; during the night when energy demands are lower, the Community could decrease the contribution from the microgrid and buy power at a discounted rate from the local utility. Typical microgrid systems can reduce the load off the main power grid by up to 15%.¹¹⁵

In addition to preventing storm-related power outages, a microgrid can have potential economic benefits such as reducing the impact of blackouts and brownouts due to demand outpacing the power network's capacity. For example, critical facilities connected to the microgrid may not need to evacuate due to interrupted power supply. Figure 4-221 shows a potential microgrid setup. In this potential setup, 3,515 residential units are connected to the microgrid. Due to the microgrid, residents in facilities connected to the microgrid might not need to evacuate, which could save the community approximately \$970,000 from the avoided evacuation costs from a Category 3 storm due to expenses such as travel, lodging,



Lafayette High School as Potential Location for Backup Power

The estimated cost of \$50,000 for expanding the studies has a low degree of uncertainty; however, to implement the microgrid, additional costs would have to be secured for the design, construction, and maintenance. These costs have not yet been estimated as they are dependent on, and a component of, the expanded microgrid feasibility studies. While no external costs are anticipated for the microgrid study, potential external costs related to microgrid construction may include temporary construction impacts associated with the installation of underground utility conduits, such as temporary road closures or impacts to noise levels and air quality. These impacts are highly uncertain, as the microgrid has not yet been designed.

Benefit or Co-Benefits

Environmental benefits

Microgrids would save power by providing a reliable electricity source independent of the main power grid. Adding a microgrid to a power network would make power consumption more energy efficient by adjusting the amount of supplied power to the demand of the network. As a result of the efficiency, microgrids have been shown to reduce the CO₂ emissions by 19% over the span of 5 years.¹¹⁴ Also, microgrids have the potential to be powered by renewable energy sources, such as solar panels.

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and food (assuming that the evacuation of a 1,000 unit facility would cost \$275,000¹⁰⁸). In addition, the urgency of repairing failed power systems would be reduced for the microgrid area—which expedites return of service for other areas—and certain healthcare facilities and affordable housing units would experience a decrease in loss of service. Coney Island Creek Hospital evacuated over 200 patients after its generators had to be turned off.¹¹⁶ This evacuation could have been prevented with a microgrid tie-in to the hospital.

Health and Social Benefits

Microgrids would improve energy redundancy for critical facilities connected to the independent grid. This would reduce the interruption of service that these critical facilities provide, which would benefit the health and safety of Community members. For example, eldercare facilities will be able to provide reliable healthcare service during storm events. Socially vulnerable populations will experience a decrease in the risk of losing facilities that provide healthcare services they rely upon. A well functioning microgrid could also help in avoiding or minimizing diminishing quality of life impacts due to loss of electricity¹¹⁵ and potentially could help to reduce incidents of illness and morbidity associated with disaster situations.⁷⁴

Cost-Benefit Analysis

The implementation of a microgrid has significant environmental, economic, and health and social benefits. The expanded feasibility study's low cost (\$50,000) is outweighed by the benefits of a potential microgrid system. Adding funds to expand the scope of an existing study is cost

effective compared to a standalone study, which would cost approximately \$200,000. Further, the study could partner with or leverage funding opportunities provided by the New York State Smart Grid Consortium (NYSSGC) and the New York Power Authority (NYPA).

Although the study would only generate 1 full-time equivalent job, the potential capital project would generate additional jobs through the design, construction, and maintenance of a microgrid. The number of these potential jobs would vary based on the recommendations of the expanded feasibility study and on the scale of the designed microgrid.

The microgrid would reduce the Community's dependence on the power grid, and could provide power to up to 6,529 residents when the main power grid fails. A well functioning microgrid could decrease the confusion and stress associated with disaster response by reducing the need to evacuate residents of connected buildings, while saving the Community money on evacuation costs. It could also avoid or minimize costs associated with lower quality of life, illness and morbidity that may result from power loss.¹⁰¹

The expanded feasibility study is a necessary step to implementing a microgrid. Given the overall benefits that the microgrid provides and the low cost of the expanded feasibility study, the Community would experience an overall benefit by executing the project.

Risk Reduction

Facilities connected to a microgrid would have a reduced vulnerability to power outages which

corresponds to an overall reduction in risk. For housing facilities, redundant energy supply would prevent power outages to key functions like lights, elevator service and water pumps. Critical facilities connected to the independent grid would benefit from a reduced risk of interruption of service. This would improve the safety of the Community and especially vulnerable populations that rely on services the critical facilities provide.

Timeframe for Implementation

Immediate (<2 years)

Regulatory Requirements

No permits should be required for the study; however, implementation of the feasibility study's recommendations may require permits or approvals including building permits and coordination with NYSERDA, local communities, and utility providers.

Jurisdiction

This project is in the Borough of Brooklyn and the City of New York would have jurisdiction over the project. The Marlboro Houses are owned and operated by NYCHA, while other affordable housing properties owned by private property owners or nonprofit organizations. The Warbasse Houses, a likely source of energy for the microgrid network, are City-sponsored, moderate- and middle-income housing units over which the Department of Housing Preservation and Development (HPD) has oversight responsibility.

E3: Develop a Wireless Mesh Network as a Backup Communications Network (Proposed)

Project Description

Residents in the Community have identified the need for a more reliable communications network. Cell phone service as well as traditional telephones went down during Superstorm Sandy, and service has been unreliable even during smaller storm events. Given these connectivity issues, this project aims to provide a backup communications system in the form of a wireless mesh network. This network, which provides wi-fi access to the internet, would be free and open to the public. Essentially, the wireless mesh network would connect individual wi-fi nodes (routers at participating non-profit and government locations) to create a web of network connectivity. If deployed properly, wireless mesh networks can be:

- Less expensive than traditional networks because they use fewer wires.
- Adaptable, expandable, and can cover large areas.
- Can support high demand with reliable connectivity.

The wireless mesh network is better equipped to cover areas and populations not adequately served by the existing telecommunications networks. Furthermore, the wireless mesh would have a backup power source that would enable the network to function even with power disruptions.

Elements of the wireless mesh network include¹¹⁸:

- A Mesh Node – the designated non-profit or government owned location where wireless equipment can be installed;
- An Internet Connected Mesh Node – a volunteer non-profit or government owned location willing to allow connection to the mesh to its internet connections;
- A Solar Powered Mesh Node – a volunteer, non-profit or government owned location willing to pilot a solar-powered site that will stay on even during times of power loss.

The Red Hook WiFi initiative in Red Hook, Brooklyn is a comparable community-led program to provide a wireless mesh network. Red Hook WiFi, in partnership with local businesses and residents provides internet access with the goal of “closing the digital divide, generating economic opportunity, facilitating access to essential services and improving the quality of life.”¹¹⁹ The wireless network has a home page which displays local events, news, job listings and is free for all users. The program utilizes “Digital Stewards”, or young adults that are employed by the initiative to install and maintain the network and use the technology to bring about community development.

Using the Red Hook WiFi model as an example, the Gravesend and Bensonhurst wireless mesh network initiative would provide seed money for a training program for young residents or



Node installation in Red Hook, Brooklyn
Source: www.nytimes.com



Conceptual visualization of wi-fi mesh network
Source: [Eric Drost, curiousmatic.com](http://ericdrost.com)

“digital stewards” to setup the mesh network. The program would identify a /non-profit to run this initiative and could fund a neighborhood education awareness campaign to help the initiative maintain long term relevance via better community understanding.

Gravesend and Bensonhurst

Cost Estimate

\$200,000

The project would cost approximately \$200,000. This cost covers the review of available technologies for the wireless mesh network, consultation with utility providers and local officials, cost estimation of the implementation of the network, identification of funding sources and innovative financing, the identification of any expected regulatory approvals and permits necessary for project implementation, and \$50,000 in seed money for a training program for young residents or “digital stewards” to establish the mesh network.

Following program development, competitive solicitation process would be performed for the construction of the network. The construction cost of the wireless mesh network (funding not covered by this project) would be approximately \$775,000. This construction cost would cover five (5) years of operations and maintenance. However, the equipment will need to be replaced after five (5) years to address degradation and antiquation of equipment. The \$50,000 in CDBG-DR funding would offset a portion of this cost and would be used for the youth training program which will help encourage participation and ongoing custodians of the project.

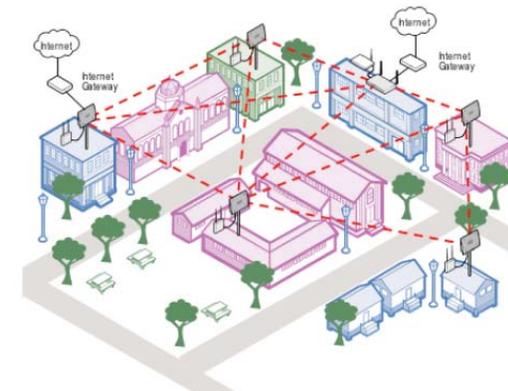
The construction cost of the wireless mesh network would include equipment and installation costs for routers, solar panels as a power source, network links, and miscellaneous costs such as those that may be associated with the operating system. The routers would cover areas in the Community where population is



Wi-fi node in Hoboken (Mile Mesh)
Source: www.milemesh.com/

high. They are also placed near critical assets or assets that serve socially vulnerable populations. Additional expansions could supplement this network, covering a larger coverage area or strengthening the signal in existing areas.

The estimated cost of \$200,000 for program development and cost estimate has a low degree of uncertainty, yet the estimated cost of \$775,000 for implementation is highly uncertain due to technological innovation and cooperation on the part of utility providers. It is for these reasons that the estimated cost of \$200,000 includes a review of available technologies and detailed cost estimate. No external costs are anticipated to result from this project. The cost estimate for the program development includes a standard 25% contingency to account this uncertainty.



Conceptual visualization of wi-fi mesh network
Source: <http://www.walk-about.eu>

Benefit or Co-Benefits

Economic Benefits

This project would generate a total of 2 full-time equivalent⁵⁹ (FTE) jobs through the study of a possible wi-fi and safety mesh grid. The future construction of a wireless mesh network would generate additional jobs from the construction, operation, and maintenance of the network. In addition, the implementation of a wireless mesh would reduce the need for the Community to harden the existing communications network.

Significant economic benefits would result from better communications following disasters, enabling more efficient disaster response and faster recovery and potentially lowering the costs of disaster response and recovery. Through the wireless mesh, community members would be able to contact their friends and family after a storm event, gain important news updates and communications from government agencies, and utilize social media, which was a key source of information after Superstorm Sandy. Business

NY Rising Community Reconstruction Plan

owners will be able to utilize the internet to their advantage for immediate recovery.

The network could be used by small businesses during times of disaster when traditional communication networks are down, such as cell and landline service. Using point of sale devices connected to the network, small businesses owners could continue to conduct business transactions, and can serve vulnerable populations reliant on public benefit cards such as an Electronic Benefit Transfer (EBT) card for food stamps which require a terminal connected to the internet to complete the transaction.

The wireless mesh would also serve as a municipal wi-fi network during non-disaster times ("blue skies"), increasing its economic benefit. This network would provide internet and telecommunications access to all of Gravesend and Bensonhurst.

Health and Social Benefits

The implementation of a wireless mesh grid would make communication more reliable during and after disaster events. This would facilitate the corresponding disaster response and recovery efforts. Vulnerable populations would benefit from a reliable communication network, which ensures they are able to locate resources and contact facilities they may depend on. Friends and family will be able to check in with each other. Community residents will know the status of emergency responders, any disaster recovery efforts, and the location of any available recovery services and supplies. A more reliable wireless network may decrease the cost of response and recovery efforts and increase the

amount of services that are delivered to entities in need including socially vulnerable populations.

In non-disaster times, the general population will benefit from a public wireless network. The network could also be a community communication hub, providing Community members with updated information on job listings, news, emergency response news and weather.

Cost-Benefit Analysis

The economic and health and social benefits of this project outweigh its low capital cost (\$200,000). The wireless mesh network would create additional jobs through the design, construction, and operations and maintenance of the network. In addition, disaster recovery and response would be facilitated through a reliable communications network which can lower the cost of response and recovery efforts. In addition, the network may increase the effectiveness of response efforts resulting in more services and resources delivered to entities in need including socially vulnerable populations.

Although the costs of design, construction, and installation are not known at this time, the benefit of establishing year-round reliable wireless service would provide everyday economic benefits to residents and businesses that do not currently have internet access. Therefore, it is uncertain whether the benefits of the project would outweigh the future cost of its implementation. However, the considerable environmental, economic, and health and social benefits of the project would indicate that the feasibility study should be undertaken at a relatively low cost of

\$200,000.

Risk Reduction

The wi-fi mesh will reduce the risk of losing access to communication networks during a disaster event. The communications network is a critical infrastructure system asset. The redundant system will ensure community members, especially vulnerable populations, are able to communicate with their family, emergency response personnel, and disaster response organizations.

Timeframe for Implementation

Intermediate (2 – 5 years)

Regulatory Requirements

The project would need to comply with Federal Communications Commission (FCC) guidelines, NYC Information Technology & Telecommunications guidelines, as well as the terms of service and any applicable licensing associated with the wireless mesh network.

Jurisdiction

As this project is in the Borough of Brooklyn, the City of New York would have jurisdiction over the project. Nonprofit organizations or community groups could assist with implementation of the proposed project through a competitive process. The responsible entity would need to coordinate with utility providers to ensure the network has reliable internet service.

Gravesend and Bensonhurst

An aerial photograph of a city waterfront, likely New York City, showing a dense urban grid on the left and a large body of water on the right. A semi-transparent blue horizontal band is overlaid across the middle of the image, containing the text 'Section V' and 'Additional Materials' in a dark blue, sans-serif font. The background image shows a mix of residential and commercial buildings, a highway, and a park area near the water's edge.

Section V
Additional Materials

SECTION V: ADDITIONAL MATERIALS

A. Additional Resiliency Recommendations

Project Name	Short Description	Regional Project (Y/N)
A4: Support Resilient Improvements at City Parks along or near Waterfront	Integrate resilient design measures into City Parks along or near the waterfront, including Bensonhurst Park, Shore Park and Parkway Six Diamonds, and Dreier-Offerman Park. Resiliency improvements could include elevations, shoreline hardening, green infrastructure, wetlands restoration, or dry flood proofing of buildings and comfort stations.	N
A5: Support Coney Island Creek Feasibility Study	Support NYC EDC’s study to evaluate the feasibility of constructing revetment(s) and a tidal gate at the mouth of Coney Island Creek to mitigate flood risk. The Committee supports the ancillary goals of enhancing roadway links, restoring wetlands, improving recreational amenities, and enhancing public access to the waterfront.	Y
B5: Support Zoning Education and Enforcement for Permeable Pavements	Support “green zoning” modifications recently adopted by the New York City Planning Commission and advocate for expanded zoning modifications and incentives to reduce the amount of impervious surfaces on private properties such as yards, driveways and sidewalks with permeable pavements, landscaping and trees.	Y
C4: Support Resiliency Retrofits at Marlboro Houses	Advocate for the elevation of mechanicals and provision of backup power supply for buildings in the housing complex.	N
D5: Support the Capacity Increase of Local Community Emergency Response Teams (CERT)	Provide assistance to local CERT teams active in Gravesend and Bensonhurst to expand volunteer participation, distribute educational materials (in multiple languages), host training programs, and use other measures to increase the CERT’s capacity to provide post-disaster recovery services.	Y
E4: Support Sewer Infrastructure Maintenance Project	Advocate for NYC DEP to increase the frequency of maintenance for catch basins, manholes, and sewers in identified areas with recurring flooding issues.	Y
E5: Support Backup Power for Telecommunications Infrastructure	Work with telecommunications operators to install backup power supply systems at cell towers, harden or flood proof underground telephone wires, prune trees that pose risks to above-ground wires, and bury above-ground wires under the street.	N

A4: Support Resilient Improvements at City Parks Along or Near Waterfront

The Community has a number of City Parks along its waterfront, such as Bensonhurst Park, the Shore Parkway Greenway, Calvert Vaux Park, Six Diamonds Park and Dreier Offerman Park. Of the five, four are within the flood zone and all are at risk to damage from tidal inundation. The Shore Parkway Bikeway and Bensonhurst Park were inundated during Superstorm Sandy, causing damage to pavement and loss of benches, as well as flooding in the Tennis Center which still remains closed. Water regularly overtops the bikeway during spring tides and even some high tides. This recurring flooding hinders the usage of these parks and requires costly repairs. This project supports the NYC Department of Parks program to integrate resilient design measures into City Parks along or near the waterfront. This includes measures at Bensonhurst Park, Shore Parkway Bikeway, Calvert Vaux Park, Six Diamonds, and Dreier Offerman Park.

Resiliency improvements should be implemented as appropriate, feasible, and effective for each park. These include elevations, sea walls, shoreline hardening, green infrastructure, wetlands restoration, or dry floodproofing of buildings and comfort stations. Some of the key improvements that this project would support are:

- Structural defense systems along parks (i.e., levees or sea walls),
- Adaptable berms and vegetated buffers,
- Installation of flood gates and storm surge barriers,
- Installation and repair of bulkheads (emergency bulkhead repairs adjacent to Belt parkway in Southern Brooklyn¹²³),
- Armored stone shoreline protection,
- Hardening of the utilities,
- Elevating or dry flood proofing of buildings and comfort stations,
- Wetlands restoration, and
- Green infrastructure for stormwater, including bioswales, pervious pavements, rain gardens, and cisterns or rainwater harvesting for rooftops.



City Parks Along or Near Waterfront

A5: Support Coney Island Creek Feasibility Study

Coney Island Creek is the one of the main entry points of water into the Gravesend-Bensonhurst and Coney Island areas. During Hurricane Sandy, water flowed into the creek from Gravesend Bay, causing the creek and the surrounding area to flood. This flooding pattern caused “backdoor flooding,” where areas farther away from the shoreline were inundated. In addition, Coney Island Creek is the host of several sewer outfalls. Flooding of the creek prevents water from flowing out of the sewer outfalls, which is a potential cause of sewer backups upland. Therefore, preventing the flooding of the Coney Island Creek provides benefits in two different ways.

This Additional Resiliency Recommendation supports the New York City Economic Development Corporation’s Coney Island Creek Feasibility Study, which would investigate hydrological management strategies that would prevent and mitigate upland flooding, improve waterfront open space, strengthen neighborhood

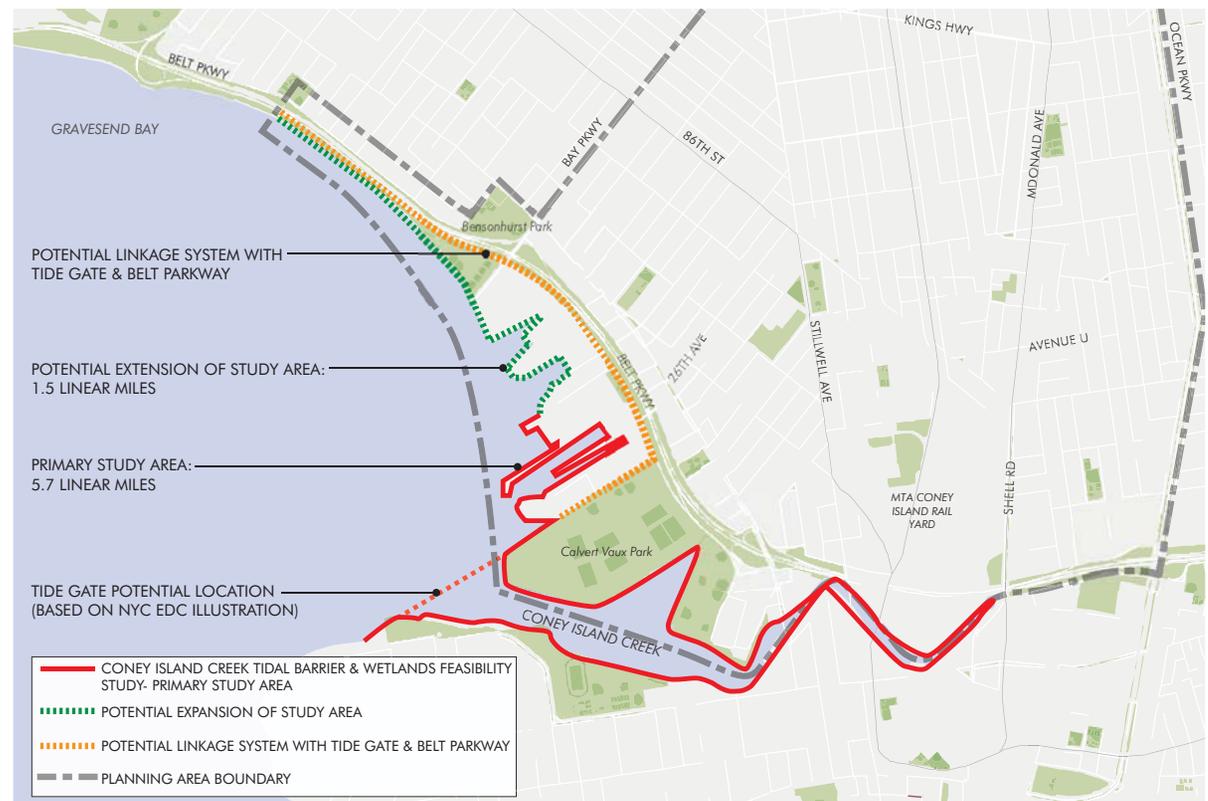


NYC EDC illustration of potential improvements at Coney Island Creek
Source: nyc.gov

connections, enhance infrastructure, and provide opportunity for economic development around the Creek. The Community supports this project for its potential flood mitigation benefits in the Gravesend and Bensonhurst Community, environmental benefits to Coney Island Creek, and economic benefits resulting from potential FEMA certification and reduced NFIP premiums for homeowners in the Community. The Community encourages the study to explore

linkage systems with defense measures resulting from A1, including options for improving access between Gravesend and Coney Island (e.g., roadway, walkway) across the potential coastal defense structure. The Community would also like continual engagement in the Feasibility Study process as well as the future implementation process of recommendations that result from the study, particularly those directly impacting Gravesend and Bensonhurst.

Figure 5-1: Potential Link with Coney Island Creek Feasibility Study



B5: Support Zoning Education and Enforcement for Permeable Pavements

The goal of this Additional Resiliency Recommendation is to support “green zoning” modifications recently adopted by the New York City Planning Commission and advocate for expanded zoning modifications and incentives to reduce the amount of impervious surfaces on private properties such as yards, driveways and sidewalks with permeable pavements, landscaping and trees.

The frequency of front yard paved driveways in front of row house style apartments was identified as a significant issue in the Community. These front yard driveways, or “parking pads” are permitted in the R5 zoning district, the predominant district between 86th Street and Cropsy Avenue. These parking pads can cover a large portion of the front lawn with impervious surfaces. Although the city has minimum planting coverage regulations for low density residential districts, the requirements do not incentivize the use of pervious materials on driveways. Capturing stormwater with landscaping, permeable pavements and green infrastructure solutions will help to minimize peak stormwater flows from entering the drainage network.

This Additional Resiliency Recommendation advocates for NYC’s Department of City Planning (NYC DCP) and the Department of Buildings (NYC DOB) to adopt stricter regulations that require parking spaces in front yards to be more permeable, either with planting or with permeable pavement.

The recently adopted zoning and building regulations only affect new construction.



Impermeable front yards

Incentives may be needed to encourage existing residential homeowners to implement green infrastructure practices. This project advocates that the city adopt tax incentives or other measures to help property owners reduce stormwater runoff on their private properties.

The Committee also advocates for NYC DOB, NYC DCP, local community boards and nonprofit organizations to educate the community about ways to reduce their individual impact on the stormwater system by providing information to homeowners about stormwater capture through green infrastructure, water conservation and rain water harvesting.

C4: Support Resiliency Retrofits at Marlboro Houses

The Committee considers the Marlboro Houses, a New York City Housing Authority (NYCHA) facility, as a significant housing asset in the community that should be protected from future storm events. While the facility was not severely flooded during Superstorm Sandy, seven of the buildings are within or partially within the 100-year flood zone. The rest of facility is at moderate risk for flooding during future storm events.

The 35-acre facility has 1,765 apartments housing an estimated 4,623 residents. Marlboro Houses is also home to a host of social service providers. In the aftermath of Superstorm Sandy, the Marlboro Senior Center was utilized as a center command hub for the coordination of recovery services. As such, protecting the complex will benefit the residents as well as the wider Community in its capacity as a potential location for emergency response and recovery services.

The Committee recommends that NYCHA makes the necessary improvements to ensure the continuity of power and other utilities at the facility during and after an emergency. This would include the raising of utility equipment in the basement, such as boilers and generators. NYCHA should also install backup generators to power the elevators, water pumps, and other mechanicals should the power go out.

The Committee also advocates for the Marlboro Houses to be considered as a potential tie-in to the Coney Island microgrid project proposed in the Brighton Beach, Coney



Marlboro Houses

Source: Bing Maps

Island, Manhattan Beach, and Sea Gate NYRCR Plan. As recommended in Project E2, a feasibility study should be conducted to assess the potential to connect the Marlboro Houses and other key facilities nearby to the proposed microgrid with a power hub at the Amalgamated-Warbase Houses.

D5: Support the Capacity Increase of Local Community Emergency Response Teams (CERTs)

Superstorm Sandy exposed gaps in the organizational and social infrastructure that facilitates communication between residents, city agencies, and first responders such as police, fire and Community Emergency Response Teams (CERTs) organized by NYC OEM. The CERT teams are made up of trained volunteers that can begin response procedures or assist emergency management professionals. Although there are active CERTs in the area, there is no one team responsible for the entire Community. CERTs are associated with their respective Community Districts (Districts 11, 13 and 15). This may have contributed to complications in coordinating response efforts in the Community. Additionally, many of the CERT volunteers were either affected by the storm themselves or were called elsewhere to assist with other recovery efforts.

In response to these issues, the Committee is advocating that NYC OEM expands the capabilities and capacity of the CERT teams active in Gravesend and Bensonhurst. This would include the following activities:

- Expand CERT volunteer participation in Gravesend and Bensonhurst,
- Distribute CERT education materials in Spanish, Chinese, and Russian tailored to needs of Gravesend and Bensonhurst,
- Host additional training programs for local CERTs geared towards locally specific disaster threats,

- Provide additional fixed resources to increase the capacity of local CERTs to provide post-disaster recovery services,
- Provide a central location to house and maintain communication equipment, and
- Provide recommendations on improving the standard procedure during major storm events.

The Committee understands the need to strengthen communication and coordination with NYC OEM. This project would also assist with local and community based efforts to increase disaster response planning efforts and disaster response capability, including the formation of a COAD, as discussed in Project D2.



Cert1NYC (Serving Brooklyn Community Boards 10 & 11)
Source: Eileen LaRuffa



OEM CERT- Distributing Goods
Source www.nyc.gov

E4: Support Sewer Infrastructure Maintenance

In 2013, there were 1,169 confirmed sewer backups in Brooklyn. The primary cause of these sewer backups was grease in the sewer system, debris clogging the sewage, and heavy rain overtaxing the sewer infrastructure. Reducing the amount of sewer backups requires a comprehensive solution, which includes maintenance of the sewer infrastructure. Sewer infrastructure maintenance is critical to avoid expensive replacements and system upgrades in future. Proper maintenance is required to maximize the environmental, social, and economic benefits of both existing sewer infrastructure and ongoing / proposed green infrastructure.

This Additional Resiliency Recommendation advocates for NYC DEP to increase the frequency of the catch basin, manhole and sewer maintenance. Increased frequency of catch basins and manhole maintenance will prevent potential overflows and stop solids from the clogging sewer system. This project will also propose periodic efforts/programs by the city to investigate and efficiently track existing conditions and maintenance of sewers, manholes and catch basins.



Sewer maintenance
Source: www.sheepsheadbites.com

E5: Support Backup Power for Telecommunications Infrastructure

This Additional Resiliency Recommendation advocates for private utility companies to harden telecommunications infrastructure to avoid telecommunication outages during regular rainfall events, or extreme events such as Superstorm Sandy. Telecommunications infrastructure can fail during disasters through three primary categories of causes:

- Disruption in supporting network infrastructure,
- Physical destruction of network components, and
- Network congestion.¹²⁰

The Committee advocates for telecommunications operators to install backup

power supply systems at cell towers and critical telecom facilities to prevent disruption in the communication network, developing a higher degree of redundancy in the system to prevent disruption caused by physical damage to network components. The project would provide case studies of best practices for backup power sources that have been used by other telecommunications and utility providers, such as Verizon's off-grid program and Resilient DC, as well as provide service options awareness programs for providers, consumers and businesses.^{121,122} The project would encourage phone companies to institute asset management programs to ensure a state of good repair for telecommunications infrastructure, harden and floodproof underground telephone wires,

regularly prune trees that pose risks to above ground wires, and develop redundancy in the communication network.



Cellular antennas
Source: www.airwavestrategies.com

B. Master Table of Projects

Strategy	Project Name	Short Description	Estimated Cost	Project Category	Regional Project
Strategy A: Develop a comprehensive Resiliency Approach to the Waterfront	A1: Develop a Comprehensive Waterfront Master Plan for Coastal Protection and Implementation of Coastal Defenses	Phase A1a: Comprehensive Waterfront Master Plan for Coastal Protection Develop a Comprehensive Waterfront Master Plan that provides a strategy for integrating recreation, access, and economic development while increasing coastal defenses. Plan would focus on the feasibility of a structural berm/seawall along the Belt Parkway connected to floodgates at vulnerable underpasses. Study will coordinate with scope and findings of the Coney Island Creek Feasibility Study.	\$500,000	Proposed	Y
		Phase A1b: Implementation of Coastal Defenses Detailed design and construction of selected recommendations of the Comprehensive Waterfront Master Plan.	\$33,000,000	Featured	Y
	A2: Redevelopment of the Bensonhurst Park Tennis Center Site	Incentivize resiliency upgrades or redevelopment of the Tennis Center at Bensonhurst Park and the adjacent area along Bay Parkway in a way that will increase the resilience of the waterfront, encourage economic development, improve transportation connections and serve the greater needs of the community. Potential uses could include recreational amenities tied to the Park and Shore Parkway Bikeway and flexible space for community uses.	\$200,000	Proposed	N
	A3: Study the feasibility of a Multi-purpose Pier with Resilient Dock	Project would analyze potential sites for multi-purpose ferry service, with the primary goal of emergency transportation during disaster events as well as year-round benefits such as commuter ferry service, economic development opportunities or recreational access to the waterfront.	\$150,000	Featured	Y
	A4: Support Resilient Improvements at City Parks along or near Waterfront	Integrate resilient design measures into City Parks along or near the waterfront, including Bensonhurst Park, Shore Park and Parkway Six Diamonds, and Dreier-Offerman Park. Resiliency improvements could include elevations, shoreline hardening, green infrastructure, wetlands restoration, or dry flood proofing of buildings and comfort stations.	N/A	Additional Resiliency Recs	N
A5: Support Coney Island Creek Feasibility Study	Support NYC EDC's study to evaluate the feasibility of constructing revetment(s) and a tidal gate at the mouth of Coney Island Creek to mitigate flood risk. The Committee supports the ancillary goals of enhancing roadway links, restoring wetlands, improving recreational amenities, and enhancing public access to the waterfront.	N/A	Additional Resiliency Recs	YY	

Master Table of Projects (cont.)

Strategy	Project Name	Short Description	Estimated Cost	Project Category	Regional Project
Strategy B: Protect the Community from Flooding during Significant Rain Events	B1: Analyze Hydrologic and Hydraulic Systems for Improved Stormwater Management	High-level analysis of the hydrologic and hydraulic (H&H) systems affecting drainage in the low-lying areas of the Community that experience recurring flooding. Study will analyze existing drainage patterns and whether the system is adequate to handle 2014 conditions and future conditions. The study will identify measures needed to ensure adequate stormwater management/capture such as storage basins, the use of green infrastructure, and upgrades to increase system capacity.	\$250,000	Proposed	Y
	B2: Improve Stormwater Drainage along the Belt Parkway	B2a: Phase I - Belt Parkway Drainage Study Drainage study that identifies stormwater drainage issues and “hotspots” on the Belt Parkway from Ocean Parkway to Bay Parkway. Identified solutions may include expanding system capacity, raising the roadway above the 10-year flood level, and using green infrastructure.	\$400,000	Featured	Y
		B2b: Phase II - Belt Parkway Drainage Improvements Measures identified in the Belt Parkway Drainage Study would be implemented through this phase.	\$800,000	Featured	Y
	B3: Improve Stormwater Drainage along Cropsey Avenue	B3a: Phase I - Cropsey Avenue Drainage Study Drainage study that identifies stormwater drainage issues at identified areas of recurring flooding along Cropsey Avenue from Bay 38th Street to Bay 49th Street. Identified solutions may include expanding system capacity, raising the roadway above the 10-year flood level, and using green infrastructure.	\$300,000	Proposed	N
		B3b: Phase II - Cropsey Avenue Drainage Improvements Pilot project to implement drainage improvement measures proposed in the Cropsey Avenue Drainage Study.	\$800,000	Proposed	N
	B4: Implement Green Infrastructure Pilot Project in Combined Sewer Area	B4a: Project A – Green Infrastructure Siting Analysis in Combined Sewer Area Development of a green infrastructure implementation project on public property strategically located to intercept stormwater before it reaches the combined sewer system. Study would focus on the combined sewer area in the northwest portion of the Community.	\$200,000	Featured	N
		B4b: Project B – Green Infrastructure Pilot Project Implement a chosen green infrastructure project on roadways and/or public and non-profit property. Pilot project will demonstrate the application of green infrastructure in the Community.	\$700,000	Proposed	N
	B5: Support Zoning Education and Enforcement for Permeable Pavements	Support “green zoning” modifications recently adopted by the New York City Planning Commission and advocate for expanded zoning modifications and incentives to reduce the amount of impervious surfaces on private properties such as yards, driveways and sidewalks with permeable pavements, landscaping and trees.	N/A	Additional Resiliency Recs	Y

Master Table of Projects (cont.)

Strategy	Project Name	Short Description	Estimated Cost	Project Category	Regional Project
Strategy C Proposed and Featured Projects	C1: Develop a Residential and Commercial Property Technical Assistance and Education Program	Provide homeowners and commercial property owners with information and technical assistance on flood insurance requirements, resiliency measures, guidance for grants and loans, building and zoning guidelines, green infrastructure practices, and other measures to reduce flooding risks. Information will be disseminated in multiple languages, with a focus on socially vulnerable populations.	\$1,000,000	Proposed	N
	C2: Establish Housing Loan Program for Resiliency Retrofits	Provide homeowners with low-interest loans for resiliency retrofits such as the raising of mechanicals, elevation, and floodproofing. Program would focus on rent-burdened households and areas "new" to the Special Flood Hazard Area (SFHA). Program may partner with a Community Development Financial Institution (CDFI) to create revolving loan program.	\$500,000	Featured	N
	C3: Establish Commercial Loan Program for Resiliency Retrofits	Provide commercial property owners with low-interest loans for resiliency retrofits such as the raising of mechanicals, elevation, and floodproofing. Program would focus on small businesses in areas "new" to the Special Flood Hazard Area (SFHA). Program may partner with a Community Development Financial Institution (CDFI) to create revolving loan program.	\$500,000	Featured	N
	C4: Support Resiliency Retrofits at Marlboro Houses	Advocate for the elevation of mechanicals and provision of backup power supply for buildings in the housing complex.	N/A	Additional Resiliency Recs	N
Strategy D Proposed and Featured Projects	D1: Create a Community Disaster Recovery Training and Workforce Development Program	Provides disaster-recovery workshops for local workers tailored to the needs of the Community. The workshops would develop trained laborers equipped to help the Community rebuild and recover from storm events. Training areas would include health and safety; mold remediation; sump pump operation and restoration; trap cleanouts; and electrical.	\$150,000	Proposed	N
	D2: Development of a COAD to create a Community Disaster Recovery Plan	Develops a plan to create a Community Organizations Active in Disaster (COAD) among established Community Based Organizations. Plan will identify, network, coordinate and provide training for these not-for-profit and civic organizations.	\$200,000	Proposed	Y
	D3: Expand Emergency Communications Network for First Responders	Provides radio repeaters at key locations to facilitate short-wave radio communication for first responders, CERT Team, and COAD members for use during disaster response and recovery.	\$250,000	Featured	Y

Gravesend and Bensonhurst

Master Table of Projects (cont.)

Strategy	Project Name	Short Description	Estimated Cost	Project Category	Regional Project
Strategy D Proposed and Featured Projects	D4: Establish Resource and Recovery Center at an Existing Social Service Facility	Advocates for existing social services facilities to operate as a Resource and Recovery Center. In addition to being a site for the coordination of emergency and relief services during a disaster event, the sites may serve at other times as meeting space for the CERT and/or COAD, and could host representatives from government agencies providing disaster relief and recovery funding (i.e., grant/loan application center).	\$250,000	Featured	N
	D5: Support the Capacity Increase of Local Community Emergency Response Teams (CERT)	Provide assistance to local CERT teams active in Gravesend and Bensonhurst to expand volunteer participation, distribute educational materials (in multiple languages), host training programs, and use other measures to increase the CERT's capacity to provide post-disaster recovery services.	N/A	Additional Resiliency Recs	Y
Strategy E Proposed and Featured Projects	E1: Install Backup Power Supply for Critical Facilities and Infrastructure	Initiate a competitive process to install generators at critical facilities, potentially creating a microgrid network, to provide reliable power during and after major storm events. Critical facilities may include schools, senior centers and medical facilities	\$300,000	Proposed	N
	E2: Expand Feasibility Study for Energy Resiliency for NYCHA and Mitchell-Lama Properties into Gravesend-Bensonhurst	This study builds on the Coney Island microgrid project proposed in the Brighton Beach, Coney Island, Manhattan Beach, and Sea Gate NYRCR Plan. The feasibility study assesses the potential to connect the Marlboro Houses and other key facilities to a Coney Island microgrid, with the power supply generated at the Amalgamated-Warbase Houses.	\$50,000	Proposed	Y
	E3: Develop a Wireless Mesh Network as a Backup Communications Network	Creation of a wireless network in the Community that provides backup and reliable internet connectivity during and after emergency situations. The system involves a wireless mesh network to be placed at strategic locations.	\$200,000	Proposed	N
	E4: Support Sewer Infrastructure Maintenance Project	Advocate for NYC DEP to increase the frequency of maintenance for catch basins, manholes, and sewers in identified areas with recurring flooding issues.	N/A	Additional Resiliency Recs	Y
	E5: Support Backup Power for Telecommunications Infrastructure	Work with telecommunications operators to install backup power supply systems at cell towers, harden or flood proof underground telephone wires, prune trees that pose risks to above-ground wires, and bury above-ground wires under the street.	N/A	Additional Resiliency Recs	N

C. Public Engagement Process

The Public Engagement Plan for Gravesend and Bensonhurst was structured to encourage broad community participation from all areas and sectors comprising the study area. The goal was to actively engage the community in the process of creating a pragmatic and unifying plan that envisions a resilient and sustainable future for the two communities. The Committee stressed the importance of engaging socially vulnerable populations in the diverse community, including the elderly, low-income, and non-English speaking populations.

The Committee made every effort to include socially vulnerable populations in the planning process. Outreach materials were developed in Spanish, Chinese, and Russian. AmeriCorps volunteers went door-to-door in the areas affected by Superstorm Sandy to notify residents about the meetings and to distribute flyers. Translators were available at the public engagement events to assist residents that do not speak English to provide feedback. Copies of presentation materials were provided in Spanish and Chinese. Public engagement events were located in different areas of the Community to make sure participation throughout the process was geographically inclusive. The Committee also surveyed residents and business owners in English, Spanish, and Chinese to solicit feedback on the impacts of Superstorm Sandy and the recovery effort. Additionally, the Consultant Team developed an online web tool called the NYRCR Mapping Gallery to provide another avenue for feedback outside of the Public Engagement Events.

In summary, the public outreach component of the plan was effective in informing a wide

spectrum of the community about the State's efforts and the actions that should be taken in the future to enhance the resiliency of the Community. It provided multiple opportunities for public input and direction, which helped to build consensus around the identified projects. The public engagement also helped to identify potential project "champions" who will oversee and monitor projects as they proceed in the future.

Public Engagement Strategy

The ten member NYRCR Planning Committee was composed of residents, as well as business, institutional and civic leaders. The NYRCR Planning Committee was instrumental in providing input and information to shape the Plan and in assisting with the broader Community Engagement Strategy through their constituent and social networks.

The Public Engagement Strategy included six (6) NYRCR Planning Committee meetings focused on the development of the Plan. At these meetings, which were open to the public, the NYRCR Planning Committee provided input on:

- The issues currently facing Gravesend and Bensonhurst as a result of Superstorm Sandy and other extreme events;
- The Community's existing assets and the opportunities they might provide for a more resilient future;
- The development of a goals and a Vision Statement for the Community;

- Input regarding the appropriate strategies needed to make the area more resilient;
- Ideas for projects in the area that can be undertaken/funded through the NYRCR process;
- Prioritization of recommended actions and projects;
- The format and content for engagement events; and
- Major outreach efforts focused on "getting the word out" about the project, the planning process, and the public engagement meetings.

Additionally, bi-weekly co-chair conference calls were scheduled provide updates on the NYRCR

Planning Committee Meetings

Meeting #1: 6/25/14

Overview and Geographic Scope

Meeting #2: 7/5/14

What Happened, Asset Identification, and Visioning Exercise

Meeting #3: 8/5/14

Needs and Opportunities

Meeting #4: 9/3/14

Reconstruction and Resiliency Strategies

Meeting #5: 9/30/14

Discussion of Potential Projects

Meeting #6: 8/7/14

Voting on Proposed and Featured Projects

Gravesend and Bensonhurst



Planning Committee Meeting #4

Plan's progress, address outstanding questions and plan for upcoming meetings. Committee wide conference calls were also scheduled as needed to further discuss plan components and specific ideas for engaging the larger community.

Public Meetings

There were three public meetings, held in July 2014, September 2014, and October 2014. A fourth public meeting will be held in January 2015 after completion of this NYRCR Plan. A summary of the input received from the Committee meetings can be found at <http://stormrecovery.ny.gov/nyrcr/community/gravesend-and-bensonhurst>. Though each meeting focused on a different part of the Plan, to help participants new to the planning process, each public meeting included a brief walkthrough of the purpose and timeline of the NYRCR Plan. Participants were invited to provide additional feedback via comment cards or the online NYRCR Mapping Tool.

Public Engagement Event #1 (July 20, 2014)

The first Public Engagement Event was held at Caesar's Bay Bazaar adjacent to Bensonhurst Park on Sunday, July 20th. Approximately 30 guests participated. The scheduling and location of the outdoor event was designed to capture as many people as possible as the park is a popular gathering place for many people in the community on the weekends. It was also intended to address the challenge of scheduling formal public events during the summer. The event was set up in an informal open house format whereupon representatives from the Governor's Office of Storm Recovery (GOSR), the Consultant Team, and the Planning Committee were on hand to explain the NYRCR Program and the planning process, discuss what happened during Superstorm Sandy, and solicit comments on community strengths, needs, and opportunities as they relate to the resilience planning in the community. Participants were invited to fill out questionnaires, which were provided in English and Spanish.



Public Engagement Event #1

Public Engagement Event #2 (September 16, 2014)

The second Public Engagement Event was at the Sephardic Home meeting room on Tuesday, September 16th. This location was selected to make access easier for the population of seniors and other residents that live in the vicinity. 37 guests attended this meeting. The meeting began with an introduction by the co-chairs of the Committee and an overview of the program from GOSR. The Planning Team then continued with an explanation of the analysis done to date along with an explanation of the five reconstruction strategies developed by the Planning Committee. After a short break, roundtable working groups were formed around the five strategies. The intent for each roundtable discussion was to discuss potential project ideas for each of the strategies. There was also a table for Spanish speaking participants. The discussions were facilitated by the Consultant Team with the support of Committee members. At the end of the workshop, representatives from each group gave a brief summary of what was discussed.



Public Engagement Event #2

NY Rising Community Reconstruction Plan

Public Engagement Event #3 (October 28, 2014)

The third Public Engagement Event was at the Block Academy on Tuesday, October 28th. 61 people were in attendance. The workshop began with an introduction by the co-chairs of the Committee followed by an overview of the program by the Consultant Team with an explanation of the five reconstruction strategies as well as the potential projects developed with the Planning Committee. The presentation was translated into Spanish and Chinese.

Afterwards, the participants were invited to freely visit the stations set up for the five reconstruction strategies. At each station, there was a representative from the Consultant Team as well as boards to illustrate the projects developed

for that strategy. Participants were invited to give opinions, comments, and preferences to the Consultant Team and Planning Committee members. Three English/Spanish speaking translators were available to facilitate conversations at the stations. Participants were invited to leave comments on the board and vote on the projects that they support with blue dot stickers.

The meeting featured a large turnout of workers who were involved in the cleanup and rebuilding efforts after Superstorm Sandy. At the end of the open house, the Spanish speaking participants reconvened to discuss what was heard during the meeting. Two members of the Workers Justice Project gave testimonials about the working conditions after the storm and the

need for facilities for training in cleanup and resilient construction techniques.

An additional workshop was conducted for Chinese-speaking residents in Gravesend and Bensonhurst on Thursday, November 13 at the United Chinese Association of Brooklyn. About 40 community members attended this workshop and were informed of the proposed and featured projects recommended by the Committee.

Public Engagement Event #4

A fourth public meeting will be held in January 2015, when the final NYRCR Plan will be presented to the community.

Public Outreach

The NYRCR Planning Committee, GOSR and the Consultant Team actively pursued a variety of strategies to inform people about the project and the Public Meetings. These techniques included:

- Electronic notices were sent to a broad range of individuals and organizations in the NYRCR area;
- Flyers and posters were created in English, Chinese, Spanish, and Russian and were distributed throughout the community
- FEMA volunteers and the Planning Committee members distributed approximately 2,000 flyers door-to-door for the second and third public engagement meetings;
- Newspaper advertisements were placed in The Bay News/Brooklyn Courier;



Public Engagement Event #3

Gravesend and Bensonhurst

The image displays four flyers for an "Open House" event in Gravesend and Bensonhurst, each translated into a different language: English, Spanish, Chinese, and Russian. Each flyer includes a title, a main question or theme, a list of bullet points, and a call to action. The English flyer asks "How should \$3 million be spent in our Community to better prepare for future storms?" and lists points like protecting from flooding, strengthening emergency response, and providing assistance. The Spanish flyer asks "¿Cómo utilizar \$3 millones en mejoras en caso de futuras tormentas para nuestra comunidad?" and lists similar points. The Chinese flyer asks "如何在我們的社區使用3百萬元來預防未來的暴風雨呢?" and lists points like assisting with flood protection, enhancing emergency response, and providing assistance. The Russian flyer asks "Как правильно распределить 3 миллиона долларов в нашем микрорайоне и подготовиться к ураганам в будущем?" and lists points like protecting from flooding, strengthening emergency response, and providing assistance. All flyers include the event date and time: Tuesday, October 28, 7pm-9pm, and the location: Block Academy, 133 27th Ave, Brooklyn, NY. They also feature the NY RISING logo and the website www.stormrecovery.ny.gov/cr.

Flyers and posters translated into multiple languages (from left to right: English, Spanish, Chinese, and Russian)



AmeriCorps volunteers preparing for door-to-door flyer distribution/door knocking in Community

- Postings were placed on community calendars;
- Press releases were sent to local newspapers and web publications;
- Outreach was conducted to local newspaper editors; and
- Postcards that explain the NYRCR Mapping Gallery were distributed (see below).

Translation

The Committee stressed the importance of including socially vulnerable populations in the planning process. Outreach materials were developed in English, Spanish, Chinese and Russian in an attempt to include residents in the community that do not speak English proficiently. Translators were available at public engagement events to facilitate discussions in these languages. In addition, the presentation



Workshop at the United Chinese Association of Brooklyn.

for the third public engagement event was translated into English, Spanish, and Chinese.

NYRCR Mapping Gallery

An online web tool called the NYRCR Mapping Gallery was developed for the Community to enable the Community to provide feedback throughout the planning process. The Mapping Gallery included three different pages for feedback:

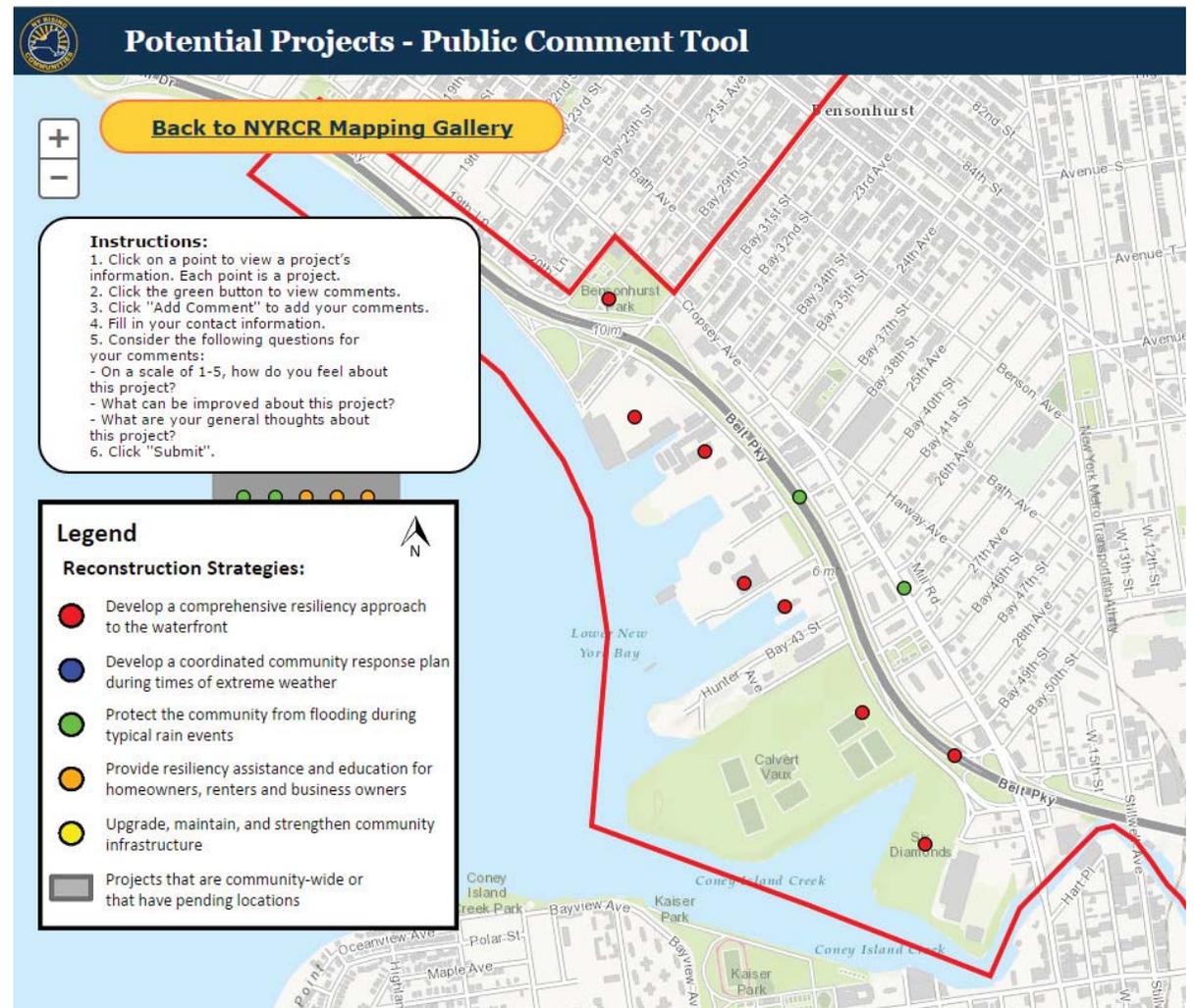
The **Asset Inventory Tool** was developed to show the identified assets in the Community and to enable participants to suggest missing assets and comment on assets and asset information (i.e., which assets are critical or locally significant).

The **Needs and Opportunities Form** asked participants to voice their opinion about critical issues and general needs of the community. The form helped participants identify specific projects, programs and actions that could make the Community more resilient.

The **Potential Projects Mapping Tool** was developed to illustrate projects already planned or funded in the Community as well as potential NYRCR projects, programs and actions. Participants were invited to comment on the potential projects and suggest additional projects.

Sharing Information

Public information (including the NYRCR Plan, meeting notices, and presentations from meetings) was provided via a project website established for the Gravesend and Bensonhurst NYRCR Area (<http://stormrecovery.ny.gov/nyrcr/community/gravesend-and-bensonhurst>). Information was also posted on the GOSR Facebook page and Twitter feed.



NYRCR Mapping Gallery

D. Community Asset Inventory

Coastal Hazard and Risk Assessment Tool (“Risk Assessment Tool”)

The risk score for each group of assets is determined by multiplying its hazard, exposure, and vulnerability values (Risk = Hazard x Exposure x Vulnerability). The Coastal Hazard and Risk Assessment Tool automatically generates this risk score, which represents the relative risk of the community. Risk scores include some subjective analysis and should not be compared from one community to another. Risk scores can range from 1.5, the lowest score reflecting negligible or ‘residual’ risk, to 75, the highest score reflecting severe risk. These ranges are broken down as follows:

Residual (Risk Score <6): Residual risk scores result from both low exposure and vulnerability; however, if assets are critical or have a very high community value, actions may be warranted to reduce their risk.

Moderate (Risk Score 6 - 23): A moderate risk score represents that the assets may suffer moderate to serious storm impacts, but that adaptation may be of a lower priority because either exposure or vulnerability are low

High (Risk Score 24 - 53): Risk scores in the high range are indicative of conditions that could lead to significant negative impacts from a storm, and actions should be taken to reduce the assets’ vulnerability and restore the assets’ coastal protections.

Severe (Risk Score >53): A severe risk score represents that the assets are in a dangerous situation and that both exposure and vulnerability should be reduced.

Risk scores help identify assets with increased potential for storm damage and serve as one of many factors that helped the Committee to determine the potential projects to include in the NYRCR Plan; see Section IV for further discussion on project screening and selection. In addition to the risk score, other contributing factors in determining which assets should be addressed and how immediately they should be addressed include:

- The assets’ contribution to life safety;
- If the asset(s) are critical or locally significant;
- The assets’ community value,
- Environmental services provided by the assets;
- Economic contribution of the assets;
- Availability or alternative assets or facilities, and,
- The capacity of the assets to adapt.

The Coastal Hazard and Risk Assessment Tool measures against a 100-year storm, or a hazard score of 3. The hazard score is based on the likelihood an event would occur and the magnitude (destructive capacity) of the event. For the purpose of preparing a NYRCR Plan, NY State recommends that Bay Park/East Rockaway consider a 100-year storm (1% annual chance). Because the magnitude of storm events increases as the likelihood decreases (100-

year storms have higher magnitude than 10-year storms), the hazard score increases as the likelihood goes down. Therefore, the Coastal Hazard and Risk Assessment Tool is calibrated to a 100-year storm. Although the NYRCR Plan seeks to protect against a 100-year storm, equally important is protecting against smaller, more frequent storm events such as the 10-year storm, which has a 10% chance of occurrence each year. Several projects may have risk reduction benefits for the 10-year storm, which are described qualitatively.

The Tool is appropriate for measuring coastal hazards, and risk reduction associated with projects that provide coastal protection or defense measures. Several proposed and featured NYRCR projects address other hazards, such as those posed by stormwater flooding, or other vulnerabilities, such as inadequate communications systems during disaster response. The risk reduction benefits provided by these “non-coastal” projects cannot be quantified using the Coastal Hazard and Risk Assessment Tool, but are described qualitatively through a discussion of mitigating hazard, exposure, or vulnerability.

Coastal Hazard and Risk Assessment Tool

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
BABIES R US	Extreme	Economic	No	Low	3	4.5	4	54
KOHL'S DEPARTMENT STORE	Extreme	Economic	No	Low	3	4.5	4	54
BEST BUY	Extreme	Economic	No	Low	3	4	4	48
STOP & STOR	Extreme	Economic	No	Low	3	4	4	48
ADVENTURERS AMUSEMENT PARK	High	Economic	No	Low	3	3	4	36
AUTHENTIC WATCH STORE	High	Economic	No	Low	3	3	4	36
BEACH HAVEN APARTMENTS LLC	High	Economic	No	Low	3	3	4	36
BEACH HAVEN MANAGEMENT CORP	High	Economic	No	Low	3	3	4	36
BJ'S WHOLESALE CLUB	High	Economic	No	Low	3	3	4	36
HICLASS AUTO SALES	High	Economic	No	Low	3	3	4	36
MARINE BASIN MARINA	High	Economic	No	Low	3	3	4	36
MERCEDES-BENZ OF BROOKLYN	High	Economic	No	Low	3	3	4	36
SHORE PARKWAY ECONOMIC CORRIDOR	High	Economic	No	High	3	3	4	36
AT WORLD	Moderate	Economic	No	Low	3	2.5	4	30
BEACH HAVEN APARTMENTS #5 INC & #6 INC	Moderate	Economic	No	Low	3	2.5	4	30
FOREVER WOMEN INC	Moderate	Economic	No	Low	3	2.5	4	30
FURNITURE INC	Moderate	Economic	No	Low	3	2.5	4	30
HARBOR MOTOR INN	Moderate	Economic	No	Low	3	2.5	4	30
KEY FOOD	Moderate	Economic	No	Low	3	2.5	4	30
MACGRAY COMMERCIAL & INDUSTRIAL LAUNDERERS	Moderate	Economic	No	Low	3	2.5	4	30
NEW YORK SPORTS CLUBS	Moderate	Economic	No	Low	3	2.5	4	30
BROOKLYN STUCCO	Moderate	Economic	No	Low	3	2	4	24
PATHMARK SUPER CENTER	Extreme	Economic	No	Medium	3	4	2	24
HENDRIX STREET DAY NURSERY	High	Health and Social Services	No	High	3	3.5	4	42
ABRAHAM LINCOLN HIGH SCHOOL	High	Health and Social Services	No, Locally Significant Facility	High	3	3	4	36
BLOCK INSTITUTE AT 506 BAY 44TH ST	High	Health and Social Services	No, Locally Significant Facility	High	3	3	4	36
CONEY ISLAND HOSPITAL	High	Health and Social Services	Yes, FEMA	High	3	3	4	36
HOPE IN HOUSE MEDICAL / DENTIST / PHYSICAL THERAPY	High	Health and Social Services	No	High	3	3	4	36
SHE'ARIT ACADEMY	High	Health and Social Services	No	High	3	3	4	36
SOCIAL SECURITY ADMINISTRATION BUILDING	High	Health and Social Services	Yes, FEMA	High	3	3	4	36
WORKER'S JUSTICE PROJECT	High	Health and Social Services	No	High	3	3	4	36
YESHIVAT MAGEN AVRAHAM SCHOOL	High	Health and Social Services	No, Locally Significant Facility	High	3	3	4	36
BLOCK INSTITUTE AT 133 27TH AVE	High	Health and Social Services	No, Locally Significant Facility	High	3	3	2	18
IS 281 JOSEPH B CAVALLARO	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	2	15
LIFESPIRE, INC. AT BATH AVE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	2	15
MERCY CARE TRANSPORTATION INC	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	2	15
PS 212 LADY DEBORAH MOODY	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	2	15
PS 721 BROOKLYN OCCUPATIONAL TRAINING CENTER	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	2	15
NYPD COUNTER-TERRORISM DIVISION	Moderate	Health and Social Services	Yes, FEMA	High	3	2	2	12
JOHN DEWEY HIGH SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	2	12
LIFE LINE AMBULANCE INC	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	2	12
MIDWOOD AMBULANCE & OXYGEN SERVICE INC	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	2	12
ASCONA INCORPORATED	High	Health and Social Services	No, Locally Significant Facility	High	3	3	1	9

Gravesend and Bensonhurst

Coastal Hazard and Risk Assessment Tool (Continued)

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
KINGSBOROUGH EARLY COLLEGE SCHOOL	High	Health and Social Services	No, Locally Significant Facility	High	3	3	1	9
MARLBORO NEIGHBORHOOD SENIOR CENTER	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	2	9
PS 101 VERRAZANO SCHOOL	High	Health and Social Services	No, Locally Significant Facility	High	3	3	1	9
IS 96	Moderate	Health and Social Services	No, Locally Significant Facility	High	4	2	1	8
BLOCK INSTITUTE	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	1	7.5
BLOCK INSTITUTE AT 2214 STILLWELL AVE	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	1	7.5
INSTITUTE FOR COMMUNITY LIVING	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	1	7.5
MCC PARTNER CORPORATION	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	1	7.5
BENSONHURST VOLUNTEER AMBULANCE SERVICE	Moderate	Health and Social Services	Yes, FEMA	High	3	2	1	6
FDNY ENG 253	Moderate	Health and Social Services	Yes, FEMA	High	3	2	1	6
MAIMONIDES MEDICAL CENTER WIC PROGRAM	Moderate	Health and Social Services	Yes, FEMA	High	3	2	1	6
AVA AMBULETTE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
EMPIRE BEAUTY SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
GRAVESEND POST OFFICE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
HEARTSHARE HUMAN SERVICES OF NEW YORK	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
IS 228 DAVID BOODY JR HIGH SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
MAGEN DAVID YESH-ISAAC SHLM E	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
OUR LADY OF GRACE PARISH	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
OUR LADY OF GRACE SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
PS 216 ARTURO TOSCANINI	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
PS 95 THE GRAVESEND	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
PS 97 THE HIGHLAWN SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
ST PETER CATHOLIC ACADEMY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
THE ACADEMY OF TALENTED SCHOLARS / BROOKLYN SCHOOL OF INQUIRY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
YAI - YOUNG ADULT INSTITUTE AT 8301 BAY PKWY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
YESHIVAT DARCHÉ ERES SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
BIG APPLE ACADEMY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	1	4.5
BIG APPLE ACADEMY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	1	4.5
FRANKLIN D. ROOSEVELT HIGH SCHOOL - EVACUATION CENTER		Health and Social Services	Yes, FEMA	High	3	FALSE	1	0
HEART TRANSPORTATION AMBULETTE		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
HIGHLAWN POST OFFICE		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
MAGEN DAVID YESHIVAH HIGH SCHOOL		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
P.S. 215 MORRIS H WEISS		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
PS 177 THE MARLBORO		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
SEPHARDIC MULTI SERVICE SENIOR CENTER		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
YAI - YOUNG ADULT INSTITUTE AT 1640 OCEAN PKWY		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	1	0
BEACH HAVEN APARTMENTS	High	Housing	No, Locally Significant Facility	Medium	3	3	4	36
OCEAN TERRACE	High	Housing	No, Locally Significant Facility	Medium	3	3	4	36
BEACH HAVEN APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2.5	4	30
WHITNEY MANOR APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2.5	4	30
OXFORD REALTY APARTMENTS	High	Housing	No, Locally Significant Facility	Medium	3	3	3	27
SONS OF ITALY SENIOR CITIZENS HOUSING	High	Housing	No, Locally Significant Facility	High	3	3	2	18
WATERVIEW TOWERS	High	Housing	No, Locally Significant Facility	High	3	3	2	18
HAYM SOLOMON HOME FOR THE AGED	Moderate	Housing	Yes, FEMA	High	3	2.5	2	15
HAYM SOLOMON HOME FOR THE NURSING AND REHABILITATION	Moderate	Housing	Yes, FEMA	High	3	2.5	2	15

Coastal Hazard and Risk Assessment Tool (Continued)

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
KINGS ADULT CARE CENTER	Moderate	Housing	Yes, FEMA	High	3	2.5	2	15
SEPHARDIC NURSING AND REHABILITATION CENTER	Moderate	Housing	Yes, FEMA	High	3	2.5	2	15
CONTELLO TOWERS	Moderate	Housing	No, Locally Significant Facility	High	3	2.5	2	15
OCEANVIEW TOWERS	Moderate	Housing	No, Locally Significant Facility	High	3	2.5	2	15
REGINA PACIS HOUSING CORPORATION	Moderate	Housing	No, Locally Significant Facility	High	3	2.5	2	15
SHORE HAVEN APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2.5	2	15
SOUTH HAMPTON APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2.5	2	15
NYCHA MARLBORO HOUSES	Moderate	Housing	No, Locally Significant Facility	Medium	3	1.5	3	13.5
HARWAY TERRACE	Moderate	Housing	No, Locally Significant Facility	High	3	2	2	12
2400 EAST APARTMENTS	High	Housing	No, Locally Significant Facility	Medium	3	2.5	1	7.5
AVENUE W DEVELOPMENT	High	Housing	No, Locally Significant Facility	High	3	2.5	1	7.5
GARDEN OF EDEN HOME (AH)	Moderate	Housing	Yes, FEMA	High	3	2	1	6
DOVER APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2	1	6
HIGHLAWN TERRACE	Moderate	Housing	No, Locally Significant Facility	High	3	2	1	6
SENATE APARTMENTS	Moderate	Housing	No, Locally Significant Facility	Medium	3	2	1	6
AHI EZER PLAZA		Housing	No, Locally Significant Facility	High	3	FALSE	1	0
BAYSIDE FUEL OIL DEPOT-1776 SHORE PKWY	Extreme	Infrastructure	Yes, FEMA	High	3	4.5	4	54
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4.5	4	54
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4.5	4	54
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4.5	4	54
NYC SANITATION DEPARTMENT GARAGE & SPECIAL WASTE DROP-OFF	High	Infrastructure	No	Low	3	4	4	48
BAYSIDE FUEL OIL DEPOT CORP	High	Infrastructure	Yes, FEMA	High	3	3	4	36
OCEAN PARKWAY	High	Infrastructure	No, Locally Significant Facility	High	3	3	4	36
OCEAN PARKWAY BIKE LANE	High	Infrastructure	No	Low	3	3	4	36
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3	4	36
SEWER OUTFALL	High	Infrastructure	Yes, FEMA	High	3	3	4	36
CONEY ISLAND NYCT MAINTENANCE YARD	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	4	30
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4.5	2	27
SHORE PARKWAY	High	Infrastructure	No, Locally Significant Facility	High	3	3	3	27
COMBINED SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	Low	3	4	2	24
CROPSEY SCRAP IRON & METAL CORP	Extreme	Infrastructure	No	Low	3	4	2	24
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4	2	24
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	4	2	24
SEWER OUTFALLS	Extreme	Infrastructure	Yes, FEMA	High	3	4	2	24
2978 GAS CORPORATION	High	Infrastructure	Yes, FEMA	High	3	3	2	18
BELTWAY ENERGY - LUKOIL	High	Infrastructure	Yes, FEMA	High	3	3	2	18
CROPSEY AVENUE	High	Infrastructure	No, Locally Significant Facility	High	3	3	2	18
SUBWAY LINE (F)	High	Infrastructure	No, Locally Significant Facility	High	3	3	2	18
SUBWAY LINE (N)	High	Infrastructure	No, Locally Significant Facility	High	3	3	2	18
ULMER PARK MTA BUS DEPOT	High	Infrastructure	No, Locally Significant Facility	High	3	3	2	18
BELT PARKWAY	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	2	15
CONEY ISLAND NYCT SUBWAY YARD	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	2	15
STILLWELL AVENUE	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	2	15
SUBWAY LINE (D)	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	2	15
BAY 50TH STREET STATION (D)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	2	12

Gravesend and Bensonhurst

Coastal Hazard and Risk Assessment Tool (Continued)

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
KINGS HIGHWAY STATION (F)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	2	12
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3.5	1	10.5
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3.5	1	10.5
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3	1	9
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3	1	9
SEWER OUTFALL	Extreme	Infrastructure	Yes, FEMA	High	3	3	1	9
BAY & BATH GULF	Moderate	Infrastructure	Yes, FEMA	High	3	2.5	1	7.5
BP GAS STATION	High	Infrastructure	Yes, FEMA	High	3	2.5	1	7.5
MOBIL GAS STATION	Moderate	Infrastructure	Yes, FEMA	High	3	2.5	1	7.5
25TH AVENUE STATION (D)	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	1	7.5
86TH STREET	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	1	7.5
AVENUE X STATION (F)	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	1	7.5
AUTO WIZ INC - GETTY	Moderate	Infrastructure	Yes, FEMA	High	3	2	1	6
SEWAGE PUMPING STATION	Moderate	Infrastructure	Yes, FEMA	High	3	2	1	6
AVENUE U	High	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
AVENUE U STATION (F)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
AVENUE U STATION (N)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
BAY PARKWAY STATION (D)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
AVENUE V PUMPING STATION	Moderate	Infrastructure	Yes, FEMA	High	3	1.5	1	4.5
86TH STREET STATION (N)	Moderate	Infrastructure	No, Locally Significant Facility	High	3	1.5	1	4.5
AVENUE P STATION (F)		Infrastructure	No, Locally Significant Facility	High	3	FALSE	1	0
KINGS HIGHWAY STATION (N)		Infrastructure	No, Locally Significant Facility	High	3	FALSE	2	0
NELLIE BLY PARK	Moderate	Natural and Cultural Resources	No	Low	3	3	4	36
VICTORY GARDEN	Extreme	Natural and Cultural Resources	No	Low	3	3	4	36
GREENSTREET SHELL RD	High	Natural and Cultural Resources	No	Low	3	2.5	4	30
MARLBORO JEWISH CENTER	High	Natural and Cultural Resources	No	Low	3	2.5	4	30
WEST PLAYGROUND	Moderate	Natural and Cultural Resources	No	Medium	3	2.5	4	30
BEACH NEAR BENSONHURST PARK	Extreme	Natural and Cultural Resources	No	Low	3	4.5	2	27
BROOKLYN HEBREW SCHOOL FOR SPECIAL CHILDREN	High	Natural and Cultural Resources	No	Low	3	3	3	27
SHORE PARKWAY GREENWAY	Extreme	Natural and Cultural Resources	No	Medium	3	4.5	2	27
BEACH NEAR SHELL RD	Moderate	Natural and Cultural Resources	No	Low	3	2	4	24
ULMER PARK LIBRARY	High	Natural and Cultural Resources	No, Locally Significant Facility	High	3	3	2	18
GRAVESEND LIBRARY	Moderate	Natural and Cultural Resources	No, Locally Significant Facility	High	3	2	1	6
HIGHLAWN LIBRARY	Moderate	Natural and Cultural Resources	No, Locally Significant Facility	High	3	2	1	6

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F. Glossary

Base Flood Elevation (BFE)

Water surface elevation corresponding to a flood having a one percent probability of being equaled or exceeded in a given year (100-year floodplain).

BMPs

Best Management Practices

Coastal Hazard and Risk Assessment Tool (“Risk Assessment Tool”)

The Risk score for each group of assets is determined by multiplying its hazard, exposure and vulnerability values (Risk = Hazard x Exposure x Vulnerability). The Coastal Hazard and Risk Assessment Tool automatically generates this risk score, which represents the relative risk of the community. Risk scores include some subjective analysis and should not be compared from one community to another. Risk scores can range from 1.5, the lowest score reflecting negligible or ‘residual’ risk, to 75, the highest score reflecting severe risk. These ranges are broken down as follows:

Residual (Risk Score <6): Residual risk scores result from both low exposure and vulnerability, however if assets are critical or have a very high community value, actions may be warranted to reduce their risk.

Moderate (Risk Score 6 - 23): A moderate risk score represents that the assets may suffer moderate to serious storm impacts, but that adaptation may be of a lower priority because either exposure or vulnerability are low.

High (Risk Score 24 - 53): Risk scores in the high range are indicative of conditions that could lead to significant negative impacts from a storm, and actions should be taken to reduce the assets’ vulnerability and restore the assets’ coastal protections.

Severe (Risk Score >53): A severe risk score represents that the assets are in a dangerous situation and that both exposure and vulnerability should be reduced.

Risk scores help identify assets with increased potential for storm damage and serve as one of many factors that helped the Committee to determine the potential projects to include and prioritize in the NYRCR Plan; see Section IV for further discussion on Project Prioritization. In addition to the risk score, other contributing factors in determining which assets should be addressed and how immediately they should be addressed include:

- The assets’ contribution to life safety,
- If the asset(s) are critical or locally significant,
- The assets’ community value,
- Environmental services provided by the assets,
- Economic contribution of the assets,
- Availability or alternative assets or facilities, and
- The capacity of the assets to adapt.

The Coastal Hazard and Risk Assessment Tool measures against a 100-year storm, or a hazard Score of 3. The hazard score is based on

the likelihood an event would occur and the magnitude (destructive capacity) of the event. For the purpose of preparing a NYRCR Plan, NY State recommends that Bay Park/East Rockaway consider a 100-year storm (1% annual chance). Because the magnitude of storm events increases as the likelihood decreases (100-year storms have higher magnitude than 10-year storms), the hazard score increases as the likelihood goes down. Therefore, the Coastal Hazard and Risk Assessment Tool is calibrated to a 100-year storm. Although the NYRCR Plan seeks to protect against a 100-year storm, equally important is protecting against smaller, more frequent storm events such as the 10-year storm, which has a 10% chance of occurrence each year. Several projects may not have risk reduction benefits, measured by the Tool or qualitatively, for the 10-year storm. These benefits are described qualitatively.

CBO

Community-Based Organization

Community Assets

Identified assets are places or facilities where economic, environmental and social functions occur or are critical infrastructure required to support those functions. These assets were identified by the NYRCR Committee and residents and are grouped into the following categories: Economic, Housing, Health and Social Services, Infrastructure, Natural and Cultural Resources, and Socially Vulnerable Populations.

NY Rising Community Reconstruction Plan

Community Based Organization

A non-profit organization that operates within a local community.

Community Development Block Grant-Disaster Recovery (CDBG-DR)

HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. CDBG-DR is a type of funding appropriated by congress to help rebuild and provide seed money for recovery activities. Further information on CDBG-DR funds and other disaster recovery grants is available at <http://portal.hud.gov/>.

(CDFI) Community Development Financial Institution

A financial institution that provides credit and financial services within underserved markets and communities.

(CERT) Community Emergency Response Team

An organization composed of volunteers trained and tasked with providing supplementary emergency care during a major disaster.

COAD

Community Organizations Active in Disaster

(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.

CWP

New York City Comprehensive Waterfront Plan—Vision 2020

Design Flood Elevation (DFE)

As defined by the New York City Building Code, the minimum elevation to which a structure must be elevated or floodproofed. It is the sum of the BFE and a specified amount of freeboard based on the building's structural category.

FEMA

Federal Emergency Management Agency

FDNY

New York City Fire Department

FTE

Full Time Equivalent

HUD

U.S. Department of Housing and Urban Development

HVAC

Heating, Ventilation, and Air Conditioning

Flood Insurance Rate Map (FIRM)

The official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.

MTA

Metropolitan Transportation Authority

NFIP

National Flood Insurance Program

NOAA

National Oceanographic and Atmospheric Administration

NOFA

Notice of Funding Availability

NORC

Naturally Occurring Retirement Community

NWS

National Weather Service

NYC DOB

New York City Department of Buildings

NYC DCP

New York City Department of City Planning

NYC DCAS

New York City Department of of Citywide Administrative Services

NYC DEP

New York City Department of Environmental Protection

NYC DDC

New York City Department of Design and Construction

NYC DOT

New York City Department of Transportation

NYC DPR

New York City Department of Parks and Recreation

Gravesend and Bensonhurst

NYC EDC

New York City Economic Development Corporation

NYC HPD

New York City Department of Housing Preservation and Development

NYC OEM

New York City Office of Emergency Management

NYC SBS

New York City Small Business Services

NYPD

New York City Police Department

NYRCR Committee

The NYRCR Planning Committee is composed of local civically minded residents and was established to help develop a plan that accurately reflects the Community and its needs. The NYRCR Committee worked closely with the appropriate municipal, non-profit and consultant representatives to identify a vision, goals and objectives for the NYRCR Plan. The Committee actively advised on all aspects of the project and will help shape the overall direction of the NYRCR Plan and the actions that flow from it. The members of the Committee were not paid, and were required to follow a detailed code of ethics provided by New York State.

NYRCR Community

The NYRCR Community planning area follows the Census-designated place boundary for Bay Park and the Village of East Rockaway. This

boundary has been reviewed and accepted by the NYRCR Committee.

NYRCR Project Categories

Proposed Projects: Projects proposed for funding through the NYRCR Community's allotment of CDBG-DR funding.

Featured Projects: Innovative projects where an initial study or discrete first phase of the project is proposed for CDBG-DR funding or other identified funding; and regulatory reforms and other programs that do not involve capital expenditures.

Additional Resiliency Recommendations: Resiliency projects and actions the NYRCR Committee would like to highlight for further consideration.

NYS CZMP

New York State Coastal Zone Management Program

NYS DOS

New York State Department of State

NYS DEC

New York State Department of Environmental Conservation

Recovery Support Functions

The Recovery Support Functions (RSFs) comprise the National Disaster Recovery Framework's (NDRF's) coordinating structure for key functional areas of assistance. Their purpose is to support local governments by facilitating problem solving, improving access to resources

and by fostering coordination among State and Federal agencies, nongovernmental partners and stakeholders.

The six RSFs are: "Community Planning and Capacity Building," "Economic Development," "Health and Social Services," "Housing," "Infrastructure," and "Natural and Cultural Resources."

Risk Reduction Benefits

A qualitative analysis of reduction in risk to assets that results from implementation of each potential NYRCR project was prepared for each project. Three factors contribute to risk: hazard, exposure and vulnerability. The Coastal Hazard and Risk Assessment Tool was utilized, where applicable, to quantify risk reduction benefits. The Tool was assumed to apply to implementation projects within the theme 'Coastal Protection,' as it is intended to measure the risk for coastal communities and test whether various projects would reduce the risk to those assets. In this case, a snapshot of reduction in the risk score to assets is provided. Where the Coastal Hazard and Risk Assessment Tool do not apply, Risk Reduction benefits were described in terms of the qualitative mitigation of hazard, exposure and vulnerability.

Risk reduction benefits consider the population positively impacted by the project, either directly or indirectly. This population can be local or regional, ranging from a discrete street to the NYRCR Community or the entire community of Bay Park/East Rockaway. While this plan evaluates the potential risk reduction benefits, actual benefits may vary depending on project

design and circumstances arising during implementation; the Final NYRCR Plan does not provide a guarantee of risk reduction, but rather a projected, and intended, benefit to minimizing risk for a given population.

Risk Reduction Benefits resulting from the proposed project were qualitatively evaluated using ESRI Community Analyst. Population data was gathered at the census tract or block group level depending on the size of the project. If the project was expected to have very localized effects in an area that was much smaller than a block group, a polygon was drawn manually in ESRI to serve as the study area and the data corresponding to that polygon was used instead. The size of the study area was determined based on the project description. The specific data set used was from the Demographic and Income Profile (DANDI) ESRI Forecasts for 2013 based on US Census Bureau 2010 Census data.

Some projects, such as select capacity building or economic development projects, may not directly reduce risk, however they provide other significant benefits to the Bay Park/East Rockaway Community in the categories below.

Economic Benefits: Economic benefits considered for the purpose of the NYRCR Plan include estimated permanent and temporary jobs secured or added, contribution to a Regional Economic Development Plan, estimated potential increase in economic activity (as applicable), and net effect on local government expenditures for disaster recovery (such as reduced emergency and recovery costs).

In estimating the job-years created by direct government spending, the NYRCR Plan utilizes

the simple rule provided by the Office of the President Council of Economic Advisors that \$92,000 creates one job-year. This procedure is somewhat crude and does not take into account the obvious differences in wages and other costs across different types of projects and across different parts of the country. It does; however, take into account the key difference between tax changes or state fiscal relief, and direct government investment spending. The rule's key virtue is its simplicity and conservatism. Because it is derived to be consistent with the macroeconomic jobs estimates, it minimizes discrepancies between the aggregate jobs estimates across the various geographies.

Environmental Benefits: Environmental Benefits of potential NYRCR projects include the environmental assets secured by the potential project, as well as the environmental remediation or cleanup provided by the project and open space created by the project. Each project was evaluated for its impacts on high-priority habitat defined as a habitat type with unique or significant value to one or more species, threatened and endangered species, migration or habitat connectivity. Benefits to environmental quality were also noted, such as improving air, surface and ground water quality.

Health and Social Benefits: Health and Social Benefits resulting from the proposed project were qualitatively evaluated using ESRI Community Analyst. Population data was gathered at the census tract or block group level depending on the size of the project. If the project was expected to have very localized effects in an area that was much smaller than a block group, a polygon was drawn manually in ESRI to serve as the study area and the data corresponding to

that polygon was used instead. The size of the study area was determined based on the project description. The specific data set used was from the Demographic and Income Profile (DANDI) ESRI Forecasts for 2013 based on US Census Bureau 2010 Census data.

Projects were evaluated for their health and social services benefits to the community by considering the following benefit types:

- "Overall population with improved access to health and social services facilities" was reported as the entire population of the area (census tract, block group or polygon) that would benefit from the proposed project. The population was reported regardless of whether the project actually *involves* a health and social services asset because presumably all projects would improve access to facilities in one form or another.
- "Type and population size of socially vulnerable population secured" was evaluated across four categories of socially vulnerable populations:
 - poverty/low income (annual household income less than \$35,000)
 - elderly population (over age 65 years)
 - minority population
- "Population served by essential health and social services facilities that are secured to provide or continue service during acute events as a result of the action", was considered to be applicable only if the project itself proposed an action that directly affected/pertained to a health and social services facility. (Health and social services facilities were previously identified/determined during the asset

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inventory). If the project directly impacted a health and social services facility, that facility (asset) was noted, and the population of the entire area (as reported under the previous criteria) can be considered to be the “population served”.

Risk Assessment Map Risk Areas (NYS DOS)

Extreme Risk Areas: Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise. Extreme Risk Areas include:

- FEMA V zone.
- Shallow Coastal Flooding per National Oceanic and Atmospheric Administration (NOAA) National Weather Service’s (NWS) advisory threshold.
- Natural protective feature areas susceptible to erosion.
- Sea level rise - Added three feet to the mean higher high water (MHHW) level shoreline and extended this elevation inland to point of intersection with ground surface.

High Risk Areas: Areas outside the Extreme Risk Area that are currently at infrequent risk of inundation or at future risk from sea level rise. High Risk Areas include:

- Area bounded by the 1% annual flood risk zone (FEMA V and A zones). Often referred to as base flood or 100-year flood, this is the area that has a 1% chance of inundation from a flood event in any given year.
- Sea level rise - Added three feet to NOAA NWS coastal flooding advisory threshold

and extended this elevation inland to point of intersection with ground surface.

Moderate Risk Areas: Areas outside the Extreme and High Risk Areas but currently at moderate risk of inundation from infrequent events or at risk in the future from sea level rise. Moderate Risk Areas include:

- Area bounded by the 0.2% annual risk (500 year) flood zone, where available.
- Sea level rise - Added 3 feet to the Base Flood Elevation for the current 1%
- Annual risk flood event and extended this elevation inland to point of intersection with ground surface.
- Area bounded by the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zone (NOAA NWS).

Socially Vulnerable Populations

The NYRCR Program Guidance notes that “Socially vulnerable populations” may be defined by the following criteria: poverty/low income, racial/ethnic minority status, immigrant status, education level, institutionalization, renter-occupied household status, single senior-citizen household status” (NYRCR Program Guidance to Firms Project Evaluation, 12/30/2013).

USACE

U.S. Army Corps of Engineers

U.S. EPA

U.S. Environmental Protection Agency

U.S. SBA

U.S. Small Business Administration

UWAS

Urban Waterfront Adaptive Strategies

G. Appendix

List of Existing Plans and Studies relevant to Gravesend and Bensonhurst NYRCR Plan

Report/Plan/Study	Author	Year
Retrofitting Buildings for Flood Risk	NYC DCP	2014
Reconstruction of Seven Bridges on the Belt Parkway	NYC DOT	2014
Rebuilding after Hurricane Sandy: A Guide to New Code and Zoning Standards - For Industry professionals	NYCDOB	2013
NYC Wastewater Resiliency Plan	NYC DEP	2013
New York City Community Development Block Grant- Disaster Recovery Action Plan	NYC	2013
New York State Community Development Block Grant Action Plan	New York State Homes and Community Renewal Office of Community Renewal	2013
Governor’s 2100 commission report: “Recommendations to Improve the Strength and Resilience of the Empire State’s Infrastructure”	NYS 2100	2013
A Stronger, More Resilient New York (SIRR)	NYC Special Initiative for Rebuilding and Resiliency	2013
Coastal Climate Resilience: Urban Waterfront Adaptive Strategies	Department of City Planning for the New York and Connecticut Sustainable Communities Consortium	2013
Coastal Climate Resilience: Designing for Flood Risk	New York City, Department of City Planning	2013
Hurricane Sandy: After Action	New York City Mayor’s Office	2013
Proposed Flood Resilience Text Amendments	New York City Department of City Planning	2013
US Army Corps of Engineers Regional Comprehensive Study (NACCS)	US Army Corps of Engineers	2013
Flood-Resilient Waterfront Development in New York City	Vrije University	2013
Protecting New York as an Ecosystem	Dr. Franco Monalto, PE	2013
Brooklyn Community Board No. 11 District Needs Statement	Brooklyn Community Board 11	2013
Brooklyn Community Board No. 13 District Needs Statement	Brooklyn Community Board 13	2013
Hurricane Sandy Rebuilding Strategy	U.S., Hurricane Sandy Rebuilding Task Force	2012
Global Sea Level Rise Scenarios for the United States National Climate Assessment	National Oceanic and Atmospheric Administration, Army Corps of Engineers, United States Geographical Survey, SERDP	2012

Gravesend and Bensonhurst

List of Existing Plans and Studies relevant to Gravesend and Bensonhurst NYRCR Plan (continued)

Report/Plan/Study	Author	Year
PlaNYC & PlaNYC Progress Report	New York City Mayor's Office	2012
Sustainable Stormwater Management Plan	PlaNYC	2012
Storm Surge Model for NY, CT, and Northern Waters of NJ with special emphasis on New York Harbor, Paper No, 156-27	Alan I. Benimoff, CSI	2012
New York City Comprehensive Waterfront Plan - Vision 2020	New York City, Department of City Planning	2011
Waterfront Vision and Enhancement Strategy (WAVES)	New York City Mayor's Office	2011
Coney Island/Gravesend Sustainable Development Transportation Study	NYC DOT	2011
NYC Green Infrastructure Plan DEP	NYC DEP	2011
Climate Change Adaptation in New York City: Building a Risk Management Response	New York City Panel on Climate Change	2010
Waterbody/Watershed Facility Plan for Coney Island Creek	NYC DEP	2009
Climate Risk Information	NYC Panel on Climate Change	2009
The New York State Coastal Management Program Document	National Oceanic and Atmospheric Administration	2006
New York City Local Waterfront Revitalization Program	NYS DOS	2002

Community Based Organizations (CBOs) that serve Gravesend and Bensonhurst

62nd Precinct Community Council	CUNY/Creative Arts Team	Legal Aid Brooklyn Office For The Aging	Ryan Repertory Theater
Albadr Islamic Center	Edith And Carl Marks Jewish Community House Of Bensonhurst	Legal Services For New York City	Saint Athanasius Roman Catholic Church
AMICO Extended Services	Families, Mothers & Others	Loyal Order Of Moose	Saint Finbars Roman Catholic Church
Asian Community United Society	Federation Employment And Guidance Service, Inc	Lutheran Medical SADS	Senior Alliance Neighborhood Senior Center
Association Of Informed Voices	Federation Of Italian American Organizations	Magen David Congregation	Sephardic Multi Service Senior Center
Astella Development Corp.	Fiorello Laguardia Republican Org	Manhattan Beach Neighborhood Senior Center	Shore Hill Neighborhood Senior Center
Avenue O Jewish Center	Friendship Truth & Brotherly Assoc. Of Kastoryalis	Marine Park Active Adults Neighborhood	Shorefront Jewish Community Council
Bay Ridge Neighborhood Senior Center	Haber House Neighborhood Senior Center	Marlboro Neighborhood Senior Center	Shorefront Neighborhood Senior Center
Benson Ridge Case Management Bk-5	Heartshare	Metropolitan Baptist Church	Shorefront YM·YWCA
Bensonhurst Neighborhood Senior Center	Heartshare Bensonhurst Prevention	Midwood Neighborhood Senior Center	Spirit Of Jesus Evangelical Community
Bensonhurst Baptist Church	Homecrest Bensonhurst Neighborhood Sr Ct	Muslim American Society	Senior Citizens League Of Flatbush Senior Center
Bensonhurst Chinese Christian Church	Homecrest Community Services	Muslim Youth Center	St. Dominic Roman Catholic Church
Bergen Basin Community Development Corp.	Hospital Audiences	National Federation-Italian American Orgs.	St. Mary Mother Of Jesus
The Block Institute	Iglesia De Evangelizacion Misionera Jovenas Cristianos	Neighborhood Improvement Association	St. Nicholas Church
United Chinese Association of Brooklyn	Islam Ahmadiyya Mowment	New Utrecht Reformed Church	St. Rosalia-Regina Pacis Neighborhood Improvement Association
Brooklyn Elks Lodge	JASA Brooklyn Caregiver Respite Program	New York Junior Tennis League	Stars & Stripes Democratic Club
Calvary Praise & Worship	JASA NORC	New York Legal Assistance Group	Temple Beth El Of Bensonhurst
CCNS The Bay Neighborhood Senior Center	Jay-Harama Neighborhood Senior Center	Ocean Parkway Neighborhood Senior Center	The American Legion Post 159
Chinese American Planning Council	JCC GCI Home Delivered Meals	Our Lady Of Guadalupe Church	United Cerebral Palsy
Christ Anchored Tabernacle	JCC GCI Innovative Senior Center	Progressive Democratic Club	United Chinese Association
COJO Of Bensonhurst	Jehovah's Witnesses' Kings Highway	Project Relief Transportation	United Regular Democratic Org
Congregation Bris Sholom	Jewish Community Center Of Bensonhurst	Reaching Out Community Service	Yeshiva Of Bensonhurst
Congregation Hisachdis Yireim	Knights Of Columbus	Research Foundation Of CUNY/Brooklyn College	YMCA Of Greater New York
Council Center For Senior Citizens	Latin American Workers Justice Project	Russian Orthodox Church Community Of New Martyrs	Young Israel Of Bensonhurst
			YWCA Of The City Of New York