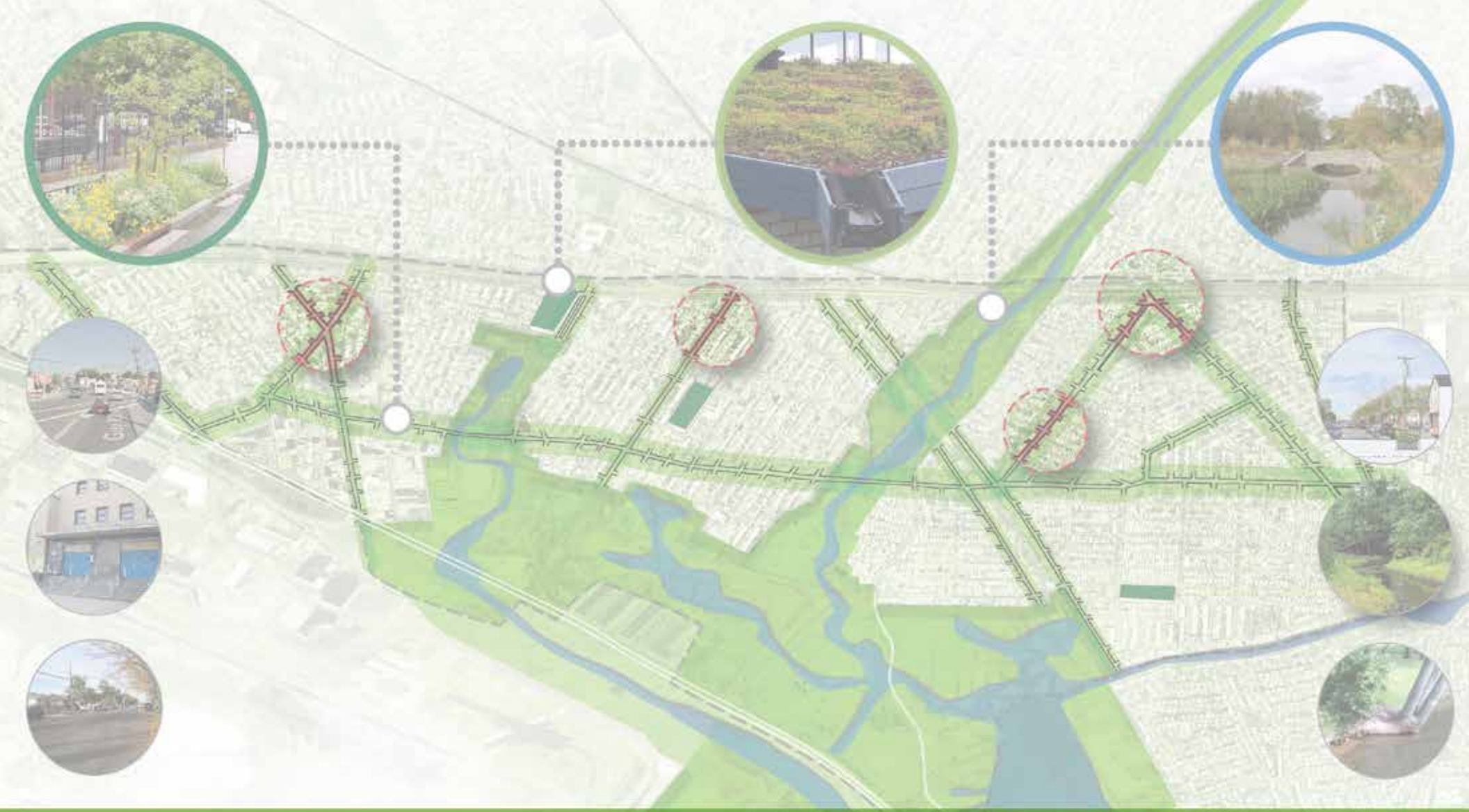

NY RISING COMMUNITY RECONSTRUCTION PROGRAM

Idlewild Watershed Communities

Springfield Gardens, Brookville, and Rosedale

NY RISING COMMUNITY RECONSTRUCTION PLAN

DECEMBER 2014

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This document was developed by the Idlewild Watershed Communities NY Rising Community Reconstruction (NYRCR) Program Planning Committee as part of the NYRCR Program within the Governor's Office of Storm Recovery. The NYRCR Program is supported by New York State (NYS) Homes and Community Renewal and NYS Department of State. The document was prepared by Perkins Eastman / BFJ Planning in association with the Louis Berger Group, and based on the NYR planning process undertaken by a multidisciplinary team consisting of Perkins Eastman, BFJ Planning, Louis Berger Group, 4Ward Planning, PACO Group and Fitzgerald & Haliday, Inc.

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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/nyrcr), providing several ways for community members and the public to submit feedback on the program and materials in progress.

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

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 Idlewild Watershed Communities 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 Idlewild Watershed Communities NYRCR Planning Area has been allotted up to $6 million in CDBG-DR funds for the implementation of eligible projects identified in this plan.

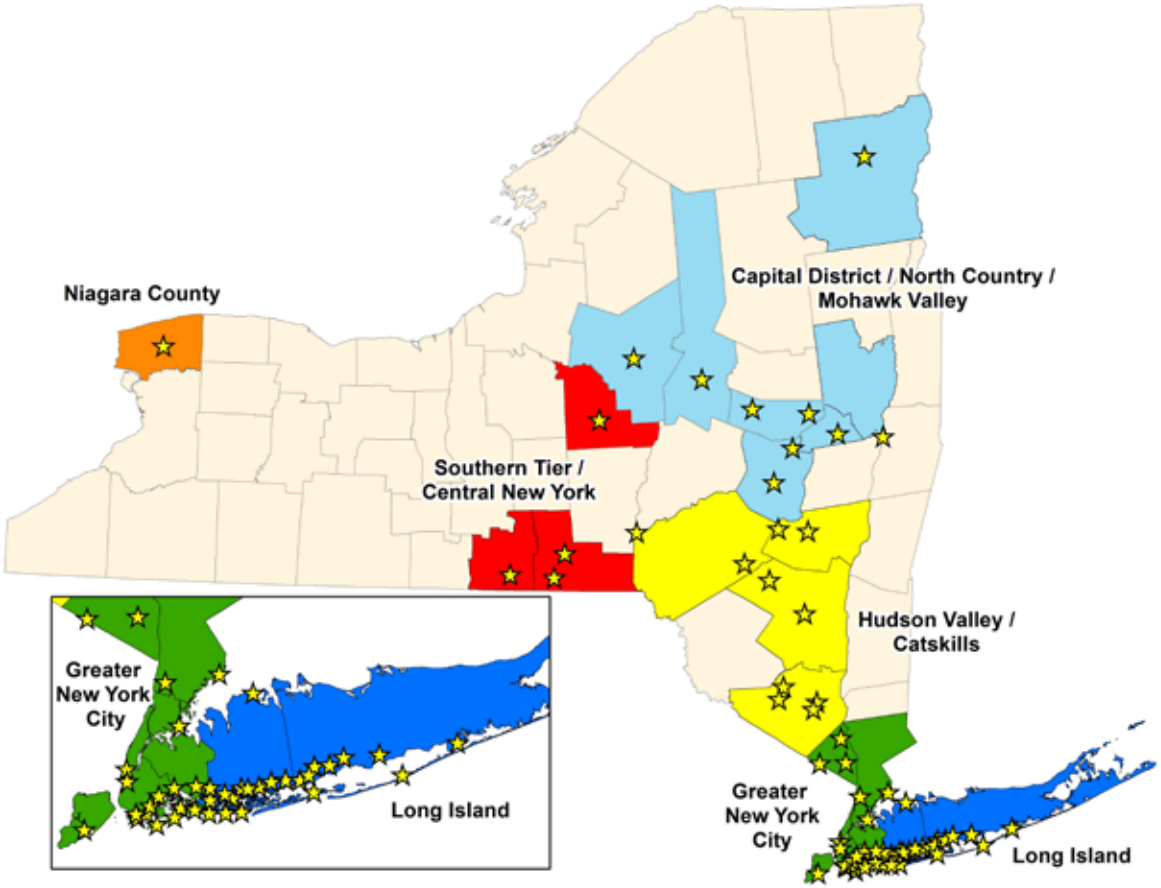
While developing projects for inclusion in NYRCR Plans, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility,

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

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

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

NY Rising Communities



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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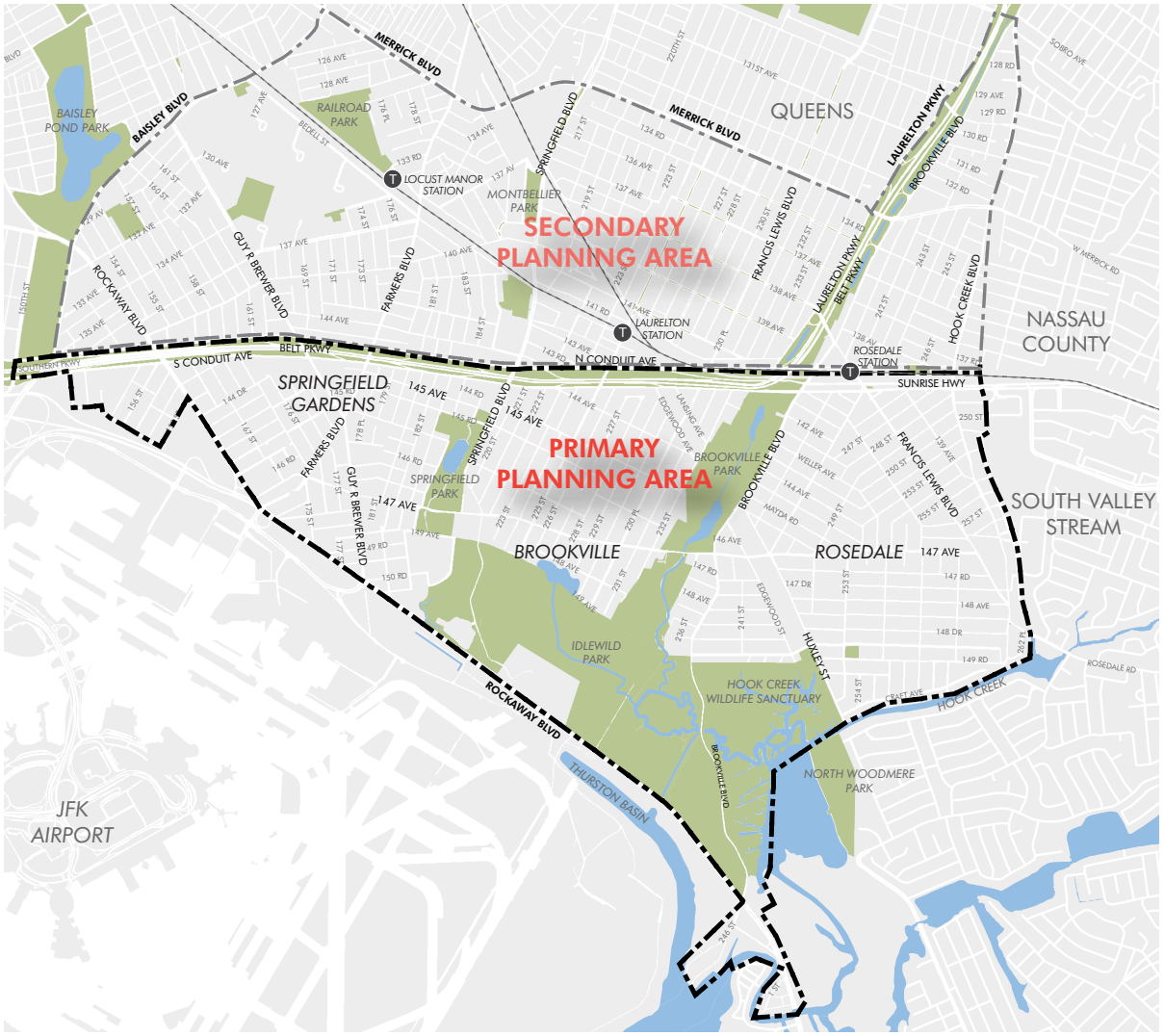
EXECUTIVE SUMMARY

The Idlewild Watershed Communities (the Community) of Springfield Gardens, Brookville, and Rosedale are uniquely close-knit New York City neighborhoods noted for their strong sense of civic activism, enviable network of open space and wetland habitat, and diverse neighborhood character. Although the area is primarily suburban and residential in character, this Community in the borough of Queens also includes a significant industrial and manufacturing district directly adjacent to John F. Kennedy International (JFK) Airport. The nearby presence of JFK Airport to the south and their low-lying topography and high water table play a formative role in shaping the landscape of the Community. The nearly 95,000 residents within the Idlewild Watershed Communities experience constant reminders of both of these features.

The Idlewild Watershed Communities NY Rising Community Reconstruction (NYRCR) Plan features a suite of projects identified as having the greatest benefit in increasing the Community's resilience to future climate related events. The Governor's Office of Storm Recovery has allotted $6,000,000 in U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant-Disaster Recovery (CDBG-DR) dollars to fund eligible projects identified in the NYRCR Plan. The NYRCR Plan is a community-based plan, which is the product of a robust public engagement effort involving consensus-building among residents, civic leaders, and elected officials. Finally, the NYRCR Plan is comprehensive,

Idlewild Watershed Communities NYRCR Boundary



addressing six Recovery Support Functions: Community Planning & Capacity Building; Economic Development; Health & Social Services; Housing; Infrastructure; and Natural & Cultural Resources.

The Community includes three neighborhoods: Springfield Gardens, Brookville, Rosedale, as well as the southern section of Laurelton below Merrick Boulevard. To the south, the Community Boundary is Rockaway Boulevard and JFK Airport. The western boundary is Baisley Boulevard, which extends north from the Belt Parkway and curves eastward to the intersection with Merrick Boulevard. Merrick Boulevard serves as the northern boundary of the Community through Springfield Gardens and Laurelton until it reaches Laurelton Parkway. From Laurelton Parkway, Rosedale extends north, bounded to the east by Hook Creek Boulevard. The southern section of Rosedale, which includes the Idlewild Park Preserve and Meadowmere, is also included in the Community.

The Idlewild Watershed Communities NYRCR Planning Committee (Committee) organized the Community into a Primary Study Area and Secondary Study Area to reflect different needs and opportunities that are present in different areas. The neighborhoods to the south of the Belt Parkway and Sunrise Highway have been designated as the Primary Study Area, while the area to the north has been designated as the Secondary Study Area. The Primary Study Area experienced significant flooding, damage, and destruction during Superstorm Sandy and Hurricane Irene and is more prone to frequent stormwater flooding.

The Community experienced tidal flooding during Superstorm Sandy due to storm surge that flowed through Jamaica Bay and into the wetlands and water bodies that extend throughout the Community. Inundation due to tidal flooding during Superstorm Sandy ranged from one to four feet, with the most severe flooding occurring in low-lying areas and tidal wetlands, including Idlewild Park Preserve. Flood waters extended from Hook Creek nearly as far north as the intersection of Rockaway Boulevard and the Belt Parkway in Springfield Gardens, to 145th Road and through Brookville Park in Brookville, and past 147th Avenue in Rosedale. Brookville Boulevard was washed out with floodwaters, as were segments of Rockaway Boulevard.

Tidal flooding from creeks and inlets, referred to as "backwater flooding," caused backups in the stormwater systems in low-lying areas. The Rosedale Pumping Station was flooded during Superstorm Sandy, requiring reconstruction, including replacing pump controls, sump pumps, ventilation and heating equipment, and compressors. The storm also resulted in downed trees, damaged roofs, and damage to power lines due to sustained winds estimated at greater than 60 mph.

In comparison to Superstorm Sandy, the impacts from Hurricane Irene in the fall of 2011 were largely a result of precipitation and wind. Localized rainfall totals during Irene ranged from seven to ten inches while storm tide levels ranged from three to six feet. Maximum wind gusts in New York City ranged from 60 to 70 mph. Stormwater flooding from Hurricane Irene was exacerbated due to a summer of high precipitation and saturated soils.

The Community is vulnerable to extreme weather events such as Superstorm Sandy and Hurricane Irene, but it also experiences frequent stormwater flooding on a smaller scale during high tide events, heavy rainstorms, and nor'easters. The Idlewild Watershed Communities are low-lying, have a high groundwater table, are partially built on historic wetlands, and are interwoven with tidal wetlands.

Superstorm Sandy and Hurricane Irene exposed several challenges within the Community, which the NYRCR Plan addresses. These critical issues were identified throughout the NYRCR Process during Planning Committee Meetings, Public Engagement Events, and meetings with representatives of New York City and state agencies. These issues helped to guide the development of the NYRCR Plan and identification of implementable projects to address problems faced by the Community.

In particular, the Plan addresses the need for expansion of green infrastructure to mitigate stormwater flooding, coordination of green infrastructure initiatives with ongoing City storm sewer projects, increased local capacity for disaster recovery, support for local businesses that provide critical services, adequate resources and planning for local disaster recovery organizations, and education and training to help home and business owners better prepare for disasters.

Community-Driven Process

In July 2014, a Committee of residents and civic leaders from the Idlewild Watershed Communities convened with the goal of creating a plan to help the Community rebuild from the damage caused by Superstorm Sandy and prepare the area for a more resilient future. Since that time, the Committee has worked closely with a team of planning consultants and representatives of the Governor's Office of Storm Recovery to develop this NY Rising Community Reconstruction Plan.

The Committee created a Community Vision to guide the NYRCR Process and ensure that the plan was responsive to the Community's long-term needs to reduce flood risks and improve disaster recovery.

Public outreach during the NYRCR Process for the Idlewild Watershed Communities was structured to encourage broad community participation. Through advertisements, flyers, and—most importantly—the Committee's broad network of contacts, public engagement events were publicized broadly throughout the Community. During public engagement events, attendees were encouraged to review the Committee's process at key steps along the way, providing feedback on the Community's needs and opportunities to increase resilience, reconstruction strategies to guide project development in support of the Community Vision, and the projects identified by the Committee for inclusion in the NYRCR Plan.

Community Vision

The Idlewild Watershed Communities of Brookville, Rosedale, and Springfield Gardens are dedicated to the creation and maintenance of resilient neighborhoods that guarantee a high quality of life for all who live and work within them, both now and in the future. Towards this end, our vision calls for the following:

Fully Functional Infrastructure
Communities in which our natural and manmade systems are maintained, improved, extended, and maximized so that they are fully functional in terms of flood prevention, control, and alleviation throughout the target Idlewild Watershed Communities of Brookville, Rosedale, and Springfield Gardens.

Appropriate Levels of Social Supports and Services
Communities that have effective, efficient systems in place to address the needs of all of the people, with special emphasis on our vulnerable populations.

Effective Emergency Management
Communities which, in the event of natural, manmade, and technological disasters, have in place coordinated disaster recovery, response plans that operate effectively before, during, and after the emergency.

Public input on the Community Vision and Proposed Projects at Public Engagement Events

NYRCR Plan: A Blueprint for Implementation

The NYRCR Plan for the Idlewild Watershed Communities includes an Assessment of Needs and Opportunities to evaluate the potential for increased resilience to flooding and extreme weather in the short-, medium-, and long-term. The Assessment of Needs and Opportunities was refined through detailed analysis of the assets and risks within the Community, analysis of demographic and economic data, guidance from the Committee, site visits, and input from attendees at Public Engagement Events.

The Assessment of Needs and Opportunities identifies areas in which the Community could improve its resilience to major storms and other disasters. This analysis helped to guide the Committee in identifying Reconstruction Strategies and Proposed and Featured Projects that will increase the Community's resilience.

The Committee developed Reconstruction Strategies based on the findings of the Assessment of Needs and Opportunities and feedback from Public Engagement Events. The Reconstruction Strategies represent a framework that guided development and evaluation of the Proposed and Featured Projects included in the NYRCR Plan.

The key strategies that guided the NYRCR Plan for the Idlewild Watershed Communities are:

Strategy A: Alleviate Localized Flooding Conditions

The objective of Strategy A is to develop a comprehensive approach to address localized flooding in the Community that leverages ongoing and planned stormwater infrastructure projects conducted by City agencies, identifies gaps in protection from flooding that are not addressed by ongoing and planned projects, and identifies additional projects that will increase stormwater retention capacity of parks and wetlands, address coastal flooding, and expand the green infrastructure network throughout the Community.

Strategy B: Strengthen the Emergency Response Capacity of the Community

The objective of Strategy B is to expand the ability of existing Community Based Organizations (CBOs) to assist in disaster preparation and recovery by providing training and education to local non-profit organizations, ensuring that critical facilities have resources they need to help vulnerable populations recover from major storms, expanding the services of CBOs to include disaster preparedness and response, and increasing coordination between local groups and the New York City Office of Emergency Management (NYC OEM) to increase the reach of existing educational materials, training programs, and recovery assistance.

Rosedale Station Community Gateway Green Street

Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources

The objective of Strategy C is to lay out a plan that gives the Community the resources it needs to promote, support, and enforce stewardship of the environment to foster sustainability and assure that natural and manmade resources can provide protections from flooding. Strategy C enhances the environmental stewardship of the Community by better maintaining and improving the ecosystem of Community parks and wetlands, supporting increased enforcement of illegal dumping and other threats to the health of parks, open space, and wetlands, and expanding educational campaigns about environmental stewardship.

Strategy D: Provide Safe and Reliable Access to Critical Goods and Services

The objective of Strategy D is to provide for reliable transportation, communication, and backup power networks so that the Community is not isolated from critical goods and services after disasters. This objective is achieved through Strategy D by supporting retail/commercial districts so that businesses can quickly recover from disasters and residents have access to essential goods after storms, strengthening the area's transportation infrastructure, power grid, and communications networks, and strengthening key connections to critical support services and regional shopping districts outside of the Community.

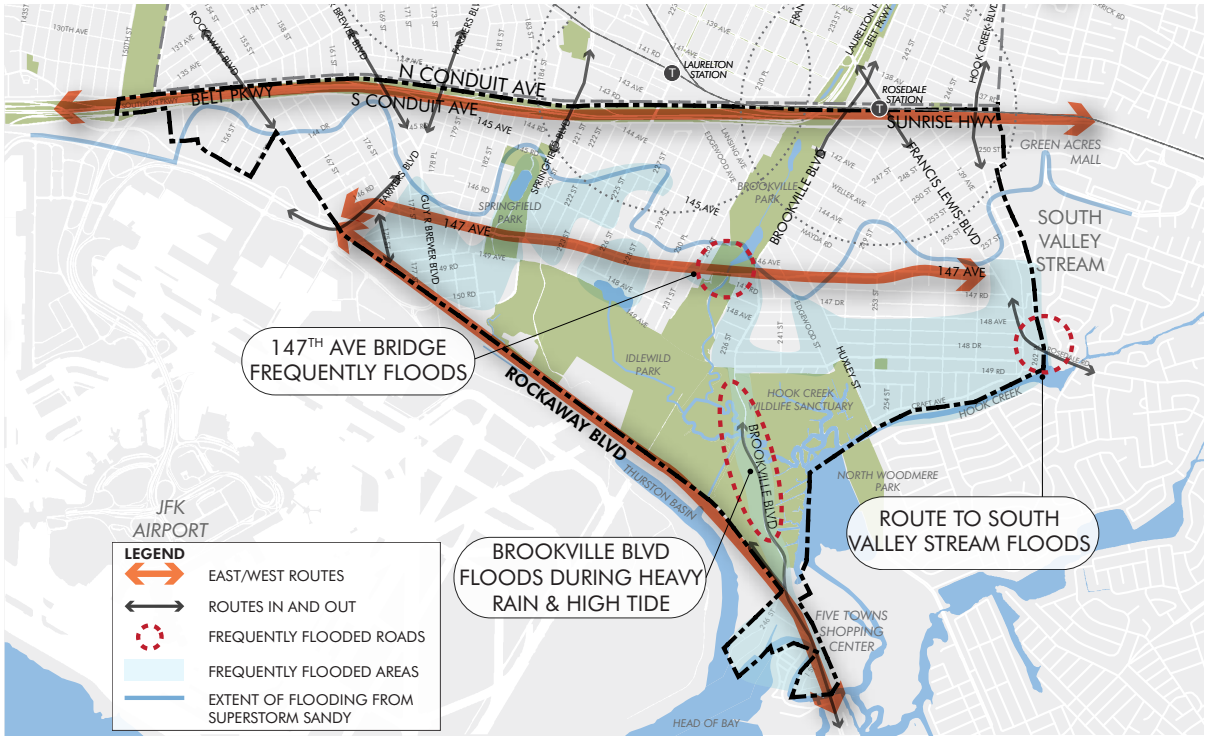
Based on the framework provided by these four strategies, projects evolved that addressed the needs of and risk to Community assets. Proposed Projects and Featured Projects have been assessed for their ability to mitigate future risk, were vetted by the Planning Committee and the public, and were categorized by their capacity to address needs within one or more of the Reconstruction Strategies.

Proposed Projects are projects proposed for funding through the Community's allotment of Community Development Block Grant-Disaster Recovery (CDBG-DR) funding.

Featured Projects are projects and actions that the Committee has identified as important for the Community's resilience and has analyzed in depth, but has not proposed for funding through the NYRCR Program.

Additional Resiliency Recommendations are projects and actions the Committee would like to highlight for further consideration.

With a fundamental focus on implementation, the NYRCR Planning Process incorporated extensive discussions with New York City and State agencies to discuss project feasibility. As a result, the projects featured in the NYRCR Plan are supportive and complementary of ongoing and planned projects, rather than duplicative.



Access to Critical Goods and Services

The NYRCR Plan is aimed at not only addressing short-term needs in the aftermath of Superstorm Sandy, but also the long-term resilience of the Community. The NYRCR Plan includes a menu of short-term projects that can be implemented immediately; medium-term projects that can be implemented within two-five years; and long-term actions that require resources beyond the NYRCR funding allotment and are largely addressed through planning projects and advocacy initiatives.

Projects are not listed in order of priority.

Strategy A: Alleviate Localized Flooding Conditions

A1: Green Infrastructure Community Master Plan [Proposed]

A1a: Brookville Park Pond Restoration [Proposed]

A1b: Community Gateway Green Streets [Proposed]

A1c: Green Infrastructure Pilot Project [Proposed]

A1d: Twin Pond Park Bluebelt Enhancement [Featured]

A2: DEP Oyster Restoration in Thurston Basin [Featured]

A3: Coastal Management Plan [Featured]

Strategy B: Strengthen the Emergency Response Capacity of the Community

B1a: Southeast Queens Disaster Recovery Plan [Proposed]

B1b: Implement Recommendations of the Southeast Queens Disaster Recovery Plan [Proposed]

Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources

C1: Phase 1— Green Infrastructure Workforce Training Program [Proposed]

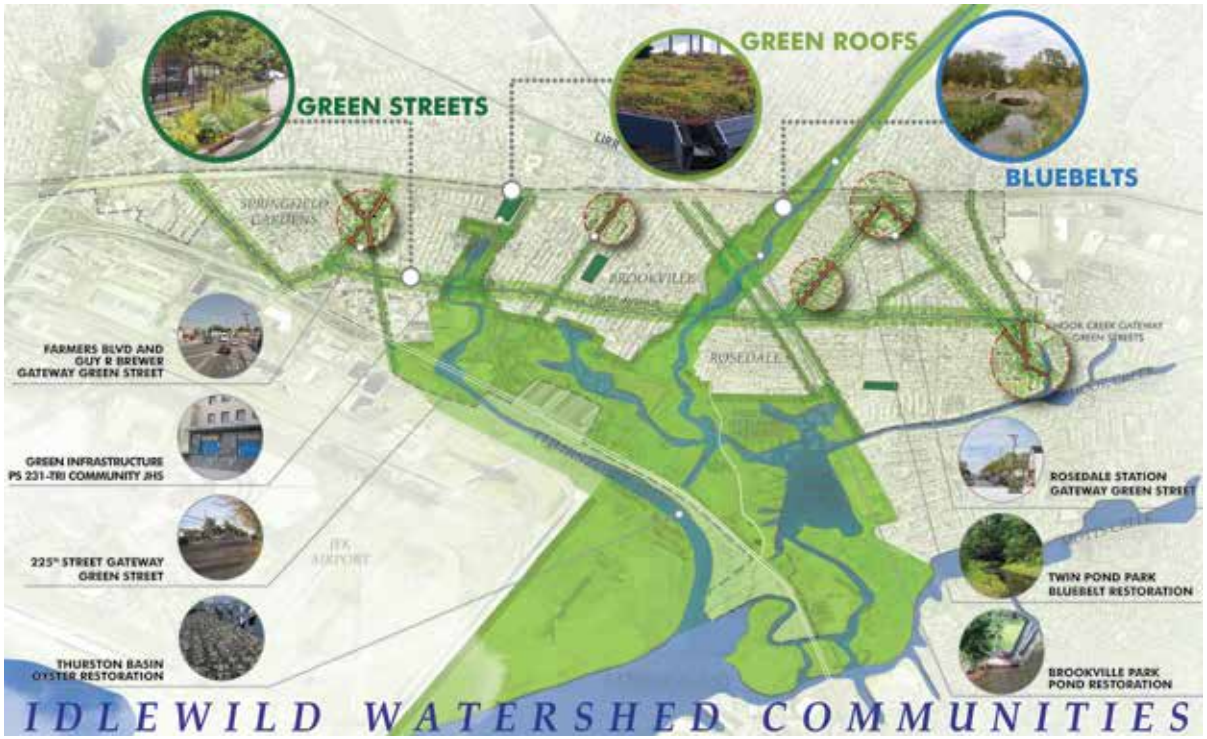
C1: Phase 2—Idlewild Watershed Communities Open Space Restoration Fund [Featured]

C2: Home and Business Owner Education and Technical Assistance Program [Featured]

Strategy D: Provide Safe and Reliable Access to Critical Goods and Services

D1: Install Backup Power Supply Systems at Critical Facilities [Proposed]

D2: Study to Elevate Brookville Boulevard (Snake Road) [Featured]



Green Infrastructure Community Master Plan

Proposed and Featured Projects

Strategy A
Alleviate Localized Flooding Conditions

- A1 Green Infrastructure Community Master Plan
- A1a Brookville Park Pond Restoration
- A1b Community Gateway Green Streets
- A1c Green Infrastructure Pilot Project
- A1d Twin Pond Park Bluebelt Enhancement *Featured Project
- A2 DEP Oyster Restoration in Thurston Basin *Featured Project
- A3 Coastal Management Plan *Featured Project

Strategy B
Strengthen the Emergency Response Capacity of the Community

- B1a Southeast Queens Disaster Recovery Plan
- B1b Implement Recommendations of the Southeast Queens Disaster Recovery Plan

Strategy C
Support Environmental Stewardship of the Community's Natural and Manmade Resources

- C1 Phase 1: Green Infrastructure Workforce Training Program
- C1 Phase 2: Idlewild Watershed Communities Open Space Restoration Fund *Featured Project
- C2 Home and Business Owner Education and Technical Assistance Program *Featured Project

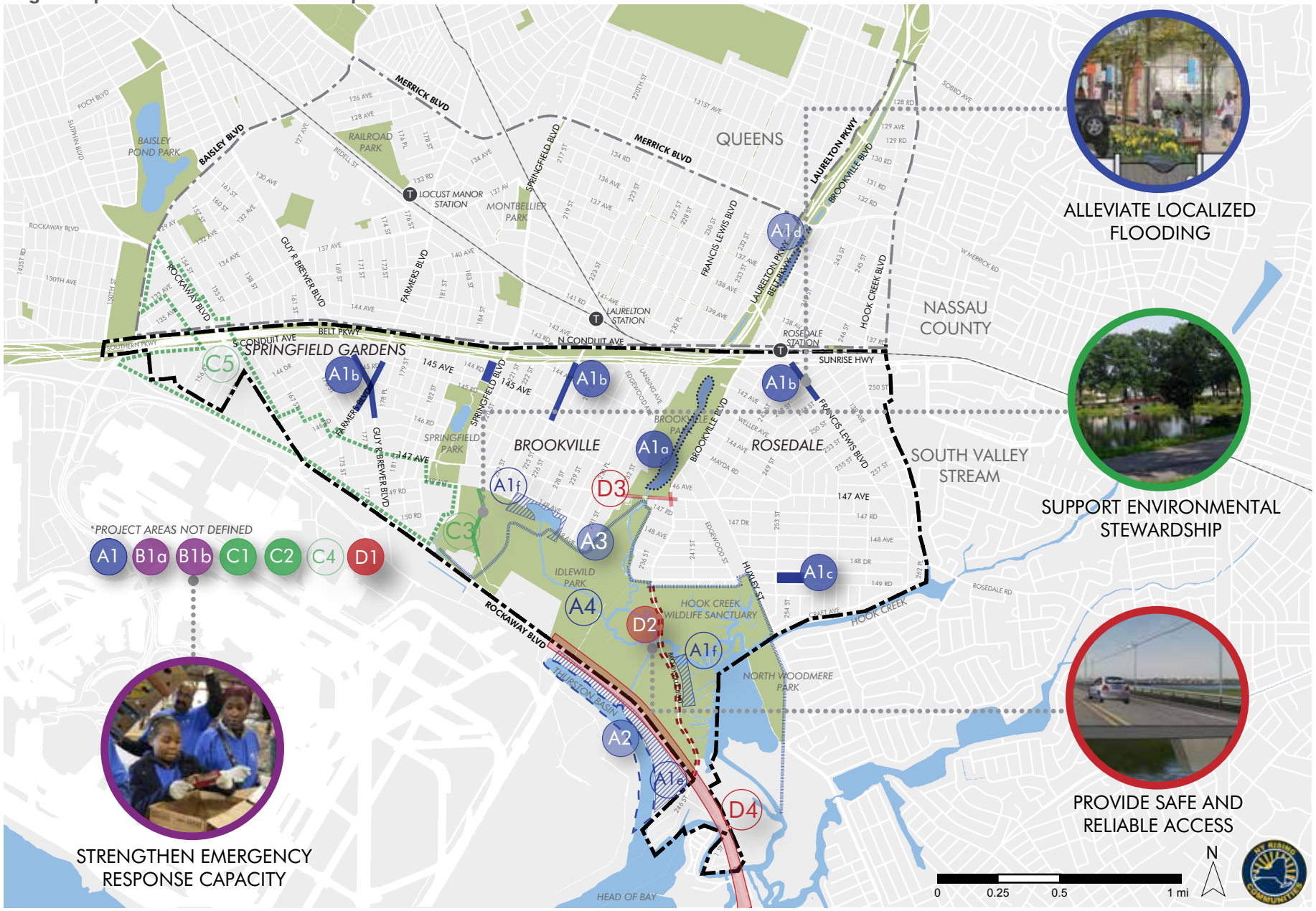
Strategy D
Provide Safe and Reliable Access to Critical Goods and Services

- D1 Install Backup Power Supply Systems at Critical Facilities
- D2 Study to Elevate Brookville Boulevard (Snake Road) *Featured Project

Additional Resiliency Recommendations

- A1e Advocate for the Construction of Thurston Basin Park
- A1f City Purchase of Privately Owned Parcels on Edges of Idlewild Park Preserve for Preservation as Wetland
- A4 Idlewild Park Preserve Culvert Expansion
- C3 Advocate for Idlewild Park Preserve Trail Network and Overlook Restoration
- C4 Advocate for Municipal Agency Coordination to Prioritize Resilience
- C5 Support for Creation of Greater JFK IBID
- D3 Elevate 147th Avenue Bridge at Brookville Park
- D4 Support Rockaway Turnpike/Nassau Expressway Resilient Corridor Study (NYRCR Plan for Five Towns)

Eight Proposed and five Featured Projects included in the NYRCR Plan for the Idlewild Watershed Communities



Section I
Community Overview

SECTION I. COMMUNITY OVERVIEW

A. Geographic Scope of NYRCR Plan

The NY Rising Community Reconstruction (NYRCR) Idlewild Watershed Communities—Springfield Gardens, Brookville, and Rosedale— (the Community) are primarily suburban in character, made up of single-family and two-family homes, with small retail/commercial districts and one significant industrial and manufacturing district adjacent to John F. Kennedy International (JFK) Airport. Although the residential neighborhoods are buffered from JFK Airport by the Springfield Gardens industrial area and the Idlewild Park Preserve wetlands (including the Hook Creek Wildlife Sanctuary), the presence of the airport is frequently felt, due to low flying planes making their approach to land.

Springfield Park, Brookville Park, and Idlewild Park Preserve provide opportunities for both active and passive recreation, but are also indicative of the area's origins as low-lying wetlands. Idlewild Park Preserve is still predominantly a wetland, while Springfield and Brookville Parks both contain large ponds that serve as collection points within the Jamaica Bay Watershed. The Community lies within two subwatersheds of the larger Jamaica Bay Watershed (Figure 1.1). The eastern portion of the Community (Rosedale and Brookville) lies mainly within the Hook Creek-Head of Bay subwatershed, while the western portion (Springfield Gardens) lies mainly within the Grassy Bay-Jamaica Bay subwatershed. The Community is located at the southernmost point of both subwatersheds, adjacent to Head of Bay. Water flows downstream from northern tributaries through water bodies in the Community, such as Hook Creek, to reach Jamaica Bay. Retention of stormwater upstream in Queens and Nassau Counties is necessary to reduce downstream flooding impacts in the Community.

The Community is predominantly suburban in character similar to neighborhoods in eastern Queens and parts of Nassau County, which is directly east of Rosedale, separated by Hook Creek. However, while most neighborhoods are characterized by single-family and two-family residential homes with large parks separating neighborhoods (Figure 1.4), the Community also includes Rochdale Village, a large co-operative housing facility with nearly 6,000 units, independent power supply, and retail facilities. In addition, the Community includes a significant retail corridor along Merrick Boulevard at its northernmost boundary. There are small retail/commercial corridors along 243rd Street and Francis Lewis Boulevard in Rosedale, South Conduit Boulevard in Brookville, and on parts of Farmers Boulevard, Guy F. Brewer Boulevard, and Rockaway Boulevard in Springfield Gardens. A large segment of Springfield Gardens across from JFK Airport is zoned for manufacturing and is predominantly made up of industrial uses related to the air cargo industry. All three neighborhoods have a strong local civic presence, with numerous active civic, neighborhood, and religious organizations.

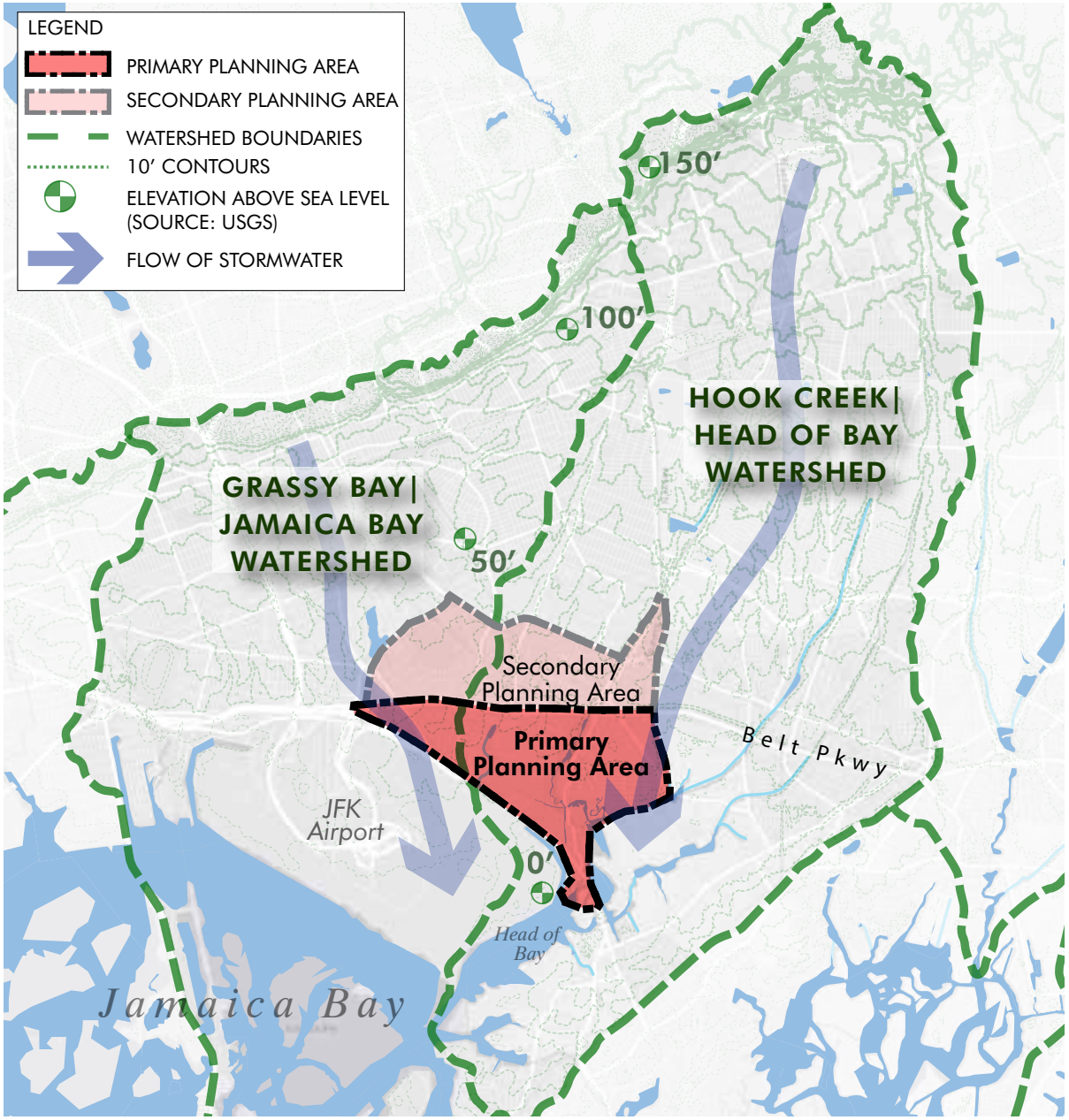
243rd Street Retail Corridor, Rosedale

Residential Area on 229th Street, Brookville

Creek in Springfield Park

Hook Creek at 259th Street

Figure 1.1: Regional Watersheds



Idlewild Park Preserve

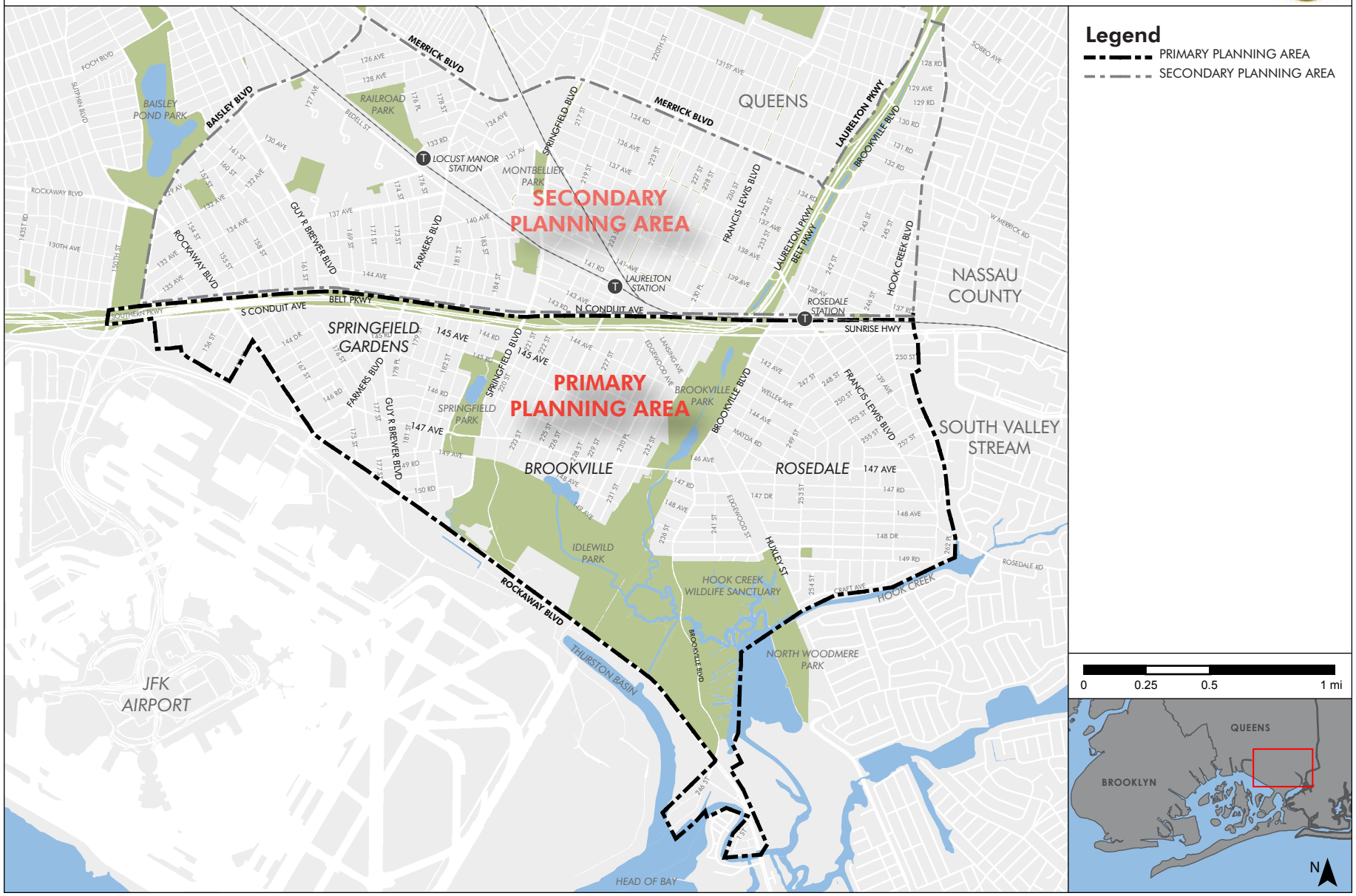
NYRCR Community Boundary

The Idlewild Watershed Communities Planning Area (Planning Area) include the neighborhoods of Springfield Gardens, Brookville, Rosedale, and the southern section of Laurelton below Merrick Boulevard (Figure 1.2). To the south, the Community boundary is Rockaway Boulevard and JFK Airport. The western boundary is Baisley Boulevard, which extends north from the Belt Parkway and curves eastward to the intersection with Merrick Boulevard. Merrick Boulevard serves as the northern boundary of the Community through Springfield Gardens and Laurelton until it reaches Laurelton Parkway. From Laurelton Parkway, Rosedale extends north, bounded to the east by Hook Creek Boulevard. The southern section of Rosedale, which includes the Idlewild Park Preserve and Meadowmere, is also included in the Community.

The Community boundary has been divided into a Primary Planning Area and Secondary Planning Area to reflect different needs and opportunities that are present in different areas. The segment of the Community south of the Belt Parkway and Sunrise Highway has been designated as the Primary Planning Area, while the area to the north has been designated as the Secondary Planning Area. The Primary Planning Area experienced flooding during Superstorm Sandy and Hurricane Irene and is more prone to frequent stormwater flooding. Therefore, the NYRCR Planning Committee (Committee) has identified this area as one in need of projects and programs that directly address issues related to flooding. The Secondary Planning Area is less likely to experience flooding, but presents opportunities to provide critical recovery resources to residents within the Primary Planning Area.

Figure 1.2: Planning Area

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



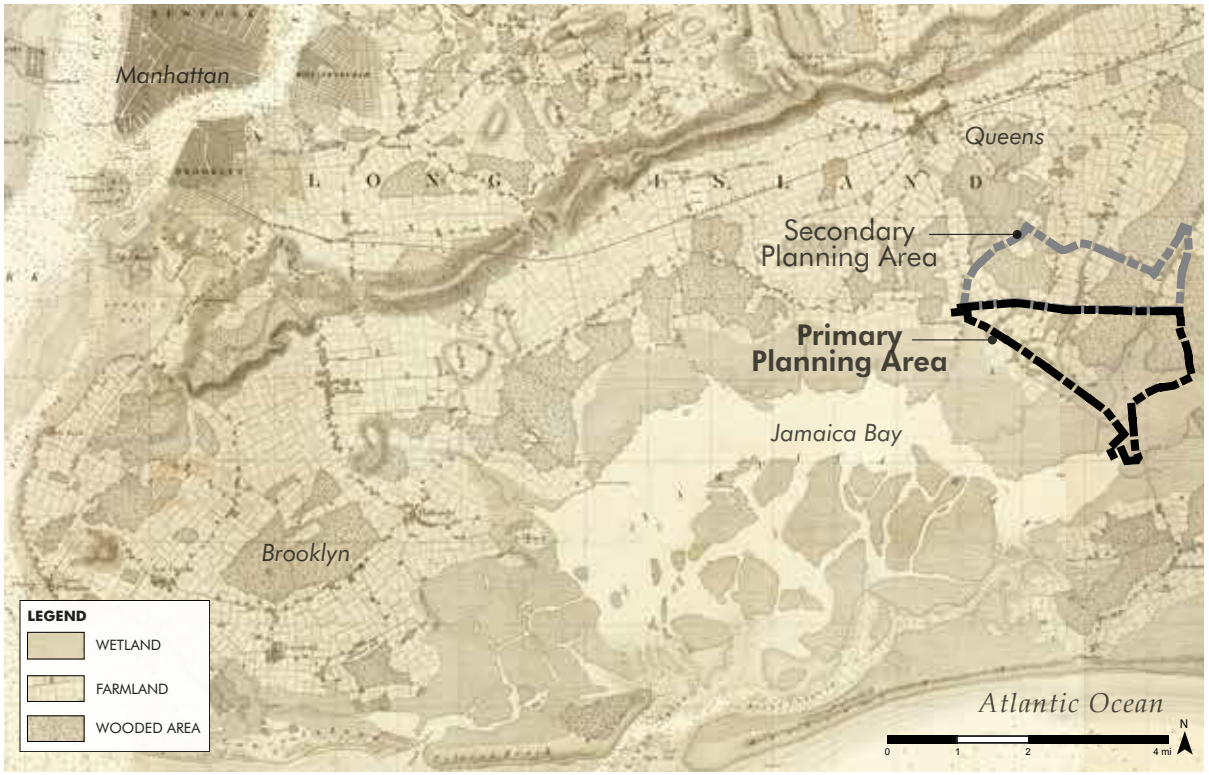
History

The Idlewild Watershed Communities are located in southeastern Queens adjacent to JFK Airport and just west of Nassau County. The Community is also considered to be part of the broader region of Jamaica, which encompasses a large segment of Southeast Queens. Historically, the landscape within the Community included tribal wetland and tributaries that fed into Jamaica Bay. Before European settlers arrived, the area now known as Jamaica is thought to have been sparsely populated by members of Native American Rockaway and Canarsie indigenous peoples.[1] The area was first settled by the Dutch in 1660, who were drawn to the area by several fresh water ponds and creeks. The settlers were able to use this network of waterways to create a crop irrigation system which resulted in an area dominated by farmland until the 20th century.[2] The area, which was known as the Springfield Settlement during colonial times, remained sparsely populated through the 1800s, with minimal municipal infrastructure such as sewers and other utilities (Figure 1.3).

The Springfield Gardens Long Island Railroad (LIRR) station initially opened in the 1870s and the line was electrified in 1925, which brought increased residential development to the Community in the 1920s and 1930s.[3] The newly constructed commuter rail network, along with construction of major thoroughfares such as Francis Lewis Boulevard and Sunrise Highway, provided easier access to Manhattan and began to change the character of the area, as residential development boomed in the 1920s. The area became known for its population of working-class immigrants in the 1940s, including Italian, German, and Irish families. In the 1950s and 1960s, the African American population increased. More recently, the population of Caribbean Americans has grown, representing immigrants from Jamaica, Haiti, and other countries of the West Indies. [4,5]

New York City began construction of Idlewild Airport in the spring of 1942.[6] The airport was named for a resort and golf course which previously occupied the area. Initially planned to cover 1,000 acres of filled wetland, the airport ultimately grew to cover nearly 5,000 acres. Idlewild Airport was rededicated as John F. Kennedy International Airport in December 1963, one month after the President's assassination. The presence of JFK Airport is constantly felt within the Community, from low-flying planes making their descent towards the runways, to the many air cargo-related businesses located in the Springfield Gardens industrial area, and the environmental threats faced by the Idlewild Park Preserve due to air traffic.

Figure 1.3: Map of New York Bay and Harbor and the Environs, 1844

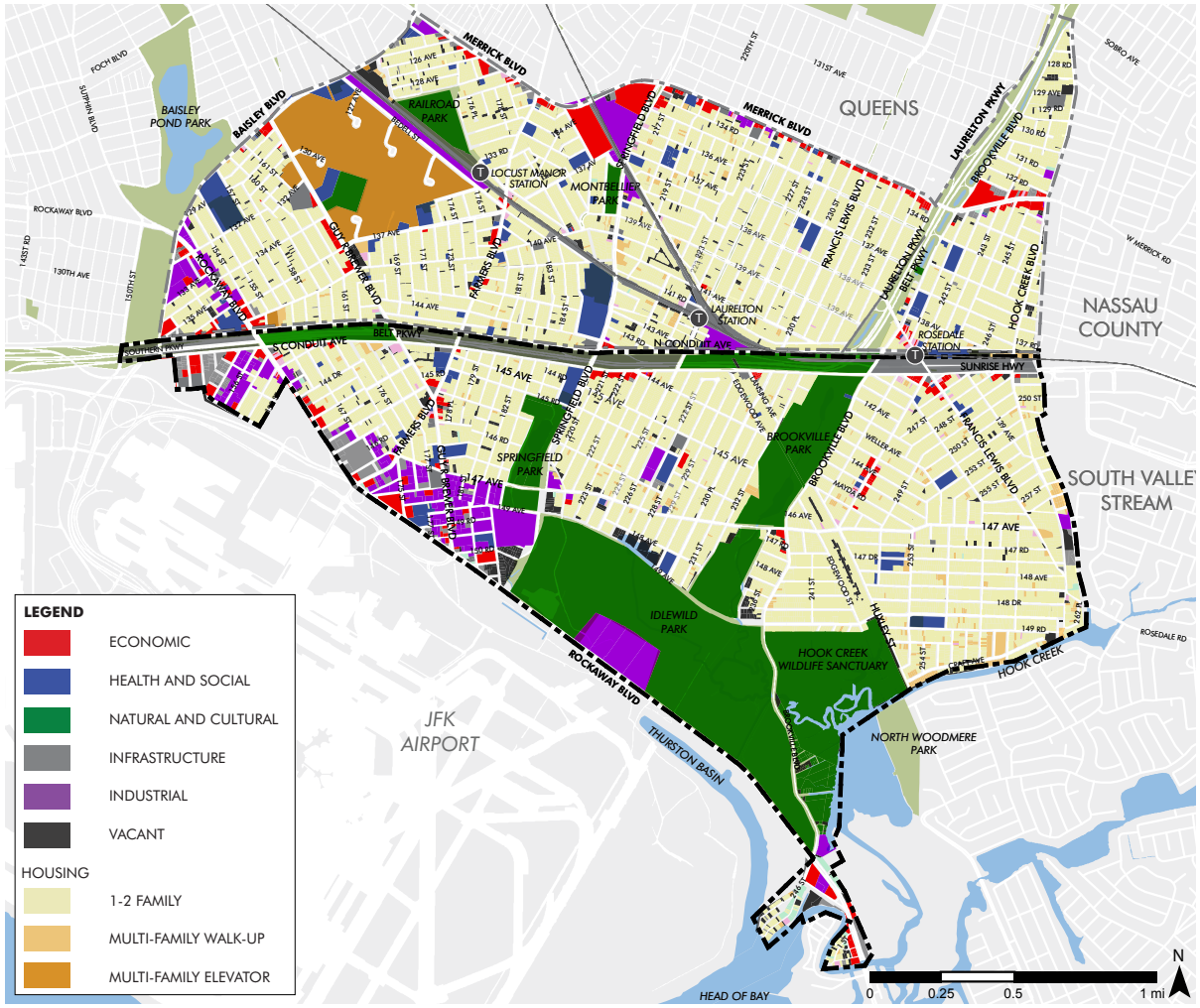


Source: © Cartography Associates, David Rumsey Collection

Demographic Profile

According to the 2010 Census, there were nearly 95,000 people living in over 31,000 households in the Community. As shown in Table 1.1, the median household income in the Community is nearly $65,000 per year, which is 18.2% greater than Queens County and 28.8% greater than New York City as a whole. The Community also has a relatively high rate of homeownership as compared to Queens County and the City with more than half of all housing units owner-occupied. However, the median home value is 17.6% less than New York City—approximately $425,000.[7]

Figure 1.4: Land Use



Housing trends in the Community indicate that the area was heavily impacted by depreciation and foreclosures following the recession in 2007-2009. Further, home values have yet to recover in the Community. The median home price per square foot within the Community has depreciated by nearly 40% over the last five years, even as median prices in Queens County have appreciated by more than 11%.[8] Meanwhile, the percentage of foreclosures is greater within the Community than in Queens County. According to 2010 data released by the Furman Center for Real Estate and Urban Policy, 18.7% of all housing units within the Community are affordable to low or moderate-income residents.[9] These affordable units are primarily concentrated in the northwest portion of the Community with 97% of all affordable units located within Rochdale Village, a mixed-use cooperative built in 1962.

According to 2010 U.S. Census data, more than 86% of the population in the Community identifies as Black or African American. Moreover, 78% of residents report speaking only English. After English, the next most common languages spoken are other Indo-European languages and Spanish. However, of residents who speak more than just English, the vast majority identify as speaking English well or very well. The median age of 37.8 is roughly equivalent to the median age in Queens County, but older than New York City as a whole. More than 23% of the population is under the age of 18, while nearly 12% is over the age of 65. A Naturally Occurring Retirement Community (NORC) was

established at Rochdale Village to provide social services to elderly residents at Rochdale Village. A NORC is characterized by a concentration of residents over 65 and health and social service assets that are easily accessible to an aging population.[10] Jamaica Service Program for Older Adults (JSPOA) operates senior centers and provides social services to elderly residents throughout Southeast Queens. JSPOA also advocates for the creation of additional NORCs to provide localized support services.

As of 2011, there were approximately 43,000 employed residents in the Community. The vast majority—about 97% of employed residents—are employed outside of the Community, while just over 2% of residents are employed at JFK Airport.[11] Nearly half of employed residents commute to work by car, while less than 40% take public transit. Reliance on cars for commuting calls attention to the importance of reliable evacuation routes in the event of severe weather or flooding. Additionally, since there are no subway stops within the Community and limited service by the Long Island Railroad (LIRR), reliable bus service becomes a critical connection to the rest of the city—for economic opportunities, social networks, and access to high ground during flood events. Bus connections are especially vital for residents who do not own cars or in the event that cars are damaged by flooding.

Residents experience long commute times, with more than half of employed residents spending over 45 minutes commuting one-way (daily). Of the more than 15,000 jobs within the Community, Transportation and Warehousing is the largest industry. Less than 7% of workers within the Community are also residents of the Springfield Gardens, Brookville, or Rosedale neighborhoods.

Table 1.1: Demographic Profile

	Idlewild Watershed Communities	Queens County	New York City
Demographics			
Population	92,776	2,230,722	8,175,133
Median Age	37.3	37.2	35.5
Population <18 years of age	23.7%	20.7%	21.6%
Population >65	12.2%	12.9%	12.1%
Economics			
Median Household Income	$68,990	$56,780	$51,865
Pct. of Household Incomes >$75,000	46.4%	37.2%	35.4%
Unemployment Rate		7.8%	8.7%
Housing			
Median Home Value	$426,325	$462,800	$501,500
Percent Owner-Occupied	51.1%	40.2%	28.6%

Source: Esri Community Analyst; U.S. Census Bureau

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 the Idlewild Watershed Communities (Figure 1.5). 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 high tidal surges. The severity of Superstorm Sandy's impact was made more extreme by four uncommon factors:[12]

- The storm's landfall in the New York City area coincided with a "spring" tide—a high tide that occurs during a full moon;
- The storm was quite large, extending approximately 1,000 miles in diameter, which contributed to an elevated storm surge; and
- 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.

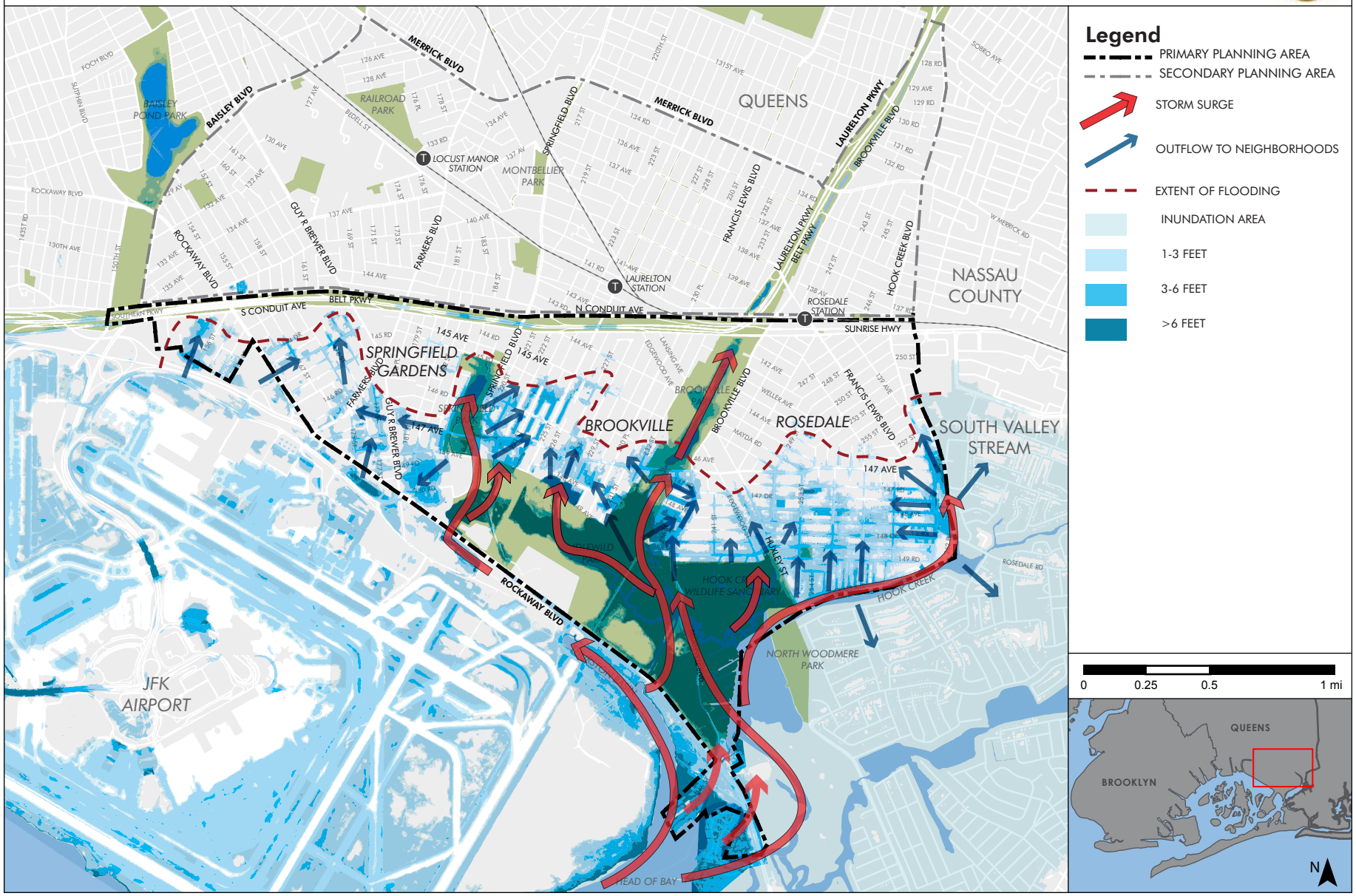
Flooding in the Community during Superstorm Sandy resulted largely from tidal storm surge that flowed into Jamaica Bay and through Hook Creek in a northerly direction through its marshes and tidally influenced streams, overflowing stream banks in areas where the elevation was lower than the storm surge levels of three to six feet.[13] A high water mark was recorded at Head of Bay at an elevation of 10.60 feet above sea level or approximately 4.6 feet above ground level. Inundation in the Community ranged from one to four feet, with the most severe flooding in low-lying areas and tidal wetlands, including Idlewild Park Preserve.[14] Flood waters covered the runways at JFK Airport and extended from Hook Creek nearly as far north as the intersection of Rockaway Boulevard and the Belt Parkway in Springfield Gardens, to 145th Road and through Brookville Park in Brookville, and past 147th Avenue in Rosedale. Brookville Boulevard was washed out with floodwaters, as were segments of Rockaway Boulevard.[15]

Tidal flooding from creeks and inlets, referred to as "backwater flooding," caused backups of the stormwater system in low-lying areas. Further, much of the land in the Community is impervious (approximately 83%),[16] as is much of the land upstream in the Hook Creek/Head of Bay watershed. The lack of permeability upstream leads to runoff that collects 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. Within the Community, approximately 30 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 and flooding, to sewer backups. The Rosedale Pumping Station was flooded during Superstorm Sandy, requiring reconstruction, including replacing pump controls, sump pumps, ventilation and heating equipment, and compressors.

Although the primary cause of damage from Superstorm Sandy was flooding, the storm also resulted in downed trees, damaged roofs, and damaged power lines in the Community. The National Oceanic and Atmospheric Administration (NOAA) reported that the sustained winds were estimated at greater than 60 mph.[17] 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, more than 720 trees were reported as damaged, uprooted or fallen as a result of Superstorm Sandy within the Primary Study Area.[18]

Figure 1.5: Superstorm Sandy Impacts

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Hurricane Irene

In comparison to Superstorm Sandy, the impacts from Hurricane Irene were largely a result of precipitation and wind. On August 28, 2011, Hurricane Irene made landfall in New York City near Coney Island. While it was downgraded to a tropical storm, it produced heavy damage over much of New York City due to flooding from substantial rainfall totals, storm surge in coastal areas, and wind gusts in excess of hurricane force. Localized rainfall totals during Irene ranged from 7 to 10 inches[19] while storm tide levels ranged from 3 to 6 feet.[20] Maximum wind gusts in New York City ranged from 60 to 70 mph, but New York City escaped severe wind-related damage because Irene's strongest winds were over water east of the path's center. However, Hurricane Irene followed a summer of high precipitation and saturated soils, which exacerbated stormwater runoff and brought down trees.[21] Power outages were widespread in the Borough of Queens. Approximately 92,368 Con Edison customers in the City were reported without power on November 1, 2012—three days after the storm.[22]

The Community is vulnerable to major flooding during large precipitation events, which bring greater volumes of rainfall than what occurred during Superstorm Sandy. This was evident during Hurricane Irene, which brought more than three times the rainfall of Superstorm Sandy.[23] Rainfall during Hurricane Irene caused stormwater flooding in low-lying areas, covered the tidal wetlands, overtopped Brookville Boulevard, and extended in some areas as far north as 147th Avenue.

Flooding of Brookville Boulevard in the Idlewild Park Preserve Area *Source: NY Daily News*

Recurring Flooding

Although Superstorm Sandy and Hurricane Irene were uniquely powerful events, 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. The Idlewild Watershed Communities are low-lying, have a high groundwater table, are partially built on historic wetlands, and are interwoven with tidal wetlands (Figure 1.6). Due to the low elevation of the Community and its proximity to tidal marshes, the shoreline provides incomplete protection against high levels of tidal flooding. Inundation from tidal waters occurs in some areas of the Community on a regular basis during spring tides.

Precipitation accompanied by everyday high tides in low-lying areas generates recurring flooding of many local roads where the existing stormwater system has inadequate capacity or is not operating properly, as well as where the sewer system is not yet built out. Such localized stormwater flooding may result from a lack of stormwater infrastructure, with peak flows exacerbated by impervious coverage upstream and low-lying areas near the shoreline.

Capturing stormwater upstream is necessary to minimize peak stormwater flows entering the stormwater infrastructure system in the Community. To help reduce the impact of water entering the stormwater system, the New York City Department of Environmental Protection (NYC DEP) is beginning to install Bluebelt Best Management Practices (BMPs) in Springfield Park to detain stormwater upstream which would prevent flooding. The Bluebelt BMP is part of a larger capital infrastructure plan for Southeast Queens which includes installation of

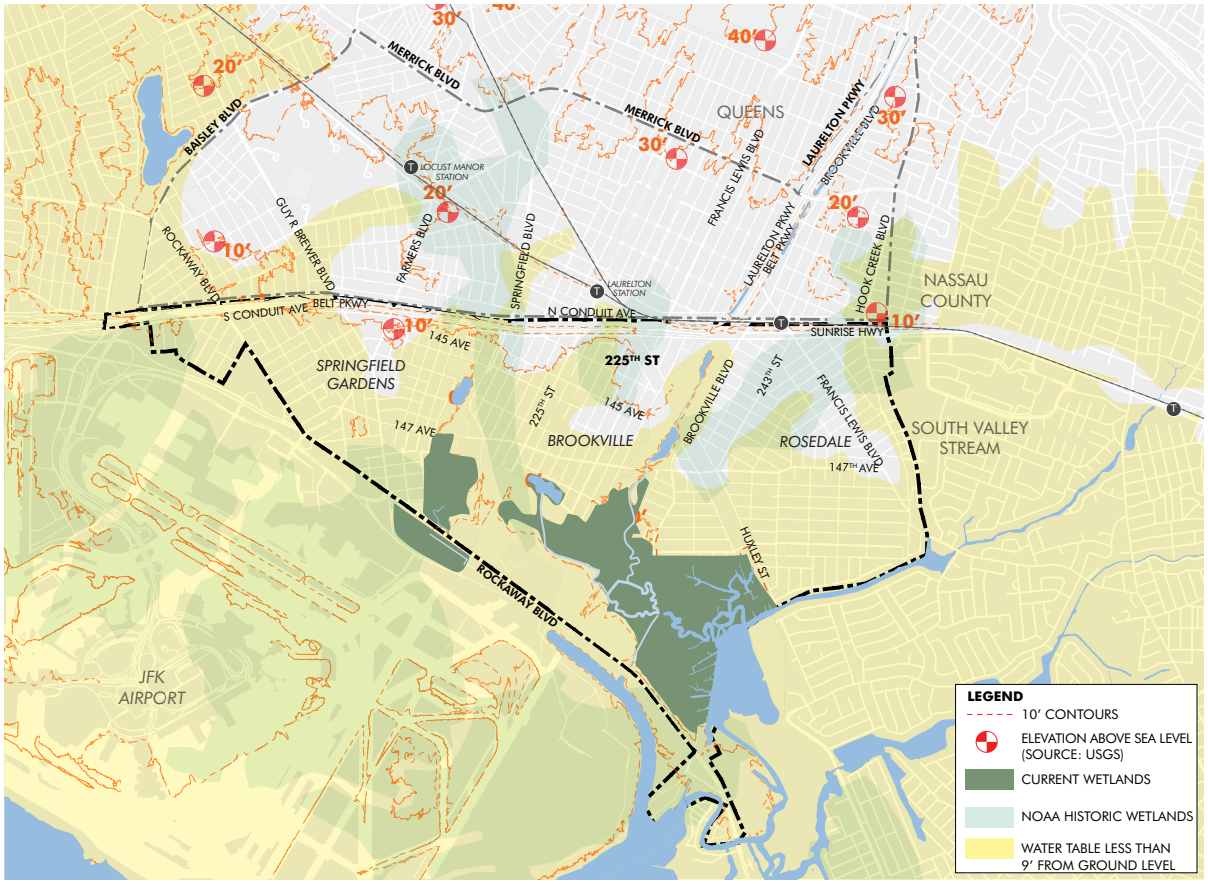
storm sewers and green streets throughout the Community.

Since 2002, NYC DEP has spent $538 million to construct 84 miles of new storm sewers in Southeast Queens. The current four-year capital budget allocated $134 million to construct 24 miles of additional new storm sewers in Southeast Queens and the future capital budget will allocate additional funding. Construction has focused on major trunk lines, which are nearly complete. Now the focus will shift to building out lines on residential and commercial streets that feed into the trunk lines. Despite this progress, a complete sewer system build out is expected to take as long as 20 years. Therefore, NYC DEP is investigating smaller, targeted drainage projects to resolve specific flooding "hotspots," or areas of recurring flooding.[24] However, the Community will remain vulnerable to localized flooding until these improvements are completed.

Further, recurring flooding is exacerbated by the high groundwater table, which prevents stormwater from infiltrating into soils. The groundwater table is less than three feet in depth in approximately 15% (571 acres) of the Community, of which approximately 8% (264 acres) is less than one foot below the surface. The U.S. Geological Survey classifies these soils as "very frequently flooded" or "frequently ponded."[25] Sewer backups, basement flooding, and flooding of driveways and yards at lower grade than the roadways occurs routinely, especially when the Community receives greater than 1.5 inches of rain in one hour. To remedy this issue, NYC DEP has begun installing reverse seepage basin pilot projects in areas with high groundwater that connect to existing sewer lines to drain groundwater via the sewer system. These pilot projects are designed to test the effectiveness of reverse seepage basins and identify suitable locations based on geotechnical constraints and engineering feasibility (i.e., they need to be installed in locations with steep enough slopes for a gravity-driven sewer system).

Recurring flooding is expected to increase as a result of climate change, which is anticipated to result in a continued rise in sea levels and increased frequency of extreme events such as high wind-induced surges. Increasing resilience against tidal flow is thus a key component of improving the Community's overall resilience.

Figure 1.6: Low Lying Areas and High Water Table Contribute to Recurring Flooding



C. Critical Issues

Superstorm Sandy and Hurricane Irene exposed several challenges within the Community that this NYRCR Plan addresses. These critical issues, which can be categorized by the six Recovery Support Functions described below, were identified throughout the NYRCR Process during Planning Committee Meetings, Public Engagement Events, and meetings with representatives of New York City agencies. These issues helped to guide the development of the NYRCR Plan and informed the selection of Proposed and Featured Projects to address key issues faced by the Community.

The following critical issues were identified during Planning Committee Meetings, Public Engagement Events, and through meetings with relevant agencies.

Community Planning and Capacity Building

Community Planning and Capacity Building refers to the ability of organizations within the Community to organize, plan, manage, and implement recovery strategies. This Recovery Support Function includes the role of local municipalities 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.

Critical Issues

- There is a large population of seniors in the Community, many of whom live in single-family homes in areas that are prone to flooding. These residents may lack the resources to age in place while upgrading their homes to withstand future flooding. Many seniors in the Community are also at greater risk during extreme weather due to a lack of adequate transportation or social networks.
- There is a general lack of homeowner/tenant education to teach residents about flood protection, tenant advocacy to ensure that landlords are properly maintaining their property, and strategies to work with insurance companies.
- Community members feel that designated evacuation centers and shelters are too far from the Community (e.g. York College), especially for residents who do not have cars or access to reliable transportation.

Latter Rain Christian Fellowship, Springfield Gardens

Economic Development

Sustainable economic development that provides jobs and important services for local residents depends upon the ability of the Community's key retail and commercial corridors to recover after major disasters. Economic Development is important in the Community for three key reasons. First, businesses that are able to recover quickly after disasters are more likely to keep their doors open in the future. Second, if businesses are closed for extended periods of time, employees will suffer from lost wages, even as they struggle to recover themselves. Third, businesses provide important services that residents need so that they can also quickly recover.

Critical Issues

- There is leakage of retail spending due to residents traveling outside of the Community (e.g., Nassau County) to purchase everyday goods and services. Retail leakage limits the potential for economic development within the Community.
- Supporting the health and viability of mom and pop neighborhood clusters is needed.
- There is limited retail diversity within the Community, forcing residents to travel to outside neighborhoods to meet their daily needs.

Health and Social Services

Health and Social Service organizations provide critical resources to the Community, especially services for socially vulnerable populations. Medical facilities, senior centers, religious institutions, and non-profit organizations provide resources for the entire Community, but are even more important to the well-being and ability to recover from disasters for vulnerable populations, such as people with disabilities, low-income populations, those with limited English proficiency, and the elderly.

Critical Issues

- First responders require adequate resources and funding to communicate and coordinate in the event of any type of disaster.
- The presence of industrial neighborhoods and JFK Airport in close proximity to residential neighborhoods causes disproportionate environmental burden on the Community.

Springfield Gardens Industrial Area at 175th Street

Housing

Housing 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. Neighborhoods in the Community that were impacted by Superstorm Sandy and Hurricane Irene continue to be at risk of flooding due to storm surge and stormwater backups. Homeowners in these same neighborhoods are also facing significant increases in flood insurance rates, which pose a threat to neighborhood stability.

Critical Issues

- Over 84% of homes within the Planning Area were built prior to 1983 when flood-resistance standards were added to the New York City Building Code. As a result, many older homes may still be in need of floodproofing building retrofits.
- As property owners pass on increasing flood insurance premiums or floodproofing costs to rental tenants in the form of rent increases, additional households in the Community may become rent burdened if additional affordable rental housing is not made available.
- Although the Community has a high homeownership rate, recent decreases in home sale prices has raised concerns among homeowners over depreciation of home values.

Single-family Homes on 225th Street, Brookville

Infrastructure

Infrastructure refers to assets that are identified for restoration, repair, and management of essential services, such as stormwater systems, transportation networks, and coastal defenses. While some infrastructure issues can be addressed by the NYRCR Plan for the Community, other projects will require additional study, significant regional coordination, and greater capital investment.

Critical Issues

- Many streets are in disrepair or are not properly graded, therefore heavy rains cause frequent flooding and ponding.
- Since no subways serve the Community, bus routes provide a critical transit link for residents and workers in the area. Reliable bus routes provide an important connection for local residents, especially those who do not own cars or in the event that cars are damaged by severe flooding.
- Several large capital projects are underway or planned by NYC DEP and New York City Department of Transportation (NYC DOT). More information is needed regarding the impact new or upgraded storm sewers will have on frequent stormwater flooding.
- The Rosedale Pumping Station is completely below grade, with the exception of some ventilation equipment housed in an onsite brick structure. Failure of the Rosedale Pumping Station would affect an area of approximately 990 acres with a population of 17,683. According to the NYC Wastewater Resiliency Plan, "the critical flood elevation would inundate the

area surrounding the facility with over 4 feet of water. This would damage electrical controls and the non-submersible pump motors. The Rosedale Pumping Station receives flow from another pumping station. Therefore loss of function at Rosedale increases the vulnerability of an additional pumping station." The pumping station requires hardening measures to protect against future storm events, including elevating the electrical equipment and pump motors, and constructing a new building, at an estimated cost of $9,943,000.[26]

Natural and Cultural Resources

Natural and Cultural Resources address the management of natural and cultural resources from a risk reduction and economic development perspective.

Critical Issues

- Due to the expansion of JFK Airport, trees are being removed from Idlewild Park Preserve per Federal Aviation Administration (FAA) vision regulations, contrary to the critical issue of improving the health of the Idlewild Park Preserve to maximize stormwater storage capacity.
- Existing ponds lack adequate capacity for stormwater capture, an issue which NYC DEP is working on through Bluebelt and green infrastructure projects.
- Development on historic wetlands and fill reduces the water storage capacity of soils, leading to increased flooding, especially in areas where the water table is high.
- Preserving the integrity of existing wetland systems and connectivity to the Jamaica Bay ecosystem are critical to buffering the impacts of tidal flooding.

Clogged Catch Basin at Hook Creek Boulevard, Rosedale

Brookville Park Pond

D. Community Vision

The Idlewild Watershed Communities of Brookville, Rosedale, and Springfield Gardens are dedicated to the creation and maintenance of resilient neighborhoods that guarantee a high quality of life for all who live and work within them, both now and in the future. Towards this end, our vision calls for the following:

Fully Functional Infrastructure

Communities in which our natural and manmade systems are maintained, improved, extended, and maximized so that they are fully functional in terms of flood prevention, control, and alleviation throughout the target Idlewild Watershed Communities of Brookville, Rosedale, and Springfield Gardens.

Appropriate Levels of Social Supports and Services

Communities that have effective, efficient systems in place to address the needs of all of the people, with special emphasis on our vulnerable populations.

Effective Emergency Management

Communities which, in the event of natural, manmade, and technological disasters, have in place coordinated disaster recovery, response plans that operate effectively before, during, and after the emergency.

Figure 1.7: Community Vision Word Cloud

Visioning Board at the first Public Engagement Event

Community Feedback at Public Engagement Events

E. Relationship to Existing Plans/Studies

Multiple regional projects that impact the wetlands of Jamaica Bay or storm surge response that would protect the airport or other communities in Nassau County have been evaluated and assessed to ensure that the NYRCR Plan for the Community does not duplicate or conflict with other efforts. Additionally, there are several ongoing or planned capital projects within the Community that could provide some benefit from stormwater flooding and other issues.

The most significant current and proposed projects, such as installation of storm sewers by NYC DEP and construction of the Springfield Bluebelt by New York City Economic Development Corporation (NYC EDC) will impact the proposed reconstruction strategies developed through the NYRCR planning process.

Noted regional initiatives and organizations reviewed or engaged through this process include (Figure 1.8):

- City of New York, State of New York, and Federal agencies,
- New York City Special Initiative for Rebuilding and Resiliency (SIRR),
- U.S. Army Corps of Engineers, North Atlantic Coast Comprehensive Study,
- U.S. Department of Housing and Urban Development Sandy Rebuilding Task Force, Hurricane Sandy Rebuilding Strategy, and
- NYC Local Waterfront Revitalization Program.

List of Existing Projects

There are a significant number of plans, policies, procedures, and resources that address the existing conditions, regulatory frameworks, Community goals and issues, and resiliency opportunities in the Community, including approximately $175 million worth of storm sewer infrastructure upgrades currently being undertaken by NYC DEP. These resources have been produced by a variety of stakeholders including public agencies at all levels (Federal, State, and City), regional planning groups, nonprofit organizations, academic institutions, and Community stakeholders. Reconstruction strategies and projects included in the NYRCR Plan recognize the planning work completed to date in the region and are compatible with and complementary of these other efforts (Figure 1.9).

NYRCR Projects

NYRCR Plan: The Five Towns

The NYRCR Plan for The Five Towns includes a Proposed Project which would fund the Rockaway Turnpike/Nassau Expressway Resilience Corridor Study. This study would fund a regional study of flood protection alternatives along Rockaway Turnpike at Hook and Motts Creeks and extending northwest along Thurston Basin adjacent to Rosedale and Brookville. The scope of this regional action plan includes the following objectives:

- Analyze the construction of floodgates and elevation of Rockaway Turnpike and Nassau Expressway to prevent tidal surge from inundating adjacent commercial properties and surrounding communities while also protecting critical evacuation routes from flooding.

Springfield Gardens Bluebelt Construction (Expected Completion: Spring 2015)

- Conduct a traffic management study to improve traffic and congestion along Rockaway Turnpike and the Nassau Expressway. These roadways are subject to intense congestion during normal conditions and poor traffic flow poses additional risk in the event of an evacuation.
- Study opportunities for economic development in the retail/commercial zones along Rockaway Turnpike and the Nassau Expressway corridors to improve the economic resilience of the area.

City-wide Initiatives

PlaNYC: A Stronger, More Resilient New York (SIRR Report)

PlaNYC: A Stronger, More Resilient New York (SIRR Report) was produced by former Mayor Michael Bloomberg's Special Initiative for Rebuilding and Resiliency (SIRR) and 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 report provides a list of initiatives for increasing resiliency in New York City in the following categories:

- Coastal Protection,
- Buildings,
- Critical Infrastructure, and
- Community and Economic Recovery.

In particular, the NYRCR Plan for the Idlewild Watershed Communities would be impacted by two proposals. The call for the U.S. Army Corps of Engineers (USACE) to develop an implementation plan to mitigate inundation risks through Rockaway Inlet, exploring a surge barrier and alternative measures would benefit the Community by limiting storm surge that enters Jamaica Bay through the Rockaway Inlet. The proposal to call on and work with the USACE to complete existing studies of the Rockaway Peninsula and implement coastal protection projects would prevent storm surge from overtopping the Rockaway Peninsula—as occurred during Superstorm Sandy—passing through Jamaica Bay, and inundating the Community.

New York City Department of City Planning Initiatives

The New York City Comprehensive Waterfront Plan—Vision 2020

The New York City Comprehensive Waterfront Plan—Vision 2020 (CWP) is an 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.

Recommendations for Idlewild Park Preserve in the CWP include:

- Advance park master plan to enhance public access including an environmental education center.
- Explore opportunities for an additional human-powered boat launch based on the criteria described in the Citywide Strategy.

The New York City Waterfront Revitalization Program

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.

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 also identifies a range of potential adaptive

strategies, and analyzes each for their ability to protect waterfront communities.

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 New York City Department of City Planning's (NYC DCP) Flood Resilience Zoning text amendment adopted by the City Council in 2013.

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 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.

Federal Initiatives

U.S. Army Corps of Engineers Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Coastal Storm Risk Management Feasibility Study
The U.S. Army Corps of Engineers (USACE), in partnership with the New York State Department of Environmental Conservation (NYS DEC), is carrying out the Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Coastal Storm Risk Management Feasibility Study which is assessing the feasibility of coastal storm risk management alternatives to be implemented within Jamaica Bay. This larger study area includes the entire Rockaway peninsula as well as back bay communities around Jamaica Bay. The study aims to improve community resiliency by reducing the vulnerability of back bay communities to storm surge impacts, enhancing the natural storm surge buffers, and reducing coastal risk. The USACE is evaluating a variety of measures to reduce coastal storm risks, such as hurricane storm surge barriers, local flood gates at inlets, flood walls or levees, and nature based features (e.g., green infrastructure and living shorelines). The USACE is currently screening and developing different combinations of risk management alternatives, which will be shared with the community in late 2014. The short list will ultimately be narrowed down to one alternative for implementation.

Special Purpose Plans that Impact the Community

Eastern Queens Alliance White Paper: A Comprehensive Plan—Maximizing Quality of Life in Southeast Queens
In 2006, Eastern Queens Alliance (EQA) released a comprehensive plan for the area that included recommendations for:

- Economic, Political, Social and Cultural Environment,
- Crowding, Aesthetics, Zoning, and Control,
- Infrastructure, Public Safety, and Group Residential Facilities,
- Environment and Health, and
- Open Space, Parks, and Recreation.

The Eastern Queens Alliance White Paper does not directly address resilience. While the NYRCR Plan builds upon recommendations that relate to economic development, housing, and community planning, the NYRCR Plan also presents an opportunity to expand the planning work that community groups have conducted in the past.

JFK Airport

JFK Best Management Plan (June 2009, revised August 2010)
The JFK Best Management Plan was produced to assist JFK Airport's compliance with the New York State Pollutant Discharge Elimination System (SPDES), which regulates the management of stormwater runoff quality. The JFK Best Management Plan identifies stormwater management strategies currently in use at JFK Airport and identifies additional best management practices that could reduce or eliminate pollutants entering the stormwater drainage system. The JFK Best Management Plan has been reviewed to determine the impact that implementation of best management practices could have on surrounding neighborhoods and the Idlewild Park Preserve.

Rehabilitation of Runway 4L-22R
In the spring of 2014, the Federal Aviation Administration (FAA) approved a plan by the Port

Authority of New York and New Jersey (PANYNJ) to extend runway 4L-22R at JFK Airport. The extension would increase capacity of the runway and brings it nearly 800 feet closer to Idlewild Park Preserve. FAA regulations have mandated that the New York City Department of Parks and Recreation (NYC DPR) to remove trees in the Park Preserve to comply with the plan. Residents of Southeast Queens have expressed concerns that the extension will exacerbate noise pollution, environmental impacts, and health impacts caused by low-flying planes, while tree removal could negatively impact stormwater flooding.[27]

NYC EDC JFK Development Site RFP

As of December 2014, NYC EDC is soliciting proposals to develop a 180,000 ft^2 parcel adjacent to JFK Airport on Rockaway Boulevard. The objective is for the site to be developed for an airport-compatible use, such as air cargo or other airport-related industrial use.[28] Although proximity JFK Airport and other air cargo uses is one key factor of this project, the site in question is also in near proximity to Thurston Basin and is directly across Rockaway Boulevard from the Idlewild Park Preserve. Development in this location could represent a missed opportunity to link the wetlands in the Idlewild Park Preserve with a broader network of stormwater management facilities.

Ongoing NYC Projects

There are a number of New York City capital projects that are either planned or in progress that will impact stormwater flooding in the Community. These projects are being undertaken by a variety of New York City agencies, including the Department of Transportation (NYC DOT), Economic Development Corporation (NYC EDC), the Department of Design and Construction (NYC DDC), the Department of Environmental Protection (NYC DEP), and the Department of City Planning (NYC DCP). Brookville Blvd and Edgewood Triangle (DOT and DEP):

- Brookville Area Installation of Storm, Sanitary and Combined Sewers (NYC DOT)
- Rosedale Area Street Reconstruction (NYC DOT)
- Springfield Gardens Area Street Reconstruction and Replacement (NYC EDC)
- Proposed Greater JFK IBID (NYC EDC)
- Edgewood Triangle Reconstruction Plan (NYC DDC)
- Rosedale Area Roadway Reconstruction (NYC DDC)
- Jamaica Wastewater Treatment Plan Upgrades (NYC DEP)
- Baisley Blvd Storm and Sanitary Sewer Upgrades (NYC DEP)
- 147th Ave Sewer Repair (NYC DEP)
- Twin Ponds Projects (Sewers in Hook Creek Blvd) (NYC DEP)
- Idlewild Park Preserve Environmental Science Learning Center (NYC DPR)
- New Waterfront Revitalization Program (NYC DCP)

Proposed Greater JFK Industrial Business Improvement District

Source: BFJ Planning

Figure 1.8: Regional Projects

Springfield Gardens, Brookville, Rosedale
NY Rising Community Reconstruction Program

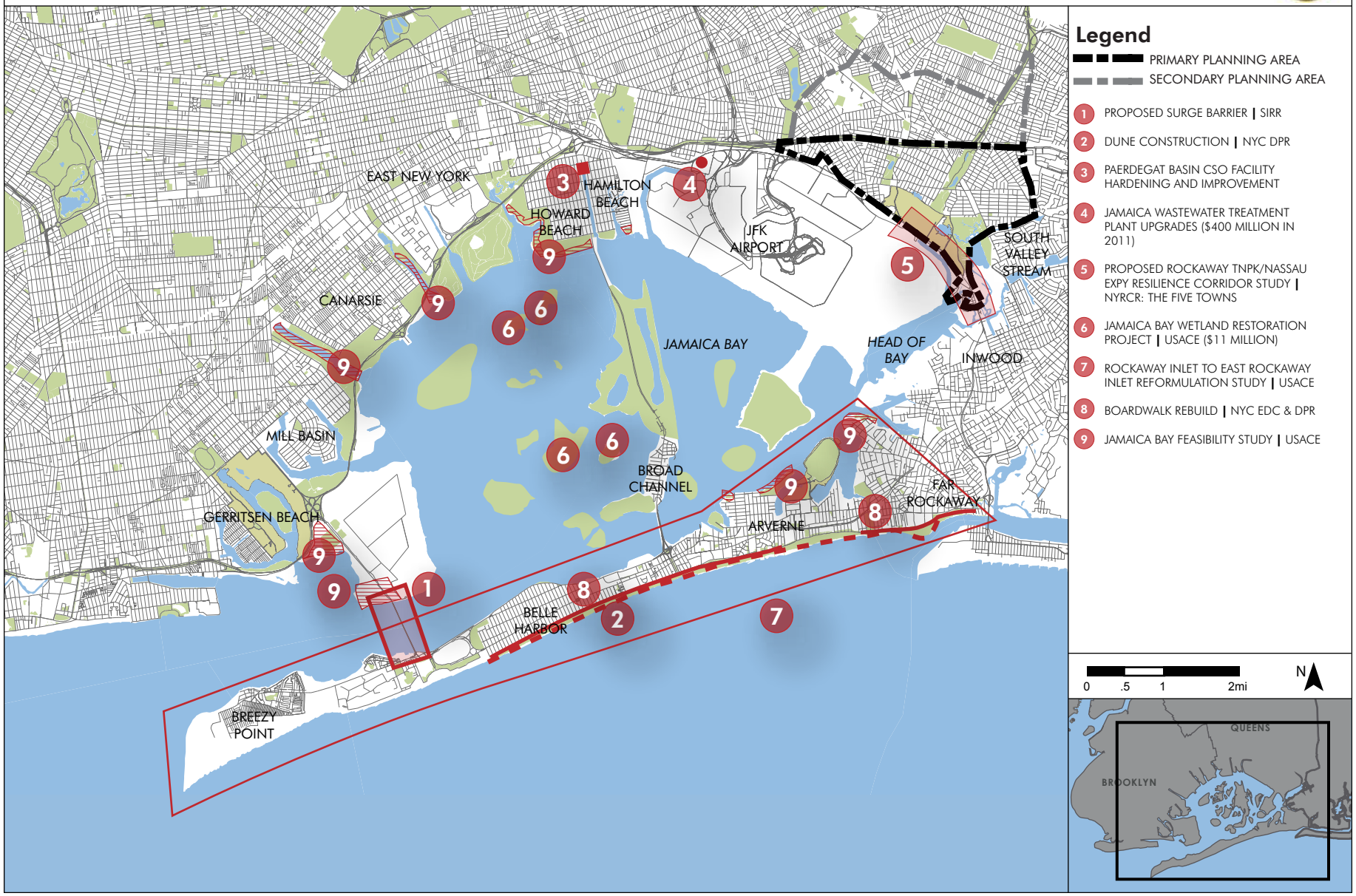
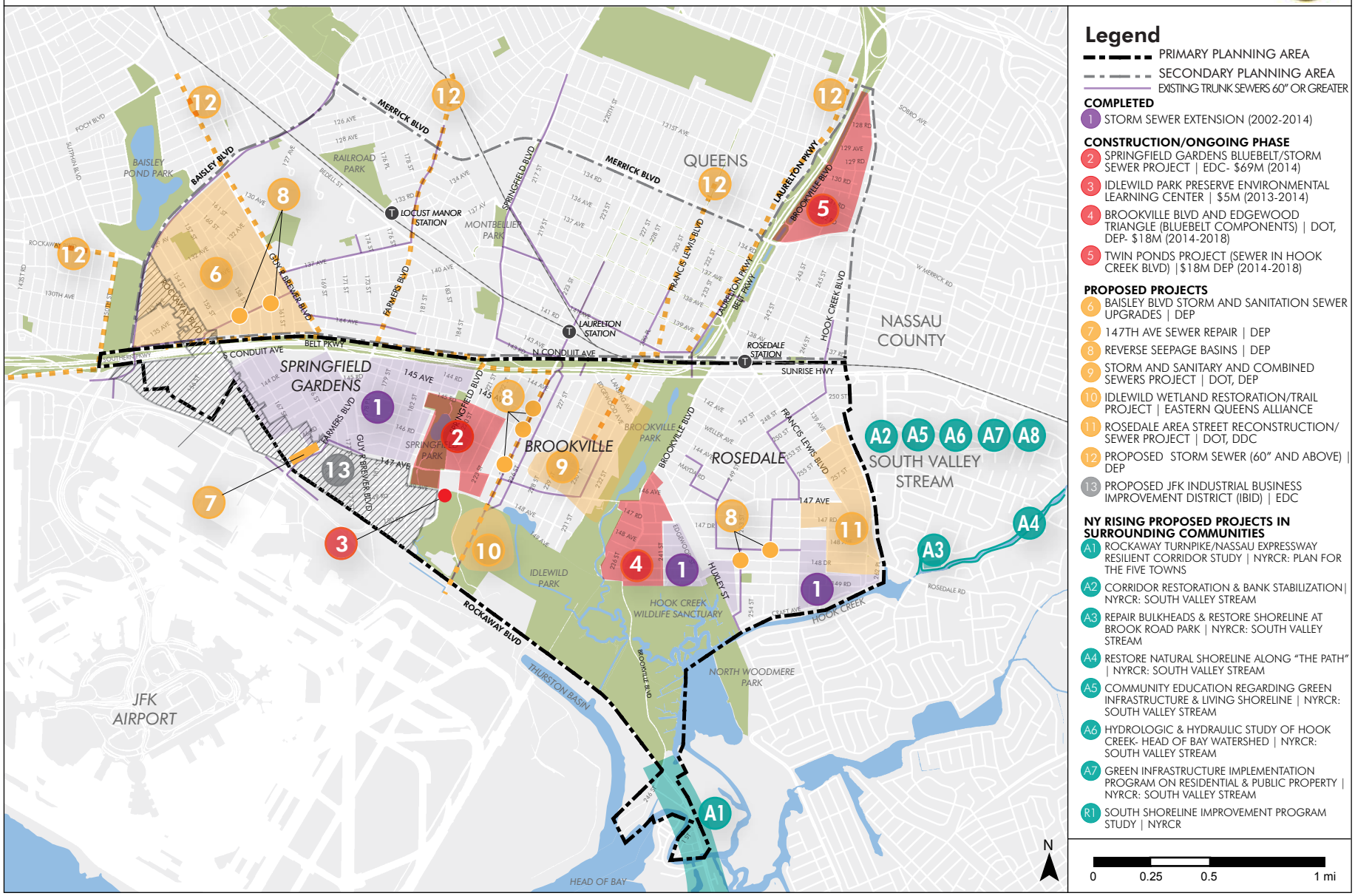
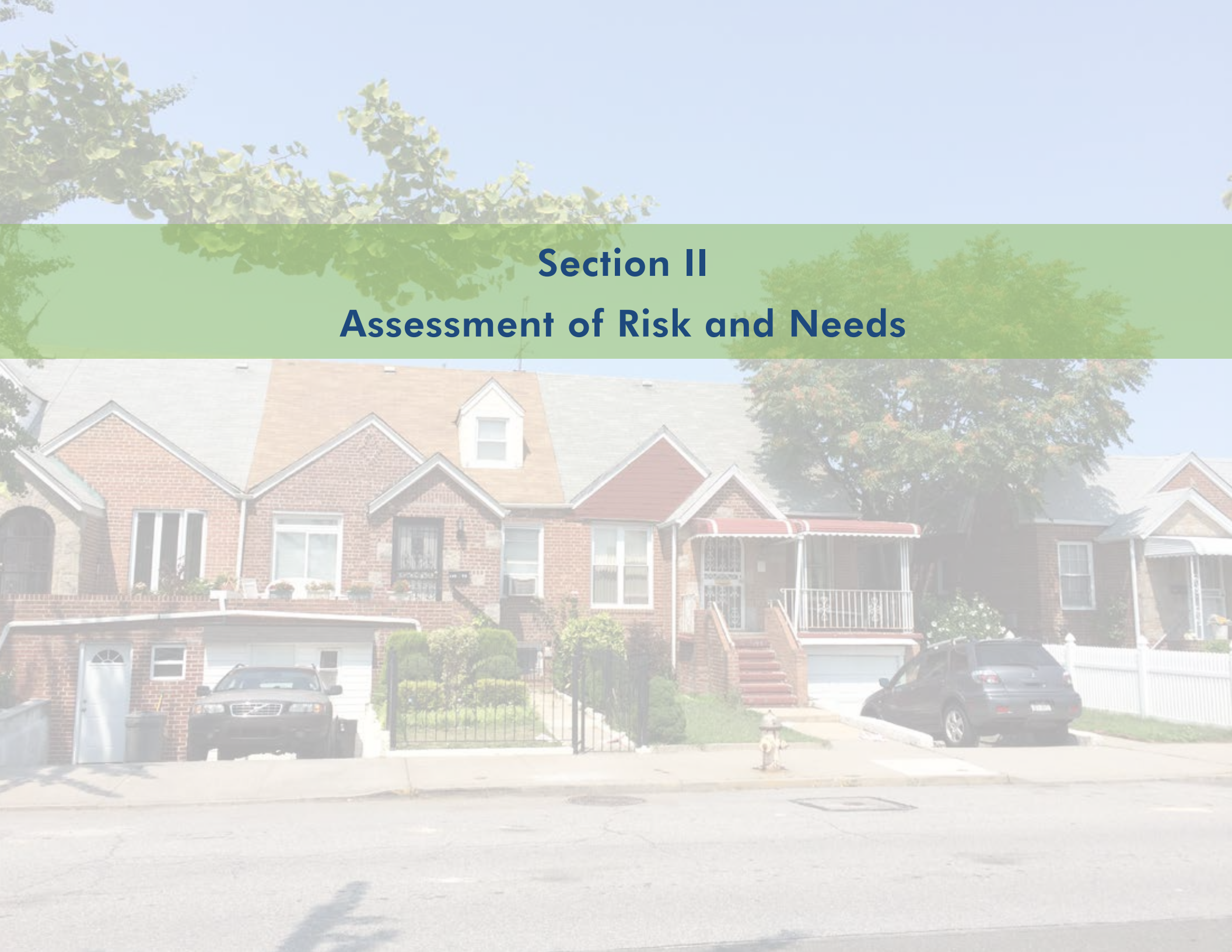


Figure 1.9: Local Projects

Idlewild Watershed Communities
NY Rising Community Reconstruction Program





Section II
Assessment of Risk and Needs

SECTION II. ASSESSMENT OF RISK AND NEEDS

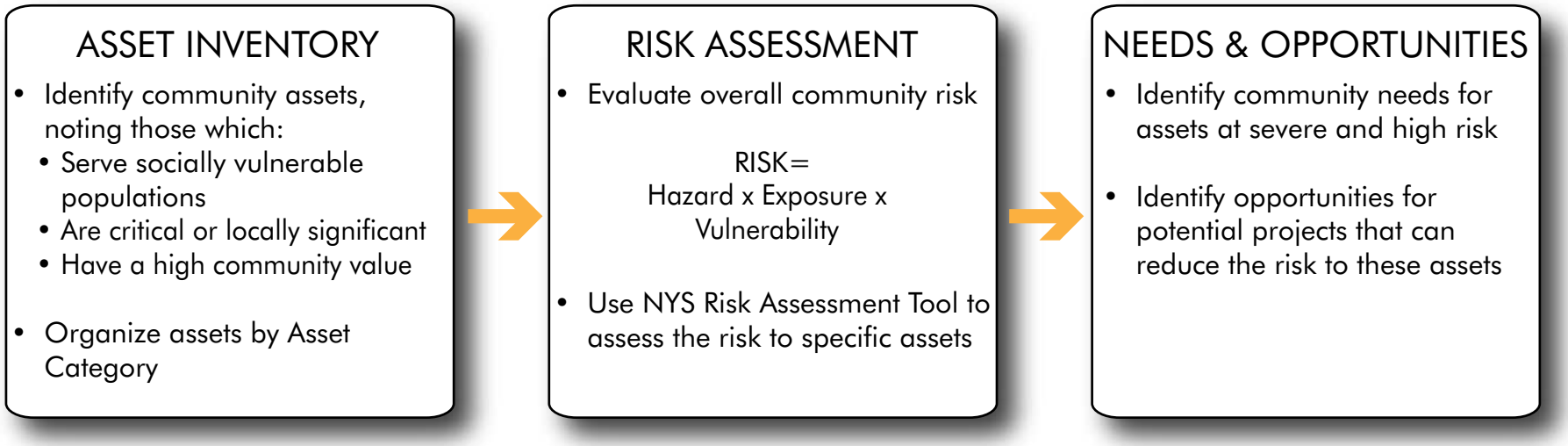
A. Description of Community Assets and Assessment of Risk

The NY Rising Community Reconstruction (NYRCR) Plan for the Idlewild Watershed Communities (Community) seeks to protect Community assets and reduce their risk from future storm events. The NYRCR Planning Committee (Committee) prioritized assets that are critically or locally significant and that provide services for socially vulnerable populations, such as people with disabilities, low-income populations, the elderly, and children.

In order to create a plan that protects critically and locally significant assets, the Committee considered the relative risk of damage to these Community assets from future severe weather events. Knowing the assets at highest risk helped the Committee to understand the needs and opportunities within their Community and empowered the Committee to develop projects that reduce risk. The ***Asset Inventory and Risk Assessment*** processes are illustrated in Figure 2.1.

The ***Asset Inventory and Risk Assessment*** has been compiled to measure the current levels of risk to assets in the Idlewild Watershed Communities and will serve as a baseline for determining the risk-reduction benefits of NYRCR projects.

Figure 2.1: Asset Inventory and Risk Assessment Process



Description of Community Assets

To be more resilient, the Idlewild Watershed Communities must identify ways to strengthen and protect their social, economic, and natural resources that have been, or will be, affected by extreme weather. Community Assets include facilities, institutions, or networks that are essential to the day-to-day life, rapid disaster recovery, and long-term resilience of the Community. 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 that 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 new or reconstructed 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 Community Assets that were either impacted by Superstorm Sandy and/or Hurricane Irene, are 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 (Figure 2.2):

- 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 Planning Committee Meetings;
- Feedback at Public Engagement Events;
- Neighborhood visits with Committee members, and meetings with New York City agencies, local officials, and Community members; and
- Data analysis.

Assets that were evaluated with the Risk Assessment tool were limited to only assets that are located within the Extreme or High Risk Areas (Figure 2.3), were identified as Critical or Locally Significant, or were noted as having High Community Value. See Hazard: Likelihood of Future Storm Events below for more information on the Risk Areas and see Section V: Additional Materials for definitions of Critical and Locally Significant Assets and Assets with High Community Value.

Figure 2.2: Asset Categories

Assessing Risk to the Community

Risk is the chance that an asset will be impacted by future storm events. Assessing 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—the moderating effect of topographic and shoreline features; and

Vulnerability—the ability of an asset to resist damage from a future storm event.

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

Risk = Hazard x Exposure x Vulnerability

Hazard: Likelihood of Future Storm Events

Hazards are considered storms that are typical for the Community. The most typical hazards in the Idlewild Watershed Communities are frequent, low-intensity storm events ranging from above-average rainfall to nor'easters that cause routine flooding of low-lying areas and roadways. Less typical hazards include infrequent, high-intensity storm events such as Superstorm Sandy or Hurricane Irene. 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 Federal Emergency Management Agency (FEMA) Flood Hazard Areas. These two hazard maps are explained below and are shown in Figure 2.4 and Figure 2.5.

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 their topography, FEMA flood zones, previous storm surge inundation, sea level rise, National Weather Service (NWS) shallow coastal flooding advisory thresholds, and natural shoreline features (Figure 2.3 and Figure 2.4). The tool classifies three areas of risk: Extreme, High, and Moderate.

Less than 1% of the Community is located in the extreme risk area, while 13% is located in the high risk area, and 75% is located in the moderate risk area. Only 11% of the Community is not located in any of the above risk areas. The most extreme risk areas in the Community lie along the shorelines of Hook Creek, Jamaica Bay, and Thurston Basin in the Meadowmere neighborhood and near Rockaway and Brookville Boulevards. High risk areas extend north from Jamaica Bay through Idlewild Park Preserve and Brookville Park to just south of Sunrise Highway. High risk areas also extend north of Hook Creek through low-lying roadways in Rosedale to 147th Avenue, and along the southeastern boundary of the Idlewild Watershed Communities. Moderate risk areas extend north of the Belt Parkway and Sunrise Highway to nearly the northern boundary of the Community.

Figure 2.3: Risk Areas

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.

- Federal Emergency Management Agency (FEMA) V zone.
- Shallow Coastal Flooding per National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) advisory threshold.
- Natural protective feature areas susceptible to erosion.
- Sea level rise - Added 3 feet to the Mean Higher High Water (MHHW) 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.

- Area bounded by the 1% annual flood risk zone (FEMA V and A zones).
- Sea level rise - Added 3 feet to NOAA NWS coastal flooding advisory threshold and extended this elevation inland to point of intersection with ground surface.

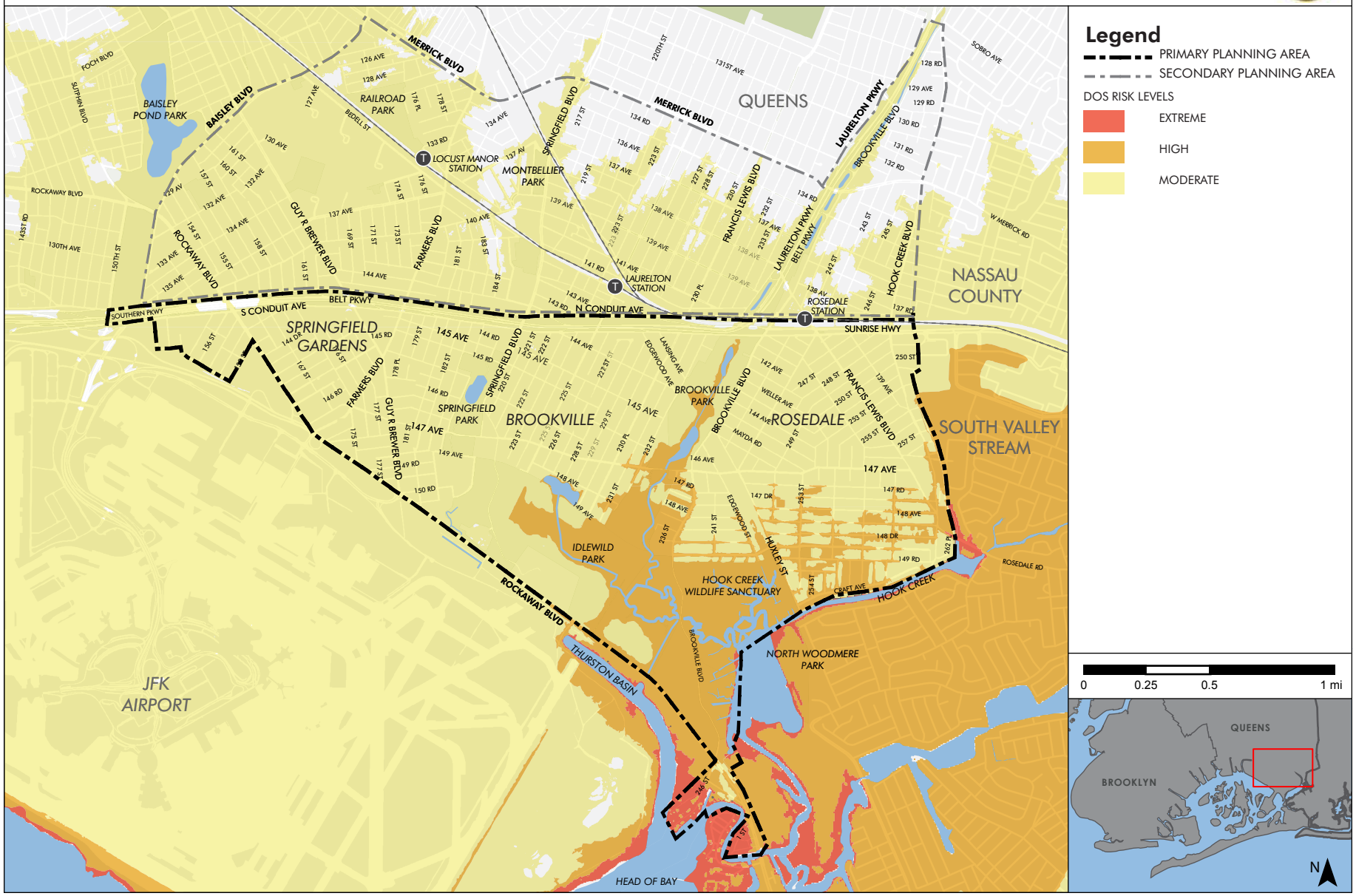
Moderate Risk Areas

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

- 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 Sea, Lake, and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zone.

Figure 2.4: DOS Risk Assessment Map

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



FEMA Flood Hazard Areas

Since the publication of the NYS Risk Maps, FEMA has released preliminary Flood Insurance Rate Maps (FIRMs) for New York City. The FIRMs show that FEMA Flood Hazard Areas (Figure 2.5) have increased in size since 2009, indicating an increase in the hazards that the Community faces. While approximately 10% of the Community was located in the 100-year floodplain in 2009, the current FEMA preliminary FIRMs illustrate that approximately 14% of the Community is presently located in the 100-year floodplain.

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 2.6 and described below.

The Meadowmere neighborhood has a high exposure to storm impacts because the water line is frequently in contact with shore defense structures (e.g., bulkheads and seawalls).

While seawalls with adjacent natural edges are found along Brookville Boulevard at Rockaway Boulevard and various heights of bulkheading are present along the Hook Creek and Jamaica Bay shorelines, these structural defenses are either deteriorating or are not considered adequate protection against future storm events, given anticipated storm or sea level rise conditions.

Coastal vegetation, illustrated in Figure 2.6, plays the biggest role in protecting the Idlewild Watershed Communities, as the tidal marshes in Idlewild Park Preserve and Hook Creek Nature Preserve serve as a buffer for tidal flow.

Conversely, one of the Community's greatest sources of exposure to flooding is its high groundwater table in low-lying areas that were historically wetlands. The Community's low-lying topography and development on filled wetlands creates a "bowl" effect with stormwater, while water-logged soils prevent water from infiltrating, leaving it with nowhere to go. These local topographic and shoreline conditions increase the impacts of stormwater flooding and coastal hazards in the Community and on its assets, as discussed in Section II below.

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 ability to recover quickly from those impacts. Therefore, vulnerability is measured by the loss of service, or amount of time that an asset or Community was impacted by a previous storm event.

Figure 2.7 illustrates the vulnerability of the Idlewild Watershed Communities, as represented by inundation from Superstorm Sandy and storm surge from Hurricane Irene. It shows that the most vulnerable areas are those farthest south along Jamaica Bay; areas near Brookville Park and 147th Avenue in Brookville; the neighborhoods east of Idlewild Park Preserve in Rosedale, generally as far north as 147th Avenue; and the industrial area and neighborhood surrounding Springfield Park in Springfield Gardens.

New York City's Hurricane Evacuation Areas and FEMA Base Flood Elevations can be indicators of future vulnerability to inundation. Figure 2.7 illustrates that Brookville and Rosedale are highly vulnerable, sharing a base flood elevation of nine feet, and located in evacuation zones one and two, respectively.

Vulnerability also reflects factors beyond inundation, including wind damage and power outages. Field surveys of business owners and Community facilities illustrate that power outages ranged from one week to four weeks throughout the Community, due to building damage, power outages, or access issues.

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 Department of State (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 are detailed as follows.

Pinpointing the Community's assets at highest risk helped to guide the development of Reconstruction Strategies and Proposed and

Featured Projects that can mitigate risk and protect the most vulnerable assets. The reduction in risk caused by implementing a Proposed or Featured 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 the complete Coastal Hazard and Risk Assessment Tool for the Community.

Figure 2.5: FEMA Flood Hazard Areas

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

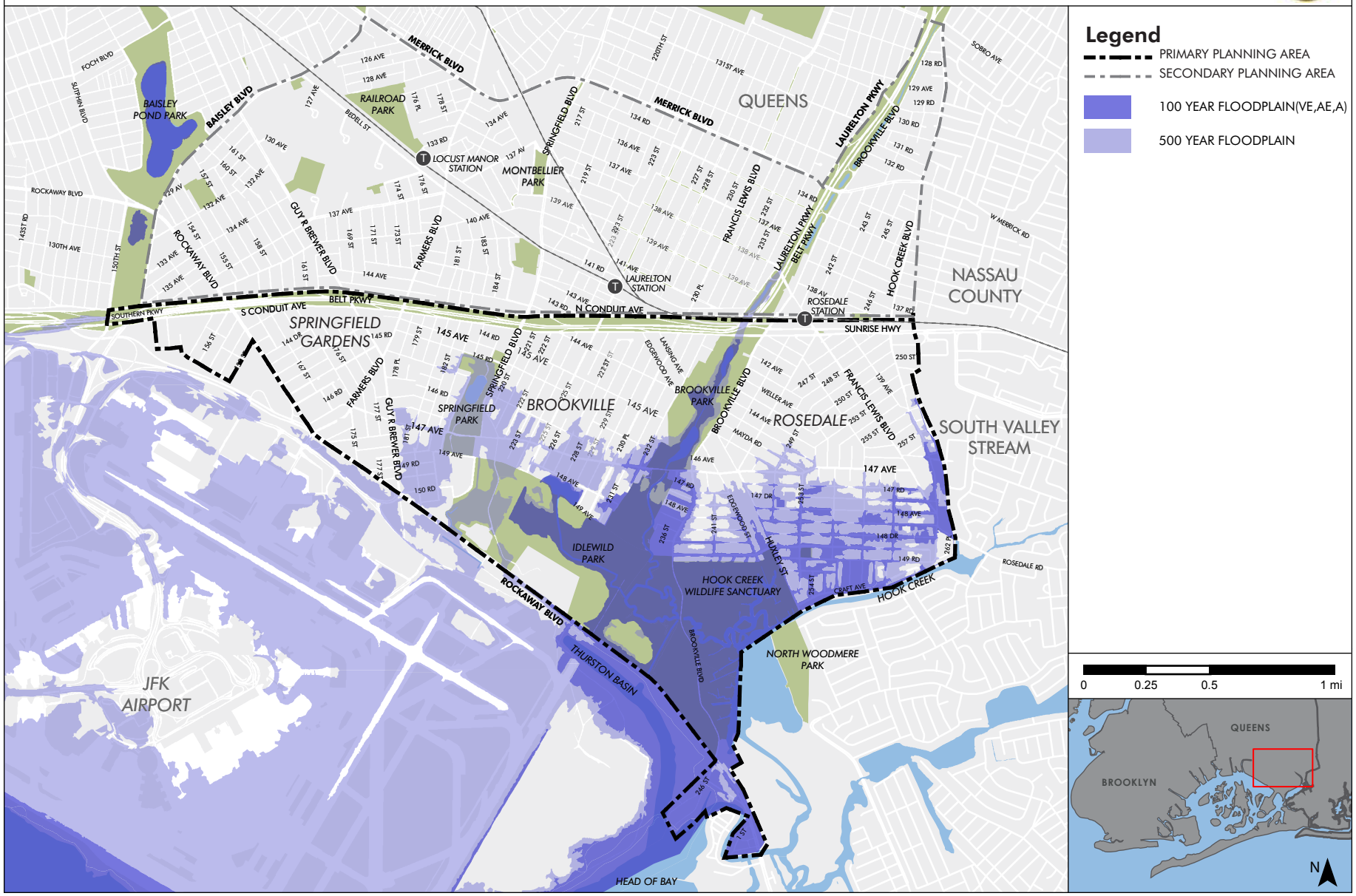


Figure 2.6: Exposure—Moderating Effect of Topography and Shoreline

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

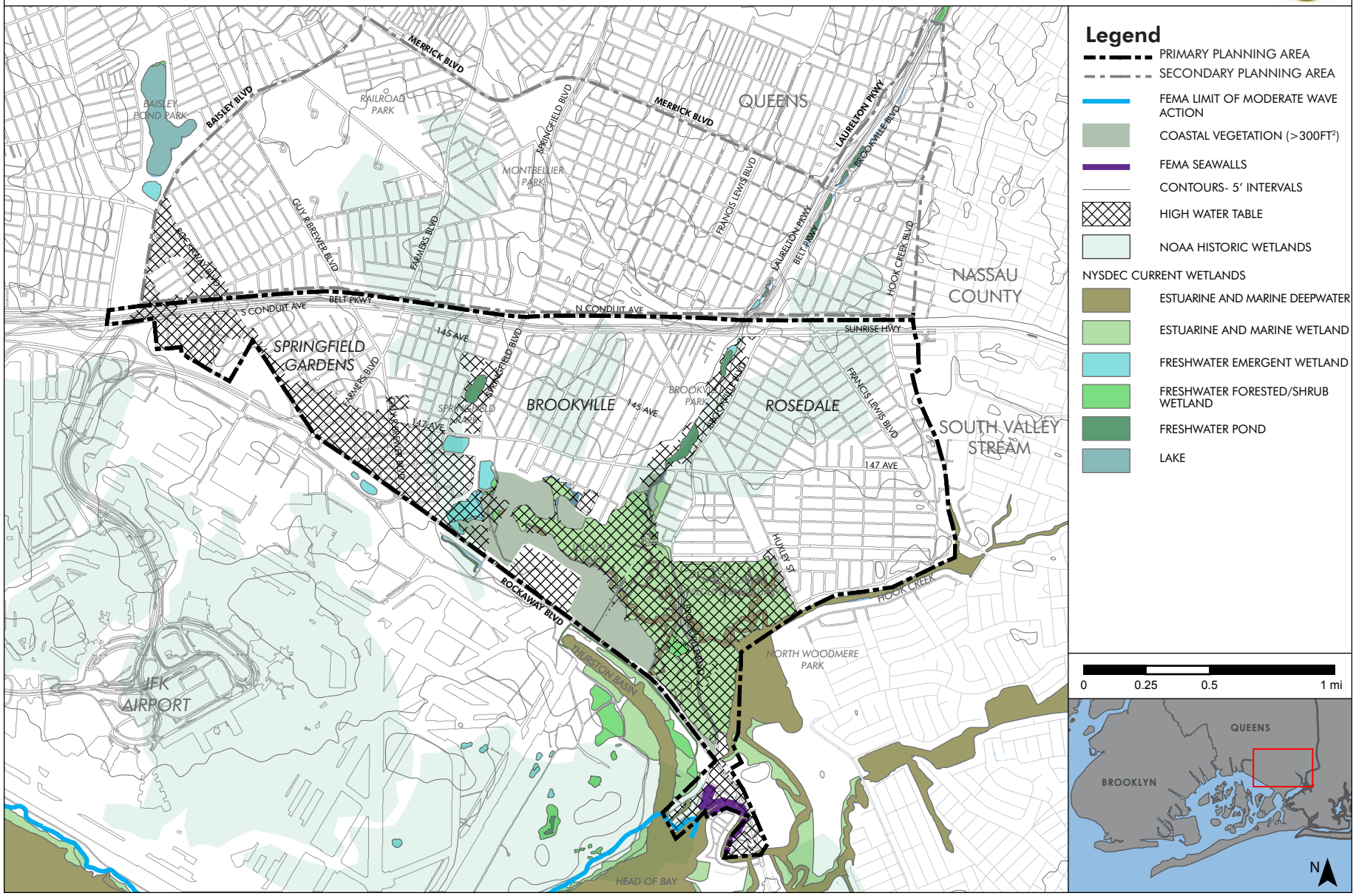


Figure 2.7: Vulnerability—Ability to Resist or Recover from Future Storm Events

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

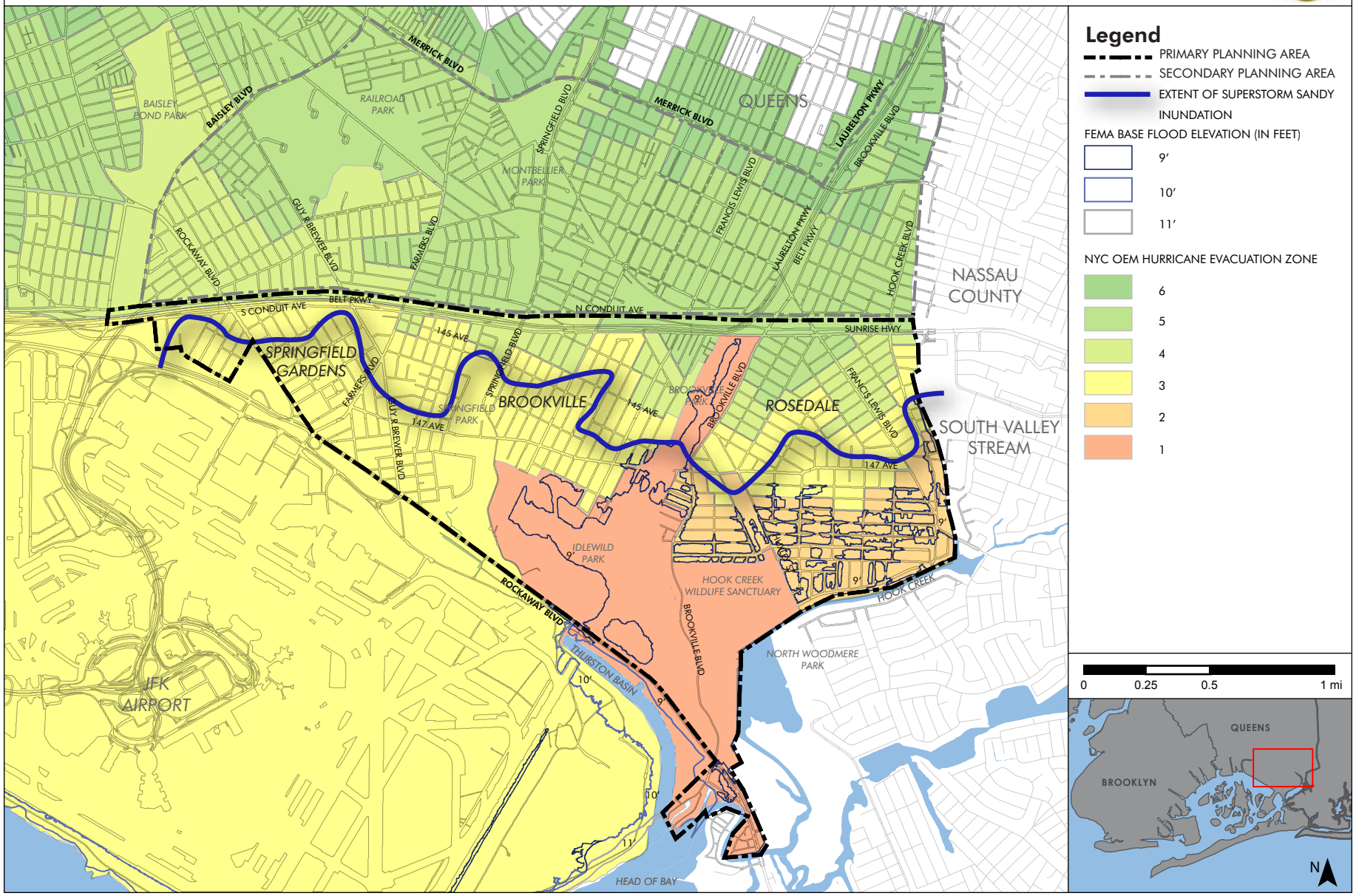
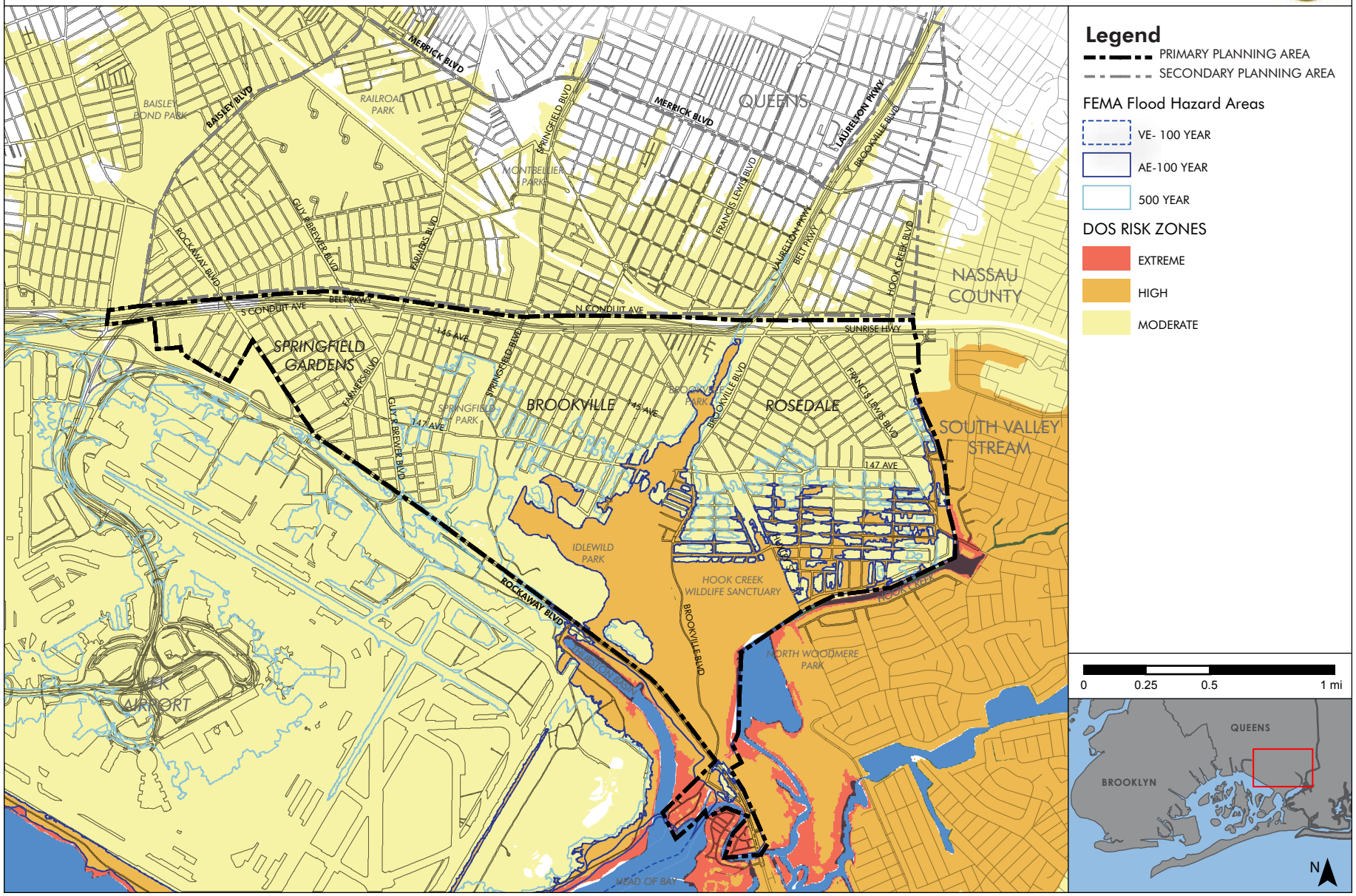


Figure 2.8: Hazard—Likelihood of Future Storm Events

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Assessment of Risk to Assets and Systems

The following is a summary of the assets within the Idlewild Watershed Communities, as identified through the asset inventory process above, and an assessment of their risks to future storm events.

Economic

Economic Assets include commercial properties, key economic corridors, and major employers in the Community. The majority of commercial properties (81%) are located in the moderate risk area, with a minority of commercial properties (less than 3%) located in the high risk area. The assessed value for all commercial properties in the Moderate, High, and Extreme Risk Areas totals approximately $300 million (Table 2.1).[29]

Most Economic Assets inventoried (86% of asset inventory) are at moderate risk of future inundation, while a minimal amount (4% of asset inventory) are at high risk. Figure 2.10 illustrates risk to economic assets identified as part of the asset inventory process.

Commercial districts along Rockaway and Brookville Boulevards are at the highest risk for future inundation from coastal storm events, as they are closest to Hook Creek and Jamaica Bay, the Community's key sources of coastal flooding. These corridors lack adequate shoreline defenses to protect them from future storm events. Interviews with business owners along Rockaway Boulevard indicated flooding, sewer backups, and power outages after Superstorm Sandy, which resulted in a loss of service of approximately four weeks. Economic corridors with concentrations of small businesses include 243rd Street, Francis Lewis Boulevard, and Guy R. Brewer/Farmers Boulevard.

Significant economic corridors at moderate risk for future inundation include Guy R. Brewer/Farmers Boulevard, Sunrise Highway, 243rd Street, and Sunrise Highway/South Conduit Avenue. These corridors are farther from flood sources; however, they are still vulnerable to impacts from power outages, which were reported at one week to three weeks in moderate risk areas.

Major employers and businesses along these economic corridors at highest risk include national retailers, restaurants, and industrial operations. Among these are specific economic assets that would be key to disaster response and recovery, such as Lowes Home Improvement, Regency Recycling Corporation and other commercial haulers, and pharmacies such as Walgreens. In addition, small businesses are especially vulnerable, as they may lack the capital to recover from storm impacts.

Table 2.1: Assessed Value of Commercial Property by Risk Area

NYS Risk Area	Extreme Risk Area		High Risk Area		Moderate Risk Area	
Commercial Properties	Percentage of commercial properties	Assessed Value	Percentage of commercial properties	Assessed Value	Percentage of commercial properties	Assessed Value
Retail	0%		1%	$1,468,800	33%	$147,274,463
Industrial	0%		<1%	$1,025,100	28%	$147,772,928
Mixed Use	<1%	$9,360	<1%	$23,100	20%	$6,575,351

Source: NYC PLUTO

Brookville Boulevard Retail Corridor at 147th Avenue, Rosedale

Farmers Boulevard Retail Corridor, Springfield Gardens

Figure 2.9: Economic Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

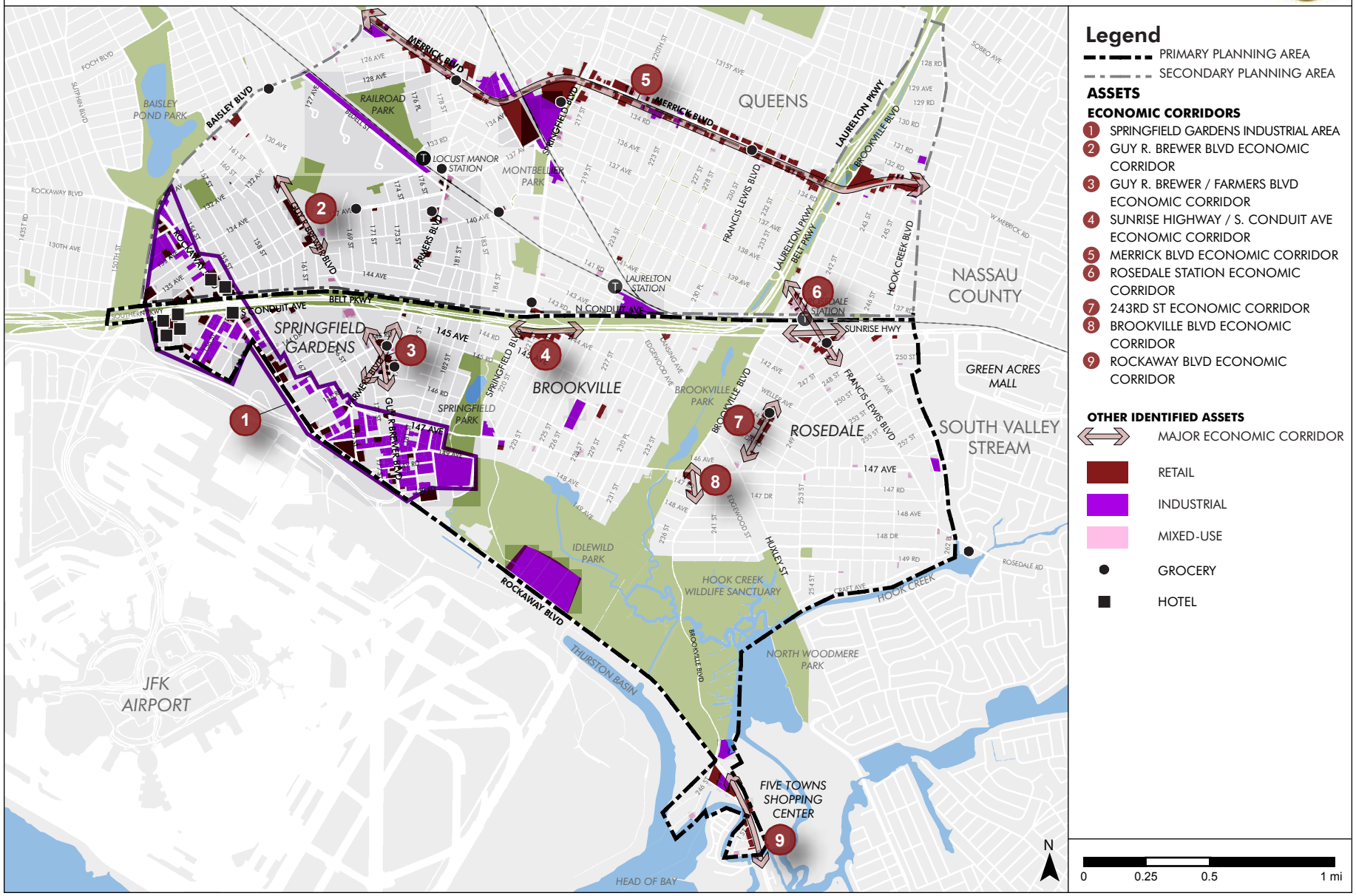
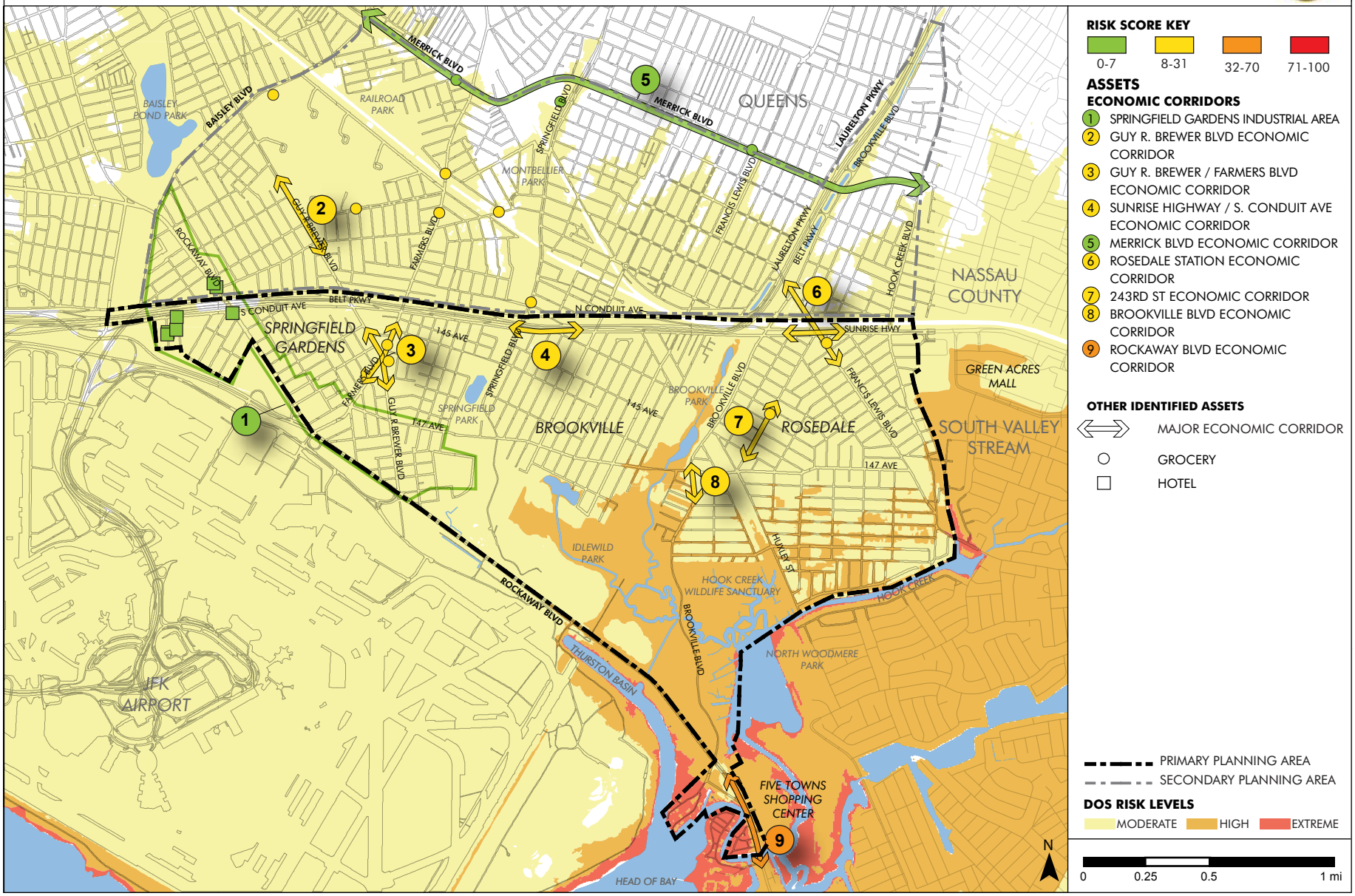


Figure 2.10: Risk to Economic Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Health and Social Services

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 daycare facilities, and healthcare facilities. Figure 2.12 illustrates risk to Health and Social Services assets identified as part of the asset inventor process.

Critical facilities in the Community include those for emergency response and recovery. The Community has two fire departments, Engine Companies 311 and 314, as well as the 113th Precinct of the New York Police Department (NYPD), the 105th Precinct (Queens South Task Force), and the NYPD Community Affairs-Queens South School Safety Division. Each of these first responders is at moderate risk for future coastal hazards. The nearest New York City Office of Emergency Management (NYC OEM) Evacuation Center is located outside of the Community at John Adams High School in Ozone Park and is not in a risk area.

Several government services facilities are also at moderate risk, including the Rosedale Post Office on 243rd Street, the Rochdale Village Post Office, and the Springfield Gardens Station Post Office on Merrick Boulevard. According to field surveys, the Rosedale Post Office lost power for nearly three weeks following Superstorm Sandy. Its location near Brookville Park Pond makes the Post Office vulnerable, while the Department of Motor Vehicles (DMV) in Springfield Gardens is vulnerable due to its location near Thurston Basin.

Among the Community's locally significant assets are 33 schools. Of these, 29 are at moderate risk for future coastal hazards, while four are not located within risk areas. The school at highest risk is PS 195 William Haberle on 149th Avenue and Weller Lane, which experienced flooding, sewer backups, and power outages. Field surveys report sewer backups and power outages in PS 52 in Springfield Gardens, PS 80 Thurgood Marshall Magnet School in Rochdale Village, PS 156 Laurelton, and Martin De Porres School in Laurelton, as well as Sunrise Public School in Rosedale, resulting in loss of service ranging from one to four weeks.

Healthcare facilities include a variety of disability clinics, medical offices, and health centers, totaling 31 assets, 26 of which are at moderate risk. The Community has four homeless shelters, all at moderate risk, and 30 daycare centers, 23 of which are at moderate risk.

Queens Library, Rosedale Branch

P.S. 231, Springfield Gardens

P.S. 181, Brookfield School, Brookville

Figure 2.11: Health and Social Services Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

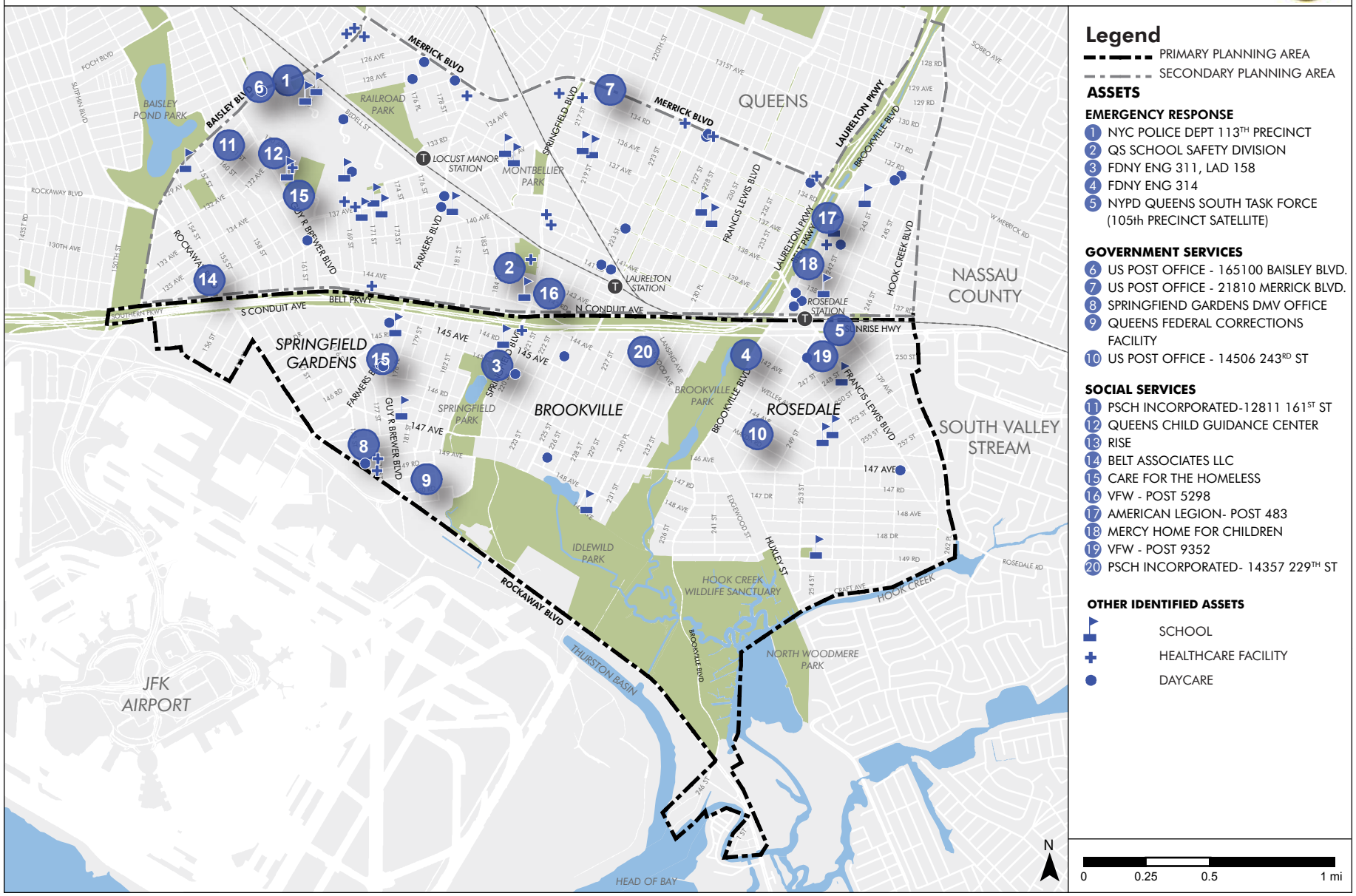
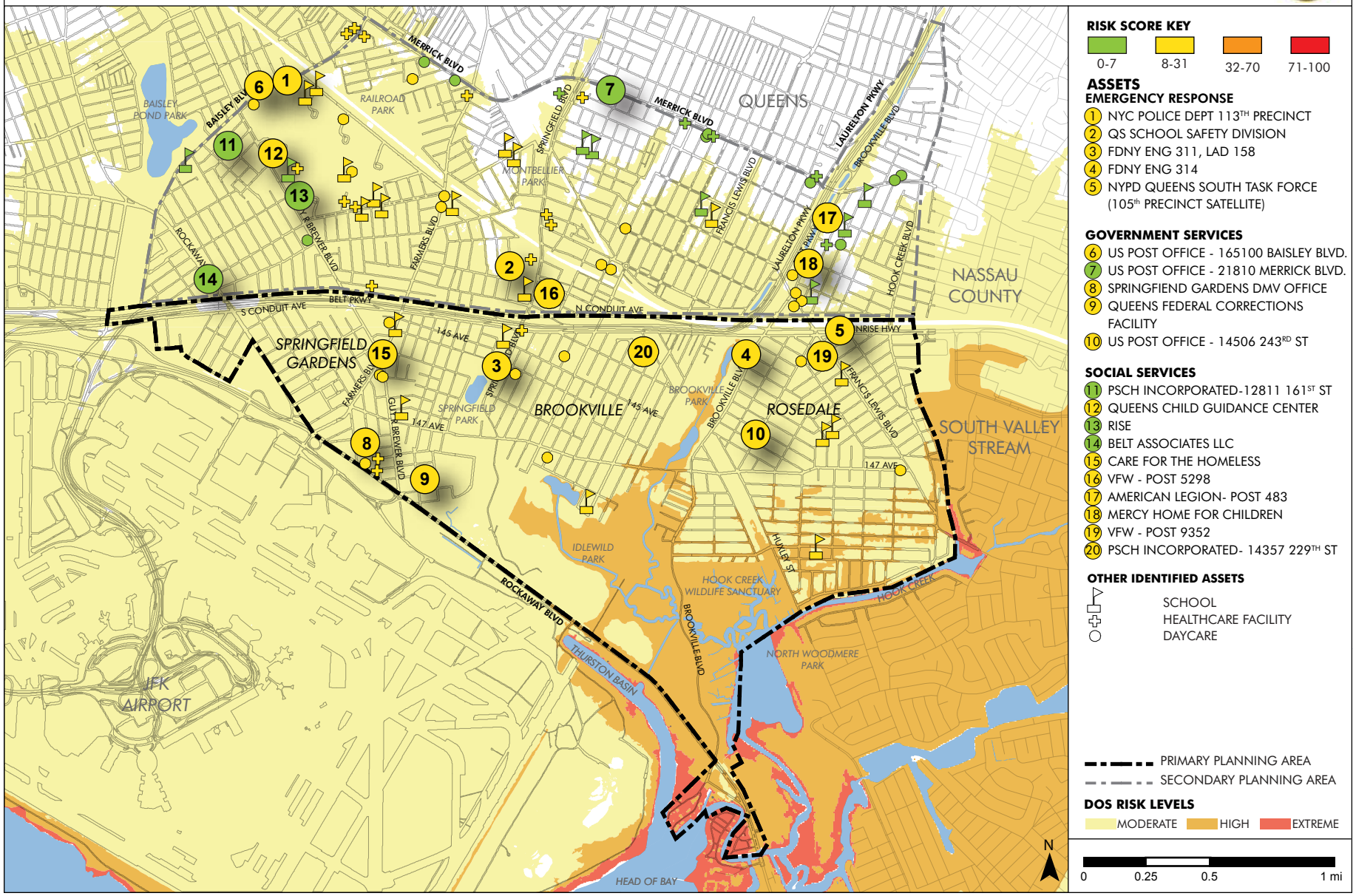


Figure 2.12: Risk to Health and Social Services Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Housing

The Idlewild Watershed Communities are primarily characterized by single- 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. Many of these homes experienced sewer backups, flooding, and power outages.

The majority of residential properties (87%) are located in the moderate risk area, with a minority of residential properties (less than 2%) located in the high risk area, and very few residential properties (less than 1%) located in the extreme risk area. Among these, one- and two-family buildings comprise the largest number of residential properties at risk, as residential properties in the Community are nearly all (97% of residential land uses) single- or two-family homes. The assessed value for all residential properties at risk for future inundation totals approximately $505 million.[30] Table 2.2 illustrates the assessed value of residential properties by risk area.

Residential properties with basements, back yards, or garages below grade level and those constructed in low-lying areas near Hook Creek and tidal marshlands are especially at risk due to exposure from topographic conditions and the high groundwater table. Figure 2.14 illustrates risk to housing assets identified as part of the asset inventory process.

The residential neighborhood of Meadowmere has the greatest exposure to coastal hazards, and therefore faces the highest risk for impacts from future storm events. Residential neighborhoods in Rosedale, Brookville, and Springfield Gardens are all at moderate risk for future storm events.

Affordable housing properties at moderate risk include Rochdale Village, Locust Manor Senior Residence, and Northeastern Conference House (Table 2.3). Locust Manor Senior Residence experienced a power outage for approximately three weeks, while Rochdale Village experienced downed trees. However, Rochdale Village has an independent power supply that makes it more resilient than neighboring communities on the Con Edison grid. The Rochdale Village power plant is a total energy facility that generates all the electrical power, heating, air-conditioning, and domestic hot water services for the entire residential development and two shopping malls.

Table 2.2: Assessed Value of Residential Properties by Risk Area

NYS Risk Area	Extreme Risk Area		High Risk Area		Moderate Risk Area	
Residential Properties	Percentage of residential properties	Assessed Value	Percentage of residential properties	Assessed Value	Percentage of residential properties	Assessed Value
One & Two Family Buildings	<1%	$303,380	<2%	$4,897,660	86%	$297,883,270
Multi-Family Walk-Up Buildings	<1%	$30,878	<1%	$1,475,807	<2%	$15,228,265
Multi-Family Elevator Buildings					<1%	$149,360,400

Source: NYC PLUTO

Attached Single-family Homes on 159th Street, Springfield Gardens

Homes Adjacent to Springfield Gardens Industrial Area

Table 2.3: Affordable Housing Facilities in the Community

Property Name	Units	Year Built	Tenure	Type	Risk Score
Rochdale Village	5,860	1963	Coop	Moderate and Middle Income	Moderate
Locust Manor Senior Residence	59	2008	Rental	Senior	Moderate
Northeastern Conference House	111	1984	Rental	Senior; Low Income	Moderate

Source: NYC PLUTO

Semi-detached two-family Homes on Craft Avenue, Rosedale

Figure 2.13: Housing Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

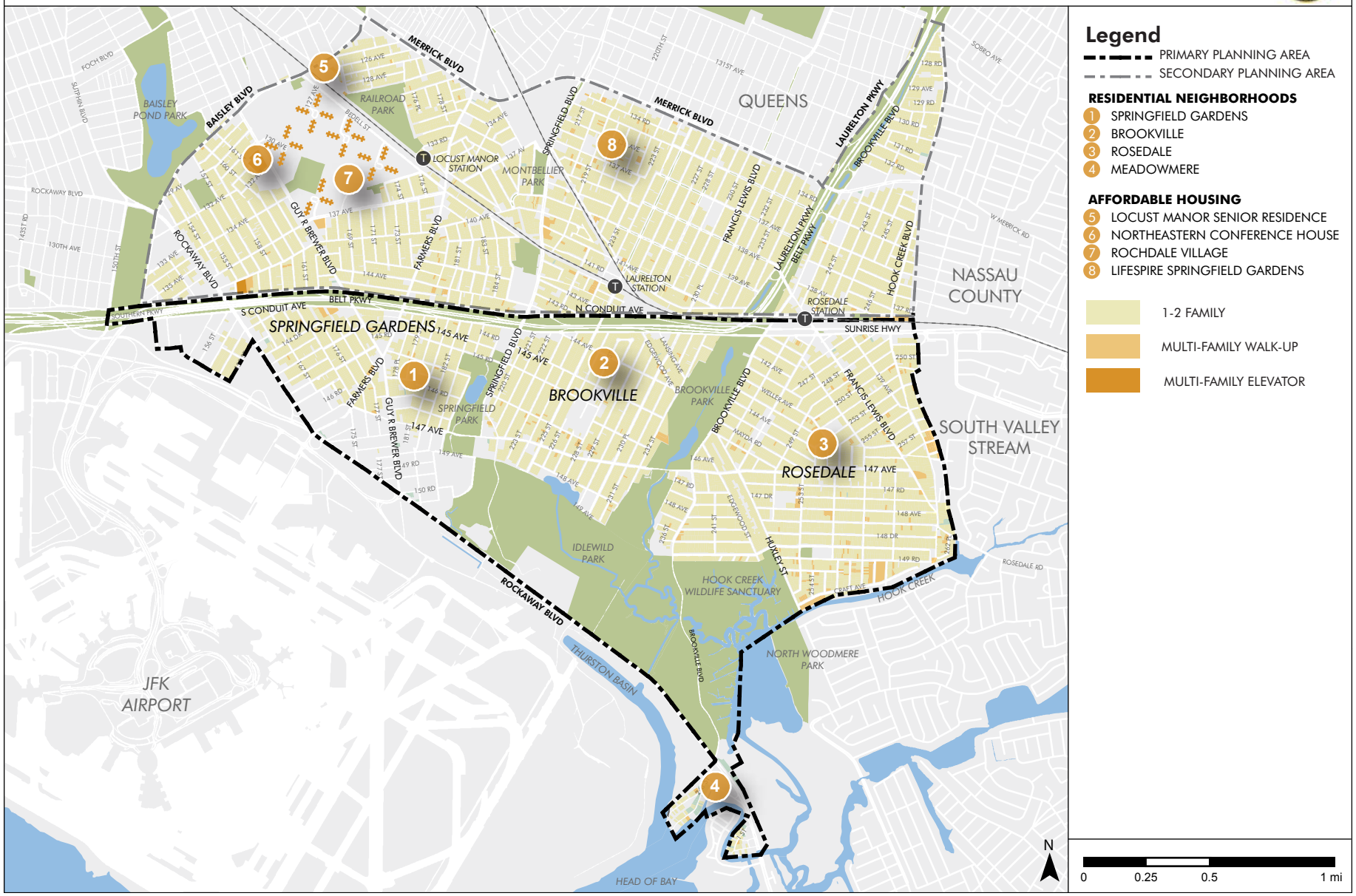
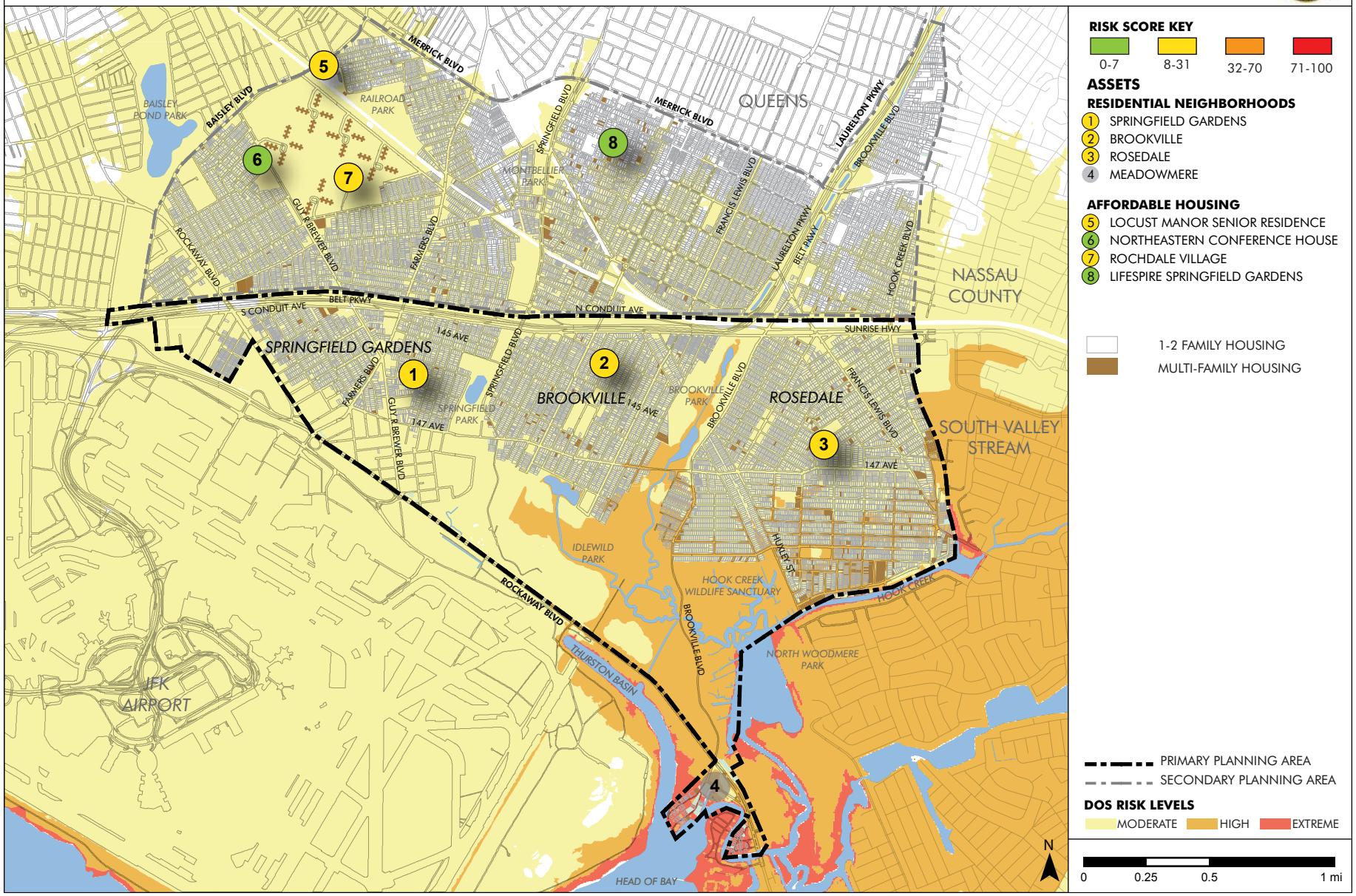


Figure 2.14: Risk to Housing Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Infrastructure

Infrastructure assets include critical transportation routes and facilities, stormwater and sewer networks and facilities, and the electrical power grid. Transportation infrastructure assets at risk of flooding present danger to residents, as persistent flooding can damage roads by forming sinkholes, as is present on several roads near Idlewild Park Preserve. Brookville, Francis Lewis, and Hook Creek Boulevards routinely flood, and Brookville Boulevard south of 149th Avenue (known locally as "the snake road") presents unsafe driving conditions under even fair weather conditions due to sharp curves and limited sight distance. Congested transportation corridors such as Rockaway, Farmers, and Guy R. Brewer Boulevards can slow evacuation and prevent access to major highways such as the Belt Parkway or Sunrise Highway prior to an extreme weather event, while flooded roadways can slow recovery time and prevent residents from returning to their homes.

The Community is largely auto-dependent, with 90% of households owning a vehicle,[31] and has inadequate bus service and limited pedestrian connections to main retail corridors, community facilities, or Metropolitan Transportation Authority (MTA) facilities. Transportation infrastructure systems lack adequate parking for multi-modal transportation, and the area is generally underserved for bus transportation, resulting in the rise of informal van (jitney) operators. The bus system includes the main MTA bus routes 111/113, 114, x63, 85, and the 3 and 6 to JFK Airport, the 77 and various private operators such as Nassau Inter County Express (NICE) bus service. Three Long Island Railroad (LIRR) stations lie within the Community—Locust

Brookville Boulevard (Snake Road) at Idlewild Park Preserve *Source: Google Earth*

Hook Creek at Hungry Harbor Road - Rosedale

Manor, Rosedale, and Laurelton—each at moderate risk. Two LIRR lines pass through the Community—Long Beach and Far Rockaway. Various private transportation operators provide taxi and limo service, much of which is targeted to nearby JFK Airport.

Several critical transportation infrastructure assets are located outside of the Community that directly impact the Community, such as JFK Airport and Sunrise Highway, which extends from South Conduit Avenue into Nassau County. Residents rely on economic assets in Nassau County and experienced access issues after Superstorm Sandy due to flooded cars and congested or flooded roadways, impacting the ability of residents to recover. Figure 2.16 illustrates risk to infrastructure assets identified as part of the asset inventory process.

Storm sewer and water supply networks are also critical infrastructure systems that are at risk of tidal inundation. The storm sewer system increases risk to the Community in areas where the network does not have enough capacity or is not well-maintained, resulting in flooding during average storm events. The lack of sewer infrastructure in some areas of the Community also increases risk, as stormwater flooding is a routine occurrence due to an incomplete storm sewer system that was never fully built out to accommodate the present level of development in the Community. The New York City Department of Environmental Protection (NYC DEP) is completing its fourth phase of a comprehensive upgrade of the sewer and water infrastructure in Southeast Queens, including a Bluebelt project in Springfield Gardens, which is further discussed in the Natural and Cultural Resources section below. The project will install approximately 2.8 miles of new sewer lines, nearly 3 miles of water mains, and new streets and sidewalks. Additional sewer lines are required and the entire system is not yet fully designed or funded.

Prior to 1996, the privately owned Jamaica Water Supply Company (JWS) operated a group of wells that provided water to the communities of southeastern Queens. These wells were purchased by NYC DEP in 1996, and a former JWS pump has been decommissioned and sits vacant, encompassing a full block between 145th Road and 145th Avenue at 228th Street in Rosedale.[32]

Another key infrastructure network impacted by Superstorm Sandy is the Community's electrical power system. A Con Edison power line crosses the northeastern portion of the Community parallel to the LIRR. Power outages were widespread, as indicated by field surveys in which 100% of respondents noted power outages as an impact from the Storm.

The Community's auto-dependence was made especially clear during the aftermath of Superstorm Sandy. Flooding of gas stations caused power outages and damage to fuel pumping equipment, leading to citywide fuel shortages. According to AAA, as few as 35% - 40% of stations in the City were operating in the days immediately following the storm.[33] Fuel shortages had an significant impact in areas where residents and employees rely on their cars to commute and shop for daily necessities.

Springfield Boulevard Storm Sewer Upgrades

Figure 2.15: Infrastructure Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

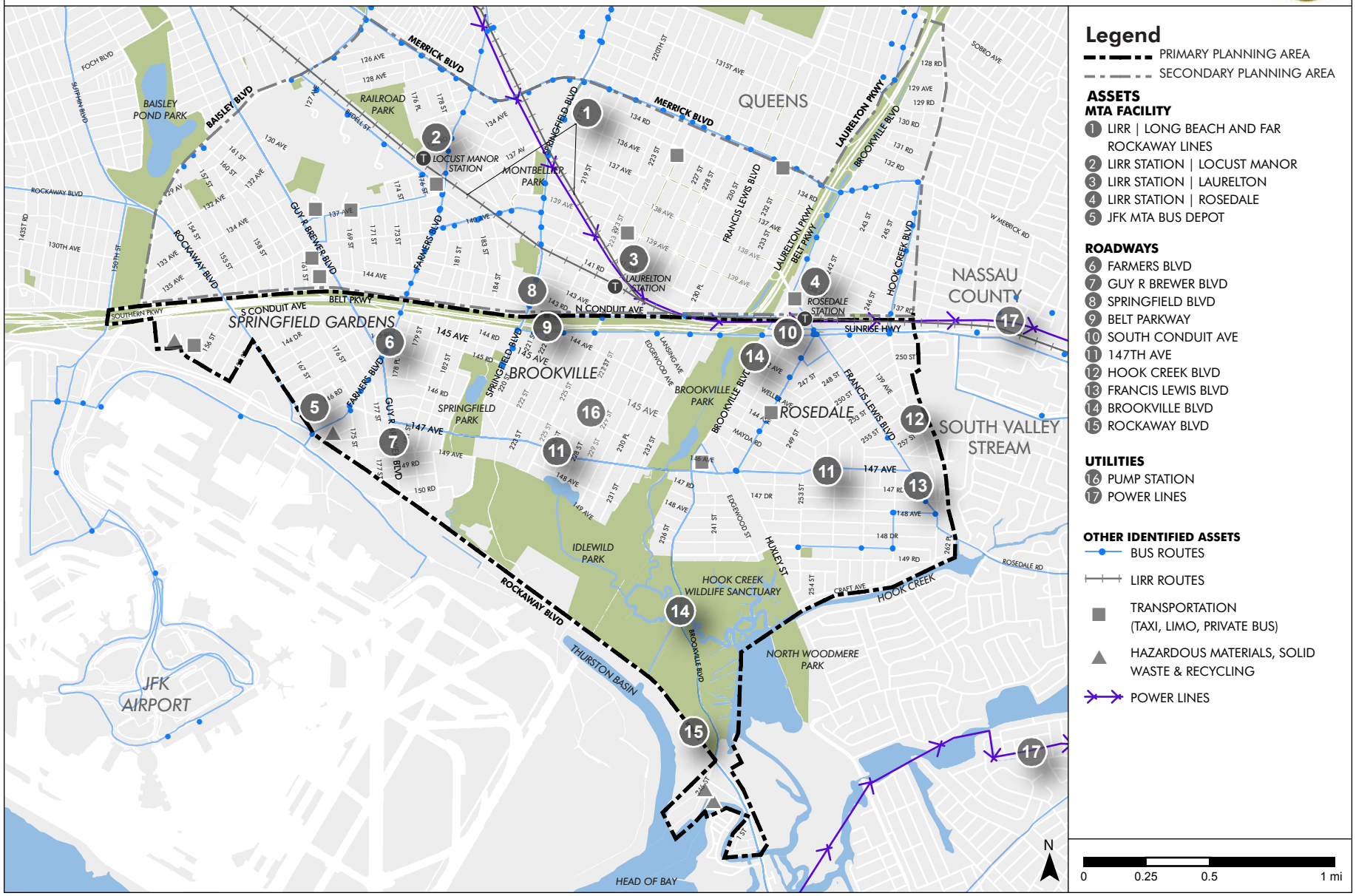
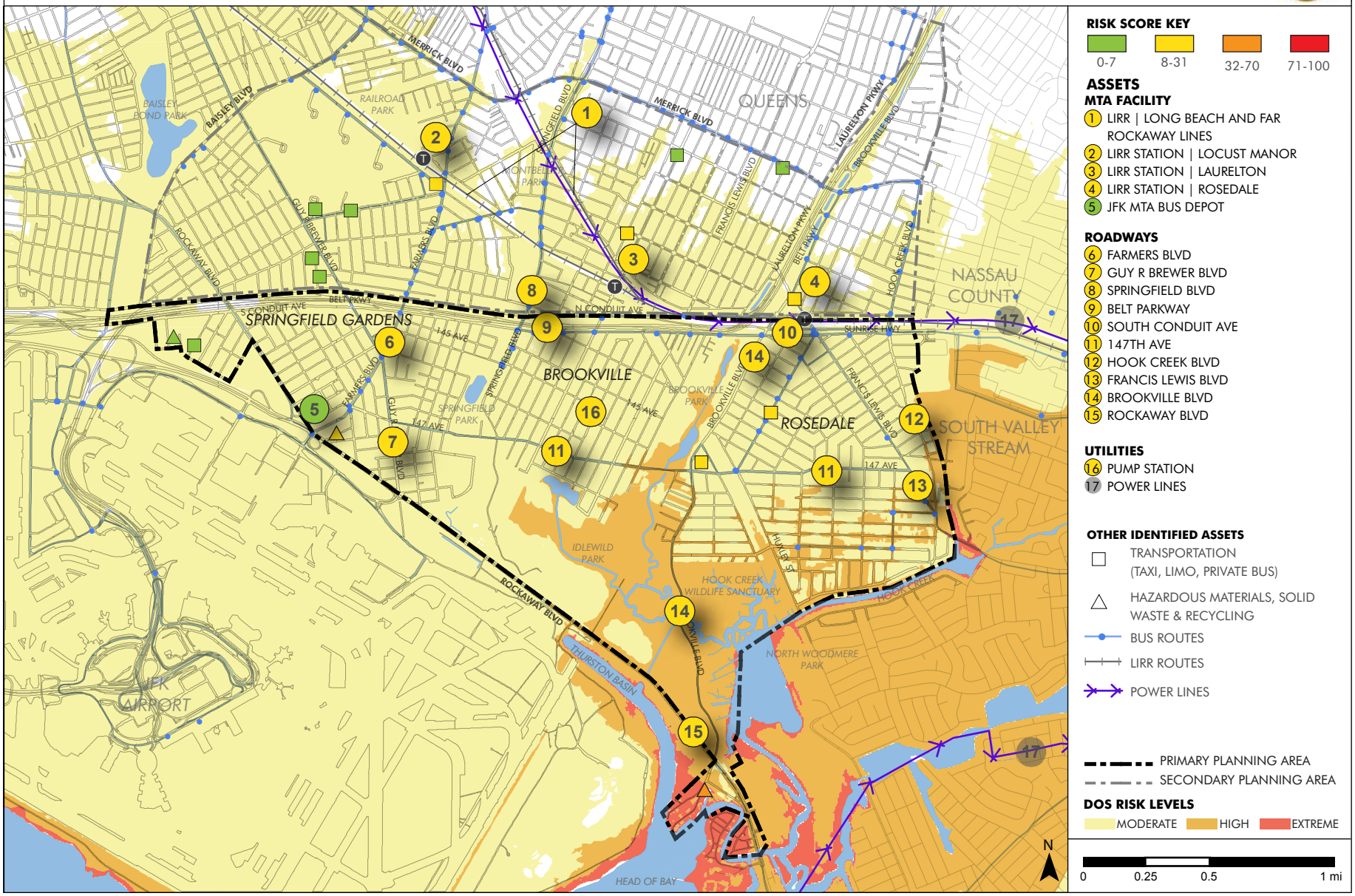


Figure 2.16: Risk to Infrastructure Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Natural and Cultural Resources

Superstorm Sandy impacted parks, tidal wetlands, natural stormwater systems, community facilities, and cultural institutions. Tidal wetlands in the Idlewild Park Preserve, both at high risk, form a network of natural tidal buffers from coastal surge as well as a natural filtration system for stormwater flowing south through the Jamaica Bay Watershed into Hook Creek and Jamaica Bay. These parks and the wetlands within are considered assets for both their flood protection and ecosystem services (e.g., clean air and water), which were enhanced in 2001 when the Idlewild Park Preserve was expanded by 100 acres to create the largest expanse of high-quality salt marsh along the shores of Jamaica Bay. Tidal creeks running through the park provide the greatest volume of fresh water to the Bay. Idlewild Park Preserve has been designated as a Forever Wild Preserve, meaning it is a natural area within New York City that supports diverse wildlife and plant populations, including numerous rare, threatened, and endangered species.[34] The Idlewild Park Preserve, together with grassland habitat at JFK Airport, is one of two sites in the City that provide nesting habitat for northern harrier (marsh hawk) and short-eared owl. Ecological restoration initiatives by NYC DEP include sewer construction mitigation, tidal and freshwater wetlands restoration, and restoration of upland habitat.

The U.S. Army Corps of Engineers (USACE) and NYS Department of Environmental Conservation (NYS DEC) are coordinating on the Jamaica Bay Restoration Project, while the U.S. Environmental Protection Agency (U.S. EPA) Habitat Estuary Program has identified the Idlewild Park Preserve as a restoration priority. NYC Department of Parks and Recreation (NYC DPR), in coordination with the Eastern Queens Alliance, has plans to construct the Idlewild Park Preserve Environmental Science Learning Center, with associated stormwater management improvements in the park.

Idlewild Park Preserve, Rosedale

The Community prides itself on the quality of its parkland and various recreational opportunities. Among the 15 parks identified as assets, 12 are at moderate risk for future storm events. This includes large parks such as Springfield Park in Springfield Gardens, Brookville Park in Brookville, and Railroad Park in Laurelton. Playgrounds at moderate risk include Sunrise Playground; South Rochdale Playground; Mentone Playground; and the playground at PS 52, the John C. Thompson School. Figure 2.18 illustrates risk to Natural and Cultural Resource assets identified as part of the asset inventory process.

Springfield Park was originally known as Spring Fields for its system of natural ponds and creeks. Today, NYC DEP and NYC Economic Development Corporation (NYC EDC) are implementing a Bluebelt project at Springfield Park. The Bluebelt program preserves and optimizes natural drainage systems including streams, ponds, and lakes by directing stormwater into natural filtration systems such as green infrastructure. This project will remove accumulated sediments from Springfield Park Pond and plant wetland shelves along its perimeter, with the goal of improving both

Springfield Park Pond, Springfield Gardens

Brookville Park Pond at 147th Avenue, Brookville

water quality and aquatic habitat in the pond. The newly planted wetlands will store and filter stormwater which will then pass through Springfield Park Pond, streams, and wetlands into Jamaica Bay.[35]

Both Brookville and Springfield Parks have ponds fed by tidally influenced streams from Hook Creek. Brookville Park Pond (also known as Conselyeas Pond) in Brookville Park and Springfield Park Pond overflowed beyond their surrounding wetlands and parklands into adjacent neighborhoods during Superstorm Sandy, inundating residential properties and businesses in Brookville and Rosedale. Likewise, flooding from Jamaica Bay and Thurston Basin inundated low-lying areas within the Community and runways at JFK Airport. Coordination is ongoing among the USACE, NYS DEC, and NYC DEP regarding both water quality and flood protection in Jamaica Bay. The Bay's fragile ecosystem has been degraded through human encroachment, increased urbanization, and Combined Sewer Overflow (CSO) discharges. The USACE is investigating ecosystem restoration measures such as regrading shorelines; revegetating grasslands; creating and/or restoring additional estuarine, wetland and upland habitats; and improving circulation and flushing.[36]

The NYC DEP has adopted the Jamaica Bay Watershed Protection Plan, which recommends best management practices for improving the water quality of the Bay. A comprehensive flood protection study is also underway for Jamaica Bay, led by the USACE in partnership with the NYS DEC. The Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Coastal Storm Risk Management Feasibility Study is assessing the feasibility of coastal storm risk management alternatives to be implemented within Jamaica Bay.[37]

In terms of cultural assets, Rochdale Village and Rosedale public libraries are at moderate risk, while the Laurelton Public Library is not in a risk area. These library services, while not at substantial risk, are locally significant facilities that are not within walking distance for many who live in the Community.

Figure 2.17: Natural and Cultural Resource Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program

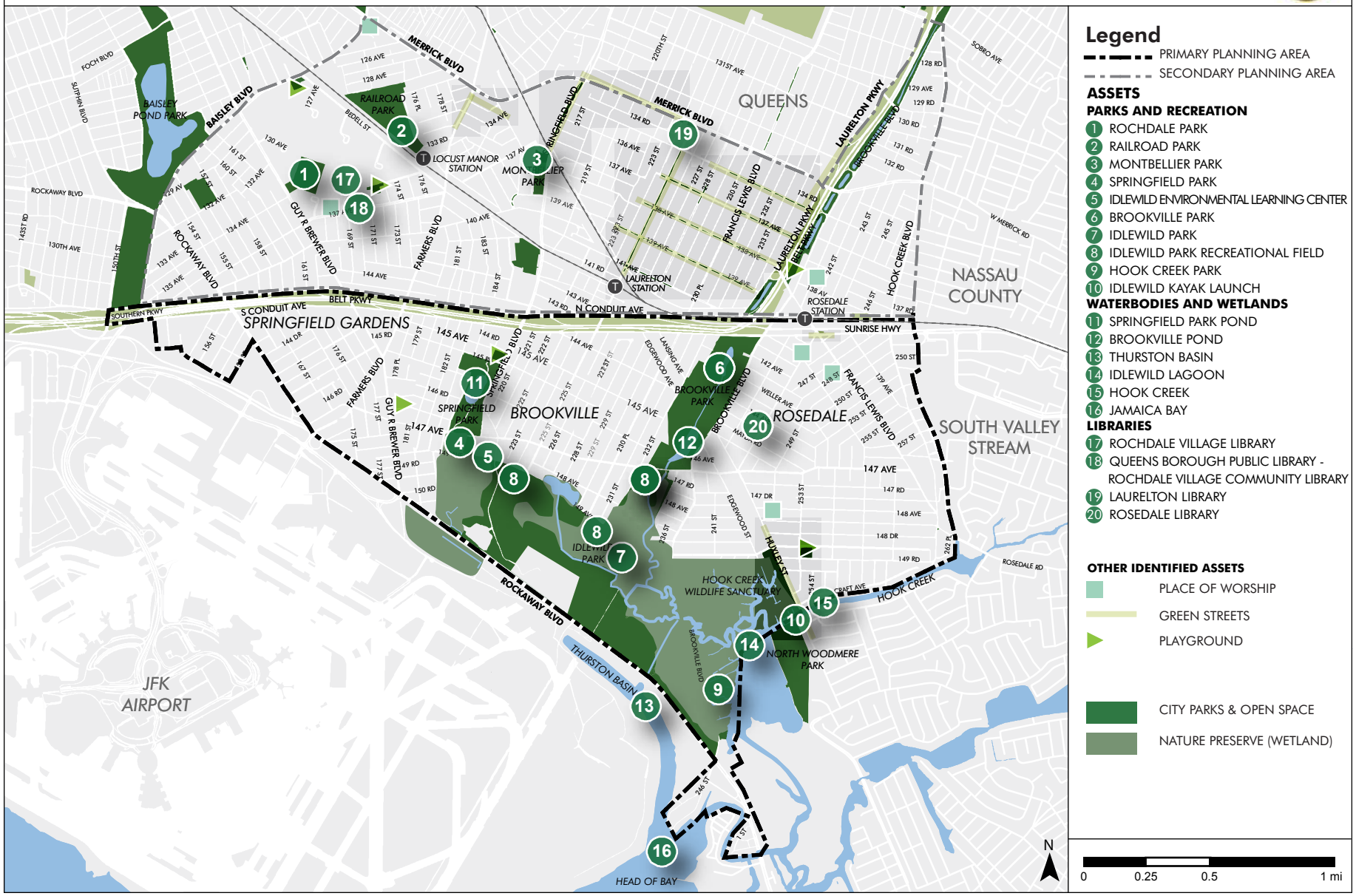
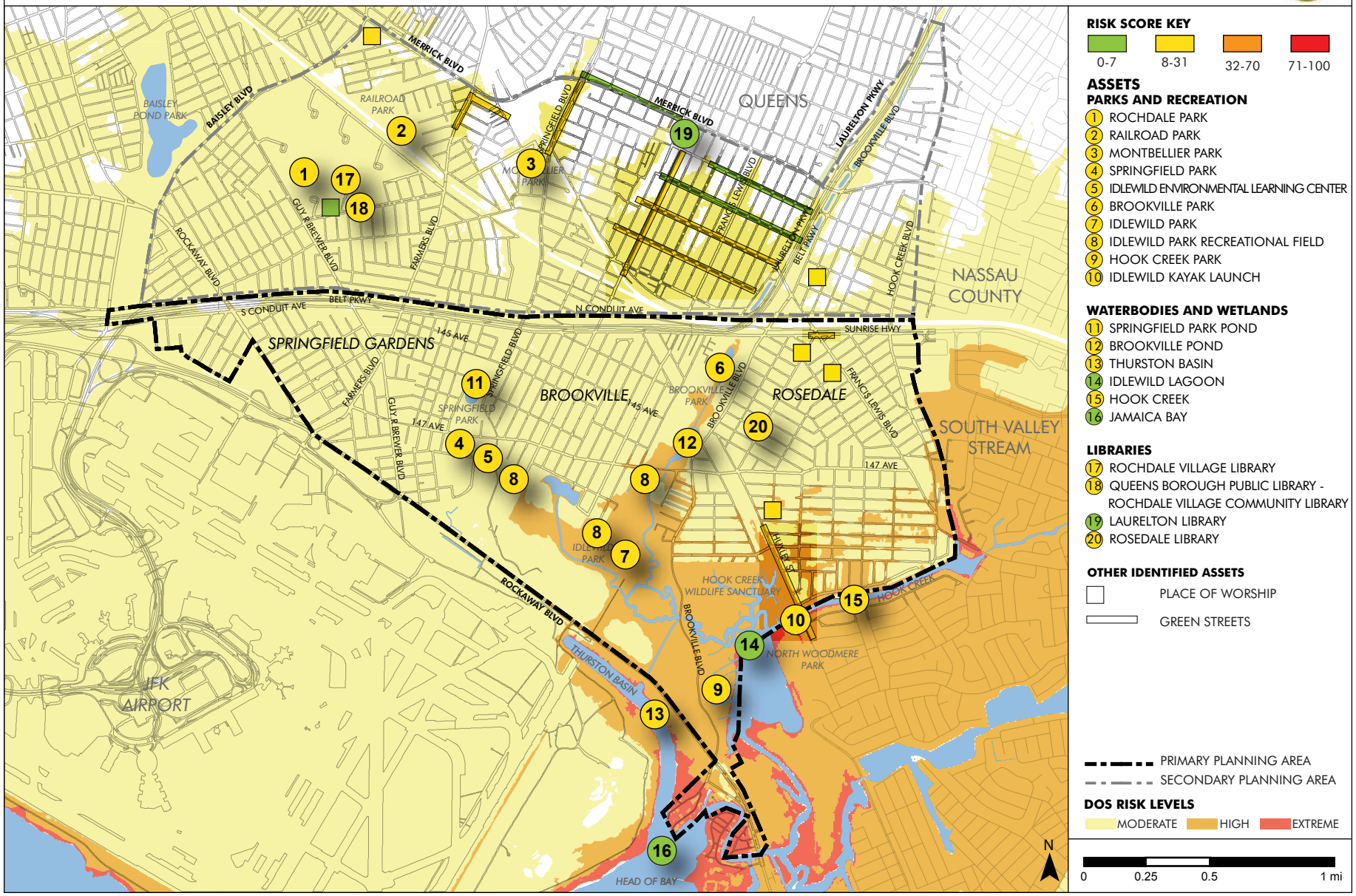


Figure 2.18: Risk to Natural and Cultural Resource Assets

Idlewild Watershed Communities
NY Rising Community Reconstruction Program



Assets that Serve Socially Vulnerable Populations

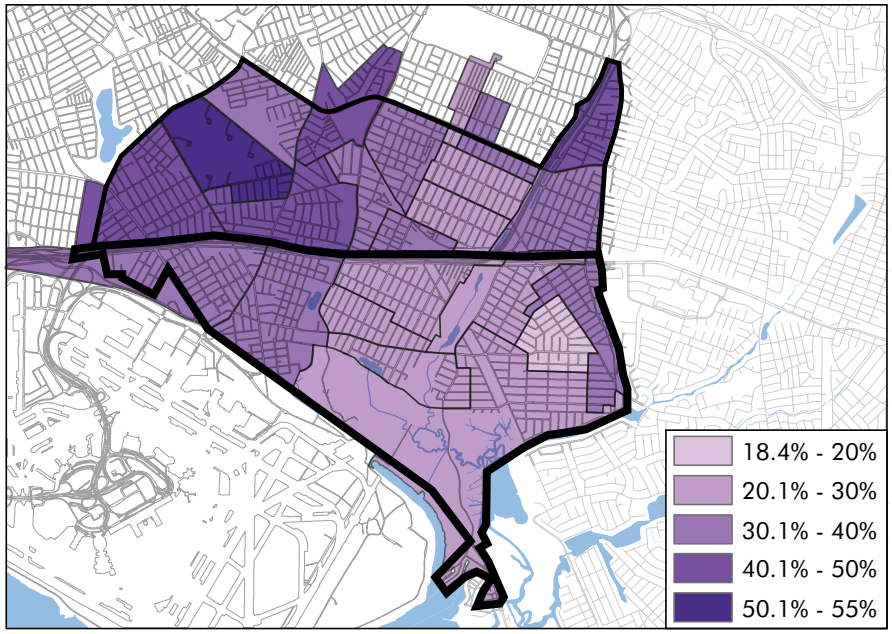
Assets that serve Socially Vulnerable Populations include facilities that provide services for people with disabilities, those with language barriers due to limited English proficiency, low-income populations, the elderly, young children, and homeless populations. Superstorm Sandy impacted socially vulnerable populations within the Community's flooded residential neighborhoods, as well as assets that serve these populations, such as schools and healthcare facilities.

The Idlewild Watershed Communities have limited socially vulnerable populations, with low percentages of elderly, low-income, young children, or populations with disabilities. The highest concentration of elderly residents resides north of the Belt Parkway in Laurelton between 223rd Street and Belt Parkway, along Baisley Boulevard in Rochdale Village, and south of Belt Parkway in Springfield Gardens between Springfield Lane and Brookville Park. Elderly populations identified within the moderate risk area include those in Rochdale Village, the northern part of Springfield Gardens, and southern Laurelton, while disabled populations include those in the western and central parts of the Communities such as at Rochdale Village and Locust Manor Senior Residence. Springfield Gardens is also home to the Queens Detention Facility, a privately operated 200-bed prison which primarily houses pre-sentenced detainees on behalf of the U.S. Marshall Service.

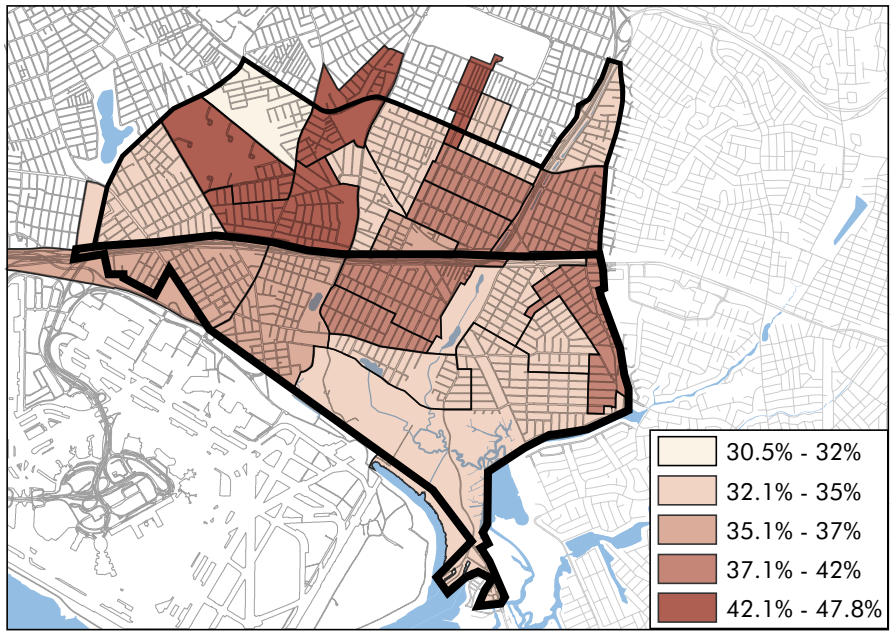
The Community does not have a high concentration of low-income households; however more than half of households in Rochdale Village earn less than $50,000.[38] Lower-income households are dispersed throughout the Community, with more than one-fourth of the households in Springfield Gardens, Brookville, and southern Laurelton earning less than $50,000 annually, which is moderately lower than the U.S. Department of Housing and Urban Development's (HUD) Area Median Income (AMI) of $67,000 for a family of four in New York City. The areas with the

Figure 2.19: Socially Vulnerable Populations

Households with Income Less than $50,000



Population that Commutes by Public Transportation



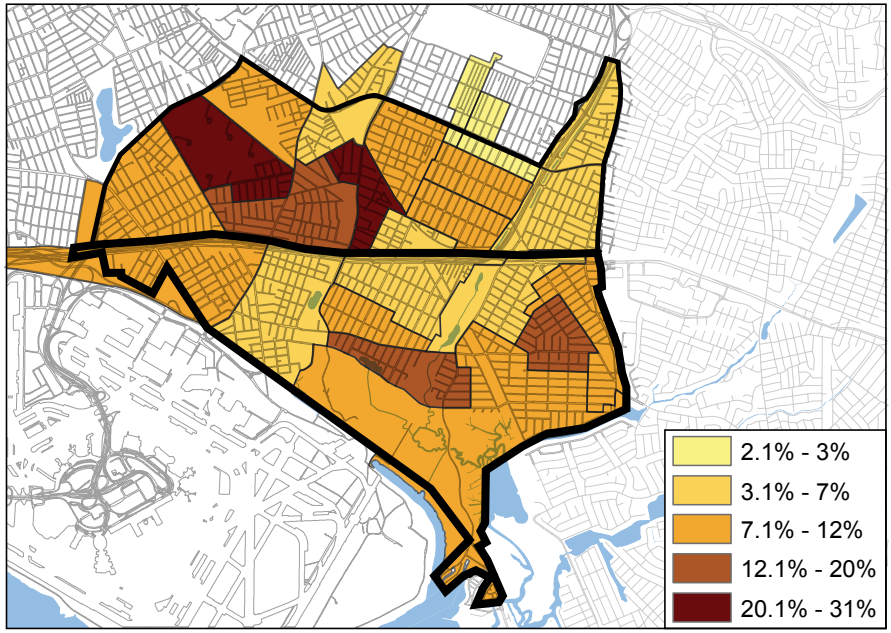
greatest share of low-income households are Rochdale Village and in Rosedale between the Belt Parkway and Hook Creek Boulevard, where more than 30% of households earn less than $50,000 annually.

In the area between Farmers Boulevard and Springfield Boulevard, 8% to 11% of the population has some physical disability, while in the area between the Belt Parkway and 86th Street, 7% to 8% of the population has some physical disability.

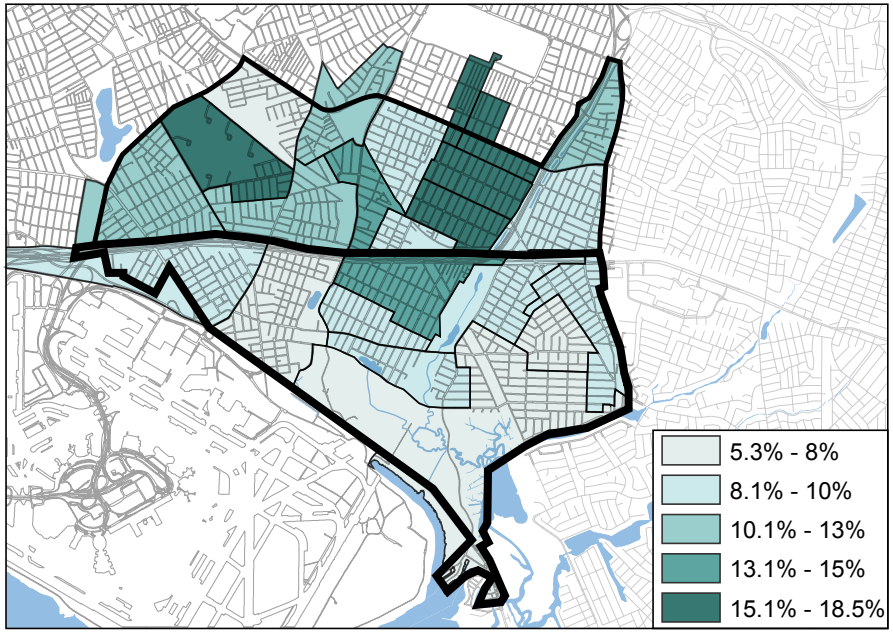
This auto-dependent community has a high car ownership rate, with more than 85% of the households having access to one or more vehicles. However, dependency on public transit is still very high. In the central part of Brookville between 145th and 147th Avenues, 37% to 40% of the population depends on public transit. More than one-third of the population depends on public transit for commuting to work between the Belt Parkway and Rockaway Boulevard and the area beyond Francis Lewis Boulevard adjacent to the LIRR station.

English-speaking populations in the Community are relatively high, with less than 9.6% of non-English speaking population in any one area of the Community. Rosedale between Sunrise Highway and 147th Avenue has the highest non-English speaking population, between 8.4% and 9.6% (Figure 2.19).

Households with No Access to a Vehicle



Population 65 Years and Older



B. Assessment of Needs and Opportunities

The objective of the Assessment of Needs and Opportunities is to evaluate the potential for increased resilience in the short-, medium-, and long-term in the Idlewild Watershed Communities (Community). The Assessment of Needs and Opportunities has been refined through detailed analysis of the assets and risks within the Community, analysis of demographic and economic data, and input from the NYRCR Planning Committee (Committee), and at Public Engagement Events.

Though Superstorm Sandy and Hurricane Irene were both extreme events, the sources and causes of flooding observed during these storms are regularly reflected on a smaller scale during high tides, rain storms, and nor'easters. These extreme events have effectively exposed the greater system-wide inadequacy of the Community's flood mitigation and protection system, as well as the need for more robust community planning.

For each of the six Recovery Support Functions (RSFs) described in Section I.C., the following Assessment of Needs and Opportunities identifies areas in which the Community could improve its resilience to major storms and other disasters. This analysis supplements input that the Committee provided at Planning Committee Meetings and received at Public Engagement Events and has helped to guide the Committee in identifying Reconstruction Strategies and Projects that will increase the Community's resilience.

Community Planning and Capacity Building

The Assessment of Needs and Opportunities for 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.

In recent years, the New York City Department of City Planning (NYC DCP) downzoned three neighborhoods within the Community in response to residents' concerns about multi-family buildings altering the Community's suburban character. These areas include: the section of Springfield Gardens between Baisley Boulevard, North Conduit Avenue, and Guy R. Brewer Boulevard (2005); the majority of Brookville between Springfield Park and Brookville Parks, from South Conduit Avenue to Idlewild Park; and several sections of Rosedale south of Merrick Boulevard (2010). However, residents remain concerned about enforcement of zoning regulations with regard to out of scale buildings.[39] Residents have also expressed concerns about enforcement regarding basement conversions and paving of front yards with hardscape. Basement conversions in flood zones put tenants at risk of flood damage, while yard paving increases the impact of stormwater runoff on adjacent properties.

Community Planning and Capacity Building Needs

Needs in the Community regarding Community Planning and Capacity Building largely pertain to educational campaigns, empowerment of homeowners and tenants to protect themselves from extreme weather, and increased resources and training for existing Community Based Organizations (CBOs) in the area.

Disaster Preparedness Education and Resources for the Elderly

The elderly population in the Community needs educational resources and additional social services that allow them to age in place while also making sure that they have the support they need to evacuate and recover in the event of a disaster. In particular, this population needs a network of social services that has the capacity to maintain a voluntary registry of their location and needs, can provide transportation in the event of an evacuation for those who cannot drive, and can provide education and assistance for elderly homeowners who need to upgrade their homes to withstand future flooding.

Expanded Localized Educational Campaigns on Emergency Preparedness and Floodproofing

Although tools exist to provide information to residents in the Community on emergency preparedness and floodproofing, localized educational campaigns that reach more residents are needed. Citywide materials provide effective emergency preparedness concepts, but need to be tailored to the Community in order to be more locally applicable. There are many ways that residents can ensure that their homes and families are better prepared for extreme weather and other disasters—some which incur minimal costs and others which would require minor structural improvements—but existing technical and educational literature has limited impact in the Community.

Tenant Advocacy

Tenants living in rental properties, including newer multi-family buildings need an advocate to provide resources and education about their rights in assuring that their homes are constructed with adequate floodproofing methods. Ensuring that rental properties are resilient to flooding will also help to make sure that these properties are well-maintained and supportive of the Community's character.

Homeowner Advocacy

Homeowners in the Community need an advocate to educate them on how to negotiate with insurance companies to receive adequate payment for storm damages. After Hurricane Irene and Superstorm Sandy, many residents have reported receiving inadequate payments or being dropped from their flood insurance policy.[40] In particular, low-income residents may lack sufficient resources and support to repair storm damage or floodproof their homes without additional assistance.

Resource and Recovery Centers

There is a need within the Community for local facilities where CBOs could provide emergency-response education and training during normal conditions while also serving as sites for distribution of resources and other assistance after disasters. A model for Resource and Recovery Centers was developed through the first round of NYRCR Plans, which is currently being implemented in other communities. The services that these facilities could potentially provide would be distinct from the services provided at Evacuation Centers operated by the NYC Office of Emergency Management (OEM). Rather, the need within the Idlewild Watershed Communities is for a new facility located within the Community that could provide educational materials, training, charging stations, and basic needs when residents return to the area after an evacuation.

Community Planning and Capacity Building Opportunities

The Idlewild Watershed Communities are well positioned to respond to the needs outlined above, increasing the Community's capacity to protect residents from extreme weather. The Community's ability to increase the resilience of community response networks is based on two key opportunities. First, many of the educational resources that the Community needs in order to increase resilience already exist. Rather than creating new materials and

NYC OEM Educational Materials *Source: NYC OEM*

programs, the Community can build upon these existing materials and use local outreach and distribution channels to make sure the resources are reaching populations in need. Second, and more importantly, the Community has in place an extensive and active network of civic associations and religious institutions that can serve as liaisons between City agencies and local residents to improve upon and localize disaster recovery educational materials and resources.

There are strong and active networks of CBOs—including local civic associations, local churches, and other community facilities—that could support a greater degree of coordination in order to improve services during extreme weather events. The model for this type of initiative is the coordinated response that health and social services organizations facilitated in the immediate aftermath of Superstorm Sandy. With little planning or advance coordination, organizations within the Community all expanded their reach to provide critical recovery

services. These existing networks of social services organizations can be a building block for greater coordination in advance of future disasters. Residents and businesses in the Community will be more resilient by strengthening connections among neighborhood organizations, religious organizations, and City agencies.

Coordinate Community-Based Organizations with NYC OEM Resources

One of the greatest resources in the Idlewild Watershed Communities is the active network of CBOs, including civic associations, religions 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. Although CBOs do not currently provide significant emergency recovery support services, the networks they have established present an opportunity to bring additional services to the Community. In addition to these organizations that are not primarily focused on disaster assistance, there is also a Community Emergency Response Team (CERT) based in Southeast Queens that is supported by NYC OEM.

The relationship between NYC OEM and the local CERT provides a model for how the Community can expand the resilience efforts of CBOs with support from the City. NYC OEM has initiated a pilot program to support existing CBO networks known as Community Organizations Active in Disaster (COAD). COADs are networks of local organizations, much like the network of civic associations that exists in the Idlewild Watershed Communities, but with an additional emphasis on providing training and recovery support services to help communities recover from disasters.

The opportunity to establish a COAD that serves the Idlewild Watershed Communities would build upon the existing network of civic associations. Through this network, the COAD would serve as a critical liaison, providing local residents and businesses with educational materials, training events, and recovery support services. The 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.

Resource and Recovery Centers

Resource and Recovery Centers can provide critical services to residents in the aftermath of major storms. These centers would serve a different function from designated evacuation centers; rather than housing displaced residents, they would provide educational materials, training, charging stations, and basic needs when residents return to the area after an evacuation. The centers would be located in existing facilities, such as libraries, churches, community centers, or other buildings that are in operation year-round.

Economic Development

Expedient post-storm recovery is advantageous for local economies. Resilience measures to 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, 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 its ability to remain open.

Economic Development Needs

The ongoing health and viability of existing businesses in the Community is important for employment, revenue, and provision of goods and services to the local population. Businesses and economic corridors that face severe or recurring flooding need to be targeted with floodproofing and resiliency measures to minimize future damage and reduce the time needed for recovery.

Access to Critical Goods and Services

While few Community businesses suffered major damage from flooding during Superstorm Sandy, daily operations for many businesses were interrupted due to the storm's effects, including power outages and sewer backups. Also, a lack of transportation made it difficult for employees to reach their jobs and for shoppers and deliveries to reach businesses. It is vital that Community businesses are accessible to

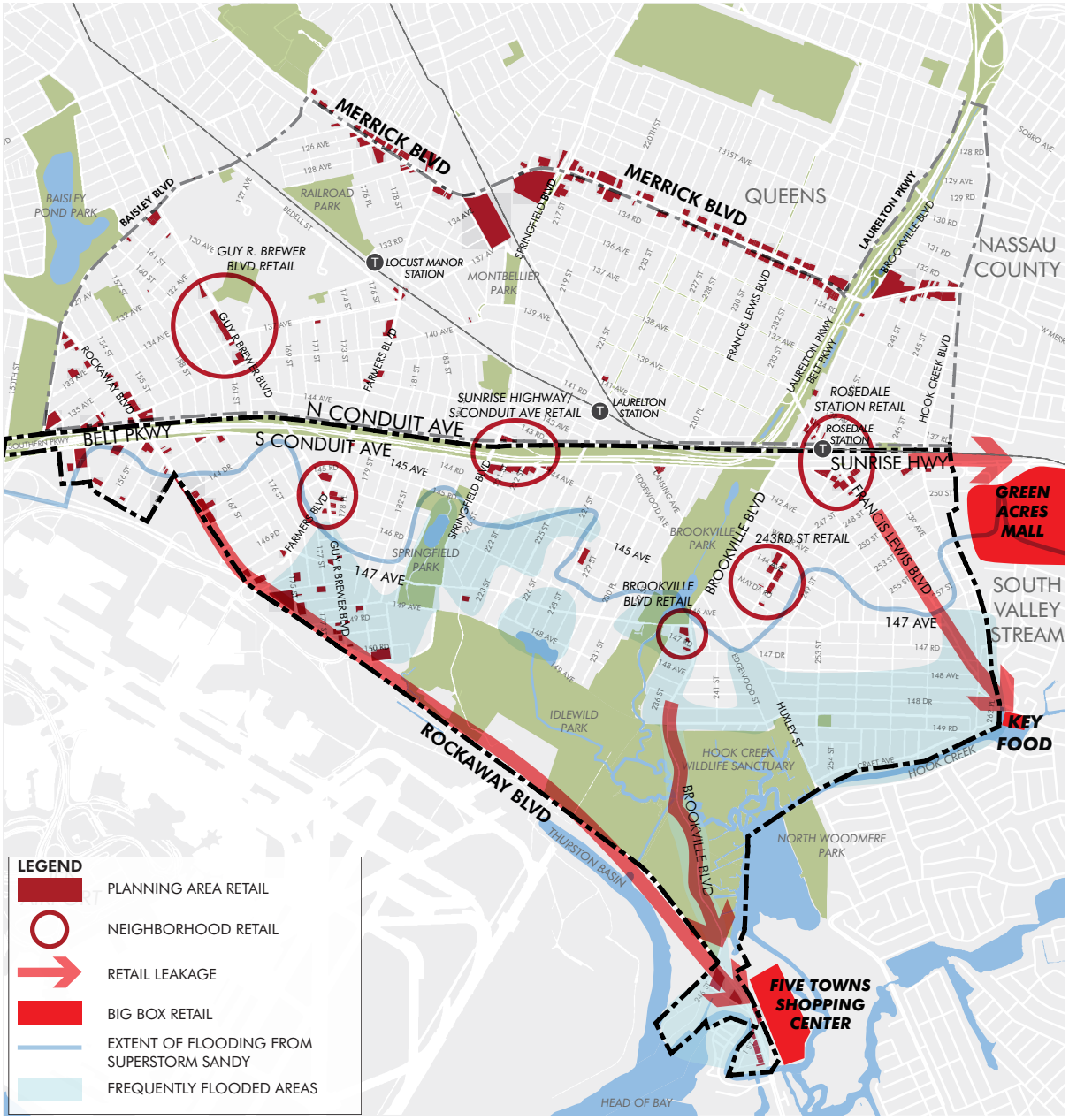
employees, shoppers, and deliveries after storm events. It is also important for these businesses to recover power, water, and heating quickly. In particular, economic corridors at risk of future flooding are shown in Figure 2.20 and include Guy R. Brewer Boulevard, Farmers Boulevard, Sunrise Highway/South Conduit, the area surrounding the Rosedale LIRR Station, 243rd Street, Brookville Boulevard, and Rockaway Boulevard.

Public input from Community residents suggests that there are retail gaps in the Idlewild Watershed Communities, and residents tend to go elsewhere for daily needs (for example, to Green Acres Mall, Five Towns Shopping Center, and other locations in nearby Nassau County). The types of goods and services located in the Community do not match residents' needs. To ensure that residents are able to access goods and services, the Community needs to identify its retail gaps. The day-to-day issue of having to leave the Community to make purchases is exacerbated after storm events due to transportation difficulties. As such, the Community needs access to retail and commercial centers, whether it involves reliable transportation or the location of appropriate businesses closer to residents, or both. Transportation is also needed for people to reach their places of work. Because top employment destinations for Community residents include Downtown Brooklyn and Lower Manhattan, it is important that Community residents can reach these destinations after storm events.

Coordination with the Business Community

There are numerous businesses in the Community (596 economic assets have

Figure 2.20: Retail Leakage to Adjacent Communities



243rd Street Retail Corridor, Rosedale

Springfield Gardens Industrial District

been identified), potentially complicating recovery and coordination. In order to make business outreach and recovery processes more manageable, there is a need for greater coordination and the information sharing business owners and employees. Informal communication networks between business owners and employees are also needed, especially when other communication networks are not functioning due to storm damage. The coordination of business owners who are able to help each other supports faster and more efficient recovery and resilience.

Support for Small Businesses

The majority of businesses in the Community are small, with four employees or less. The three zip codes covering the Community (11413, 11434, and 11422) contain 1,717 businesses. Of these, 1,007 (58.6%) have four employees or less, and 1,333 (77.6%) have nine employees or less.[41] Small business support is needed, as these businesses generally have fewer resources to deal with interruptions. Institutional support for small businesses is an economic need in the Community.

Economic Development Opportunities

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 agencies are providing financial assistance through the Hurricane Sandy Business Loan and Grant Program, which provides grants and loans to small businesses that suffered direct damage from the storm.[42] Additionally, NYC SBS is offering training sessions for those interested in applying for a grant or loan, and will hold office hours for those needing assistance.

Opportunities for Local Entrepreneurs

There is opportunity for local entrepreneurs to fill commercial gaps identified in the retail gap analysis. These entrepreneurs can take advantage of the chance to work with local economic development organizations, such as the Queens Economic Development Corporation (QEDC) and the Queens Chamber of Commerce. QEDC has a partnership with Accion International, a nonprofit organization that works with microfinance institutions to provide financial services, that provides loans to small businesses and start-ups. They also offer advice on credit, finances, and loan eligibility.

The Community can also identify vacant or underutilized parcels that could be used for infill or redevelopment based on the needs identified

PS 231, Queens

Queens Library, Rosedale Branch

in the retail gap analysis. An inventory of such parcels could help guide the local business community in identifying future opportunities. Parcels located outside of flood zones should be identified as places to locate essential services, such as grocery stores (should such businesses be needed).

To facilitate better collaboration and coordination, the Community can create a database of businesses in the area so people are aware of the local businesses, and so businesses are aware of each other, and can be reached during times of emergency and recovery.

Health and Social Services

For this Assessment of Needs and Opportunities, Health and Social Services assets and 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.

Health and Social Services Needs

Centralized Communications Strategy for the Elderly

The Community needs resources to provide comprehensive support for the elderly population, including education during normal conditions, notification and transportation during pre-storm conditions, and search crews after a disaster in case of phone and power outages. This comprehensive strategy to provide support for the elderly before and after disasters would include an inventory/database of homebound seniors, coordinated educational campaigns, emergency transportation planning for evacuations, and coordination with local first responders or CERT to carry out post-disaster searches.

Backup Power for Critical Facilities

Facilities within the Idlewild Watershed Communities experienced power outages from one week to four weeks in the aftermath of Superstorm Sandy. It is especially important that Health and Social Services assets are able to maintain continued operations during and after disasters, especially first responders and other critical facilities that provide recovery services, such as schools, healthcare facilities, and other social services organizations. These assets require reliable backup power supplies to maintain provision of recovery services

during widespread power outages. Backup power supplies 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.

Flood Protections for Assets that are at Risk of Flooding

Although none of the Health and Social Services assets in the Idlewild Watershed Communities received High or Extreme Risk Scores, many received Moderate Risk Scores, and three of these are located in or near the High Risk Zone on the Risk Assessment Maps. These three assets—Engine 314 of the New York City Fire Department (FDNY), P.S. 181 in Brookville, and P.S. 196 in Rosedale—all may be subject to future flooding due to tidal surge in the event of an extreme storm like Superstorm Sandy. To mitigate this risk, these assets require flood protections to limit potential damage, while Health and Social Services assets that are not at risk of future flooding should be viewed for their potential to provide resources to those who rely on assets that could flood during future storms.

Health and Social Services Opportunities

Expanding Existing Resources for the Elderly

There are three senior centers just outside of the Community that provide services to its residents, Laurelton/Rosedale Senior Center, Robert Couche Senior Center, and Rockaway Boulevard Senior Center. These facilities, identified below, are outside of the Risk Zones and therefore could provide services for those affected by future flooding. In addition, the Rochdale Village Senior Center provides supportive services for seniors who are residents of Rochdale Village and the surrounding areas, including residents of the Idlewild Watershed Communities. There is an opportunity to expand services at this location to provide education and resources on disaster safety.

Jamaica Service Program for Older Adults (JSPOA) has established a program to promote Naturally Occurring Retirement Communities (NORCs) and provide resources for seniors who are aging in place. NORCs are multi-generational communities that were not originally built for seniors but that have developed over time into areas that house a significant number of older adults.[43] The Senior Homeowner's Guide produced by JSPOA provides some helpful information on working with contractors to conduct home improvements. This publication presents an opportunity to provide educational resources to seniors on renovating their homes to increase resilience.

All of these existing resources for the elderly could be expanded to include more information, outreach, and support for older adults in the event of a disaster. The Rochdale Village NORC and newly established NORCs within the Primary Planning Area could work with JSPOA and 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. This registry would need to be updated and maintained on a regular basis by a social service organization located within the Community.

Backup Power for Critical Facilities

The need to provide backup power for critical facilities can be supported by several well-established social service organizations that are active in the Community. Existing facilities such as the Rosedale Library, VFW and American Legion locations, and public schools already provide the Community with social-services resources. Organizations such as these, which do not have a direct mission to provide recovery services—but that nonetheless serve a critical role during disasters—could provide even more reliable assistance if their facilities were augmented with backup power supplies to ensure continued operations during power outages. Generators that provide backup power for Health and Social Services assets would improve recovery work in the aftermath of extreme weather such as Superstorm Sandy or Hurricane Irene, and the benefits would also extend to other recovery services, providing charging stations during blackouts, cooling stations during the summer, and warming stations during the winter.

Housing

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

Housing Needs

Floodproofing Retrofits

Older housing units in the Community need floodproofing retrofits, and homeowner education is critical. More than 84% of Community homes were built prior to 1983, when flood-resistance standards were added to the New York City building code, which was originally implemented in 1968. In New York City, 84% of buildings within Superstorm Sandy's inundation area were built before 1983, but 98% of the buildings destroyed and 94% of the buildings suffering severe structural damage were built before 1983,[44] indicating that residences pre-dating flood-resistance standards are more vulnerable to damage.

Mold Remediation

Community residents voiced concerns about mold in homes as a result of flooding. A study commissioned after Sandy found that "flooded homes not dried out within 24 to 48 hours were at serious risk of developing mold infestations, threatening the health and safety of thousands of New Yorkers. More than two years after Superstorm Sandy hit, the acute need for mold remediation across New York City has not abated, and mold's disproportionate impact on low-income and immigrant communities has resulted in displacement, sickness, and continued crisis in Sandy-affected neighborhoods."[45] The Community needs to develop measures to remediate homes to address mold and identify safe removal strategies.

Floodproofing of Renter-Occupied Housing

Maintenance of affordable housing in the Community is another necessity. Based on data provided by the 2008-2012 American Community Survey and mapped by New York University's Furman Center in 2011, 34% to 40% of renter-occupied households in the Community spent more than 30% of their monthly income on rent[46] (including heat and electricity) and are thus considered "rent burdened," according to guidelines established by the U.S. Department of Housing and Urban Development (U.S. HUD). Measures need to be taken to ensure that housing that is currently affordable remains so. Resiliency retrofits will be costly, and there is danger that landlords will pass on the costs of retrofits to renters through higher rents. Rent-burdened households need to be shielded from such cost increases that may occur due to resiliency investments.

Flood Insurance Assistance

Flood insurance is another concern for Community members. Residents have reported being dropped from their flood insurance, even if they had no flood claims. A number of news outlets have reported insurance companies dropping customers after Sandy. Skyrocketing insurance costs have also been a concern due to recent legislative changes. In 2012, the

Home with Paved Yard on 148th Drive, Rosedale

Single-family Homes on 225th Street, Brookville

Homes Adjacent to Springfield Gardens Industrial Area

Federal government passed the Biggert-Waters Flood Insurance Reform Act, which aimed to ensure that flood insurance rates reflect flood risk, raising long-subsidized premiums over the course of four years. Congress voted in March 2014 to delay this price increase for three years, due to the high costs it would impose on homeowners. Insurance costs have risen post-storm, with one estimate suggesting that the average cost of flood insurance in New York City after Superstorm Sandy had risen about 20% for properties in high-risk areas.[47] And, after insurance premiums increase, properties generally see a matching decline in value, and substantial premium increases reduce disposable income, wealth, or both.[48] To the extent that property owners have to pay more for insurance, already rent-burdened households may struggle with higher rents and homeowners may struggle with higher insurance costs. There is a need for these households to be able to keep their insurance coverage at an affordable level.

Because the majority of housing units in the Community are owner-occupied, there is a need to mitigate financial risks to homeowners related to storm damage and insurance. Advice and help is also needed so that Community residents are able to find credible information on housing programs, flooding risk, and insurance issues so that they can assess their options and make appropriate decisions.

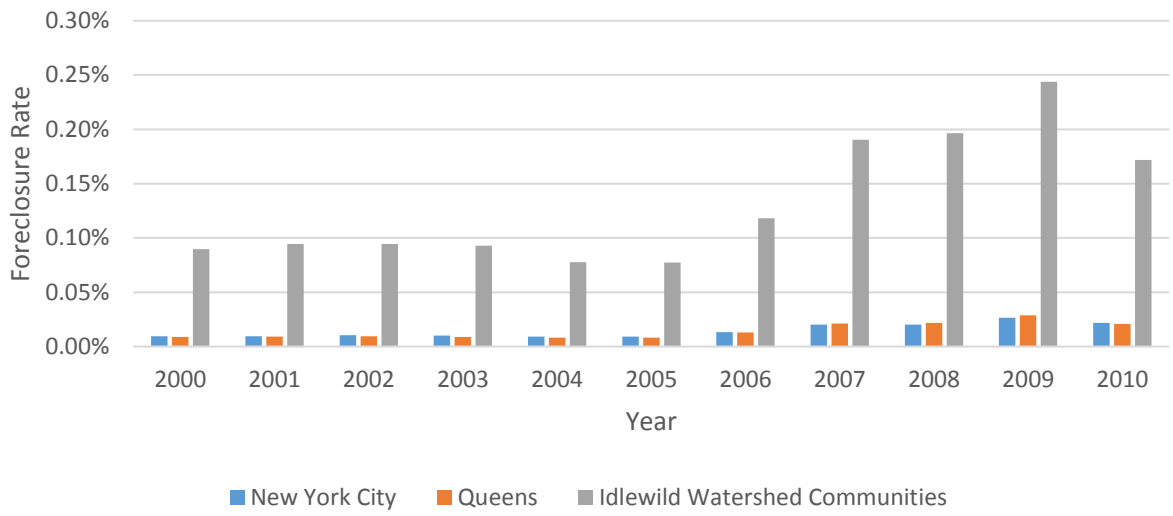
Loss of Street Trees

Another concern is that trees destroyed on residential streets during Superstorm Sandy have not been replaced.[49] Loss of street trees has a negative impact on both stormwater management and on property values. Multiple studies have shown that the presence of street trees can add to property values and sales prices for single family homes.[50] One report finds that "homes with trees are generally preferred to comparable homes without trees, with the trend across studies being a price increase of about 7%."[51,52] Street trees need to be replaced in front of residences throughout the Community to mitigate stormwater flooding and protect property values.

Storm Damage Compounding Foreclosures

Foreclosures are an issue in the Community that may be worsened by post-storm drops in housing value. According to data from the Furman Center, the rate of foreclosures within the Community is approximately ten times that of Queens and New York City (Figure 2.21).[53] Although the foreclosure crisis began during the recession of 2007-2009, storm damage and increasing flood insurance rates pose an added burden on families who are already struggling with housing costs. Credit counseling is needed for those households going through or at risk of going through foreclosure.

Figure 2.21: Notices of Foreclosure (Rate, 1-4 Family Buildings), May 2014



Source: Public Data Corporation, New York City Department of Finance, Furman Center

Housing Opportunities

A number of housing assistance programs exist to help homeowners with post-disaster repairs on top of FEMA funding,[54] and the Neighborhood Recovery Fund,[55] which provides grants or loans to homeowners who were affected by 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.[56] Also, the Individuals and Households Program (IHP), administered

by the U.S. Department of Homeland Security (DHS), provides funding and help for housing needs related to disasters.[57]

Building Retrofits
Community residents have expressed interest in floodproofing or elevating single-family houses in specific parts of the Community in areas where flood risks are particularly high. Existing programs that provide homeowner assistance for home elevation, storm damage repairs, or floodproofing assistance include New York City 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.

There are also opportunities through the mold remediation program, Neighborhood Revitalization NYC, operated by LISC. However, according to the report Sandy's Mold Legacy released in 2013, only 2,000 homes were helped by this program city-wide, with awareness of the program minimal.[58] There is an opportunity to increase awareness of Neighborhood Revitalization NYC so that homeowners who are facing still problems with mold can receive assistance.

Flood Insurance Assistance
A number of local organizations are providing advice and aid to households regarding their options and new regulations. Assistance is also being 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. Additionally, Community residents can obtain legal help relating to flood insurance through the City Bar Legal Hotline, or review Touro Law Clinics' Flood Victims FAQ.[59]

Street Tree Plantings
Community residents can reach out to the New York City Department of Parks and Recreation (NYC DPR) for free street trees. Tree planting can help with stormwater management and maintaining residential property values as well as enhancing community character.

Infrastructure

Superstorm Sandy caused significant damage and strain 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.

Infrastructure Needs

Needs for infrastructure systems involve the restoration, repair, and management

Francis Lewis Boulevard at South Conduit Avenue

of essential services, such as stormwater systems, transportation networks, and coastal defenses. While some infrastructure issues can be addressed within the NYRCR Plan for the Community, other projects will require additional study, significant regional coordination, and greater capital investment. The Committee identified several critical infrastructure issues within the Community including:

- Heavy rains and frequent flooding have caused damage to local streets, including ponding and sinkholes;
- Because no subways serve the Community, buses provide a critical transit link for residents and businesses in the area. Reliable bus routes provide an important connection for local residents, especially those who do not own cars or in the event that cars are damaged by severe flooding;
- Frequent power outages occur due to downed wires, as most power lines are above ground, and lack of a diversified power network;
- Several large capital projects are underway or planned by NYC DEP and the New York City Department of Transportation (NYC DOT). More information is needed on the impact new or upgraded storm sewers will have on frequent stormwater flooding and what gaps exist that potential NYRCR projects could fill; and
- The Rosedale Pumping Station is completely below grade, with the exception of some ventilation equipment housed in an onsite brick structure. Failure of the Rosedale Pumping Station would affect an area of approximately 990 acres with a population of 17,683. According to the NYC Wastewater Resiliency Plan, "the critical flood elevation would inundate the area surrounding the facility with over 4 feet of water. This would damage electrical controls and the non-submersible pump motors. The Rosedale Pumping Station receives flow from another pumping station. Therefore loss of function at Rosedale increases the vulnerability of an additional pumping station." The pumping station requires hardening measures to protect against future storm events, including elevating the electrical equipment and pump motors, and constructing a new building, at an estimated cost of $9,943,000.[60]

Vacant Lot on Bayview Avenue, Meadowmere

These needs address critical issues the Community faces and opportunities to enhance and improve the 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 parts of Queens and Nassau Counties.

Power Supply Network

After Superstorm Sandy, the Community experienced widespread power outages, ranging from one to four weeks. As a result, the Community faced a lack of heat, interrupted communications capabilities, hardship for local small businesses, and inadequate capacity to operate critical facilities. According to input from the Committee and feedback at Public Engagement Events, the main source of power outages during the storms was from downed trees that fell on power lines. The Community lacks a diversified network of power sources and relies mainly on overhead power lines for their source of power. With the exception of the Rochdale Village Power Plant, the Community

does not use natural gas or microgrids to supply alternate power during storm events.

Telecommunications Network

The Community has a network of civic associations that reach out to their respective constituents before and after storm events for coordination, organization, and to identify areas of need and assistance. These associations use grassroots techniques to stay connected within each of their respective neighborhoods. During Superstorm Sandy and Hurricane Irene, the associations did not have a reliable emergency communications network, complicating efforts to coordinate. They lack the equipment needed to connect with each other and to other emergency coordination efforts. Due to power outages and lack of available Wi-Fi access in public areas, gathering information via the Internet was either unreliable or not possible. Currently, there is one public Wi-Fi hotspot at the Queens Public Library in Rosedale, covering an area that does not adequately serve the entire Community and its residents.

Stormwater and Sewer Network

The configuration of the Community's drainage system provides additional clarity regarding potential sources of recurring flooding issues. The western portion of the Community is within the Grassy Bay-Jamaica Bay watershed, while the eastern portion is within the Hook Creek/ Head of Bay watershed. The total drainage area for the Jamaica Bay watershed is 50,708 acres, with a combined sewer contributory area of 6,600 acres, approximately 5,478 acres of which are impervious.[61]

According to the 2011 NYC DEP Waterbody/ Watershed Facility Plan for the Jamaica Bay and CSO Tributaries, the majority of the Community's collection system is served by separate sewers, with a very small portion in the northeast area served by combined sewers (along Merrick Boulevard near the Belt Parkway and Francis Lewis Boulevard) and direct drainage in the southeast area (along Hungry Harbor Road). The entire Community is served by Jamaica Wastewater Treatment Plant (WWTP). Adjacent areas of Brooklyn and Queens are served by the Spring Creek Auxiliary Water Pollution Control Plant (AWPCP) and the 26th Ward Water Pollution Control Plant (WPCP). The Spring Creek AWPCP also receives stormwater overflow from the Jamaica WWTP.

As of 2011, approximately 70% of Jamaica WWTP was served by separate sewers, 21% by combined sewers, and 9% by direct runoff into Jamaica Bay. Portions of the sanitary sewer system flow into the combined system, and other portions of the sanitary system act as combined sewers because stormwater systems have not been constructed. The Jamaica WWTP service area has two pumping stations located in Howard Beach and Rosedale. The Rosedale Pumping Station serves a separate sewer area and is located on 147th Avenue at Brookville Boulevard.[62]

Stormwater and sewer systems throughout the Community were compromised during Superstorm Sandy, causing flooding in low-lying areas and sewer backups into basements. These systems also experience frequent flooding and sewer backups during rainstorms and high tides. An effort by NYC DEP is underway to expand the stormwater, water supply, and sewer networks by installing new drainage pipes and mains in coordination with natural solutions such as the Bluebelt project in Springfield Park. These projects will address frequent flooding throughout the Community and improve water quality in Springfield Park Pond. The project includes stormwater pipe installation and street reconstruction. A number of significant Bluebelt components include:

- Three large constructed wetlands, each situated at storm sewer outfalls.
- Installation of 2,000 square feet of porous concrete in the Springfield Boulevard median, undergirded with structural soil to encourage the growth of new trees planted in the median.

Construction on the new Springfield Gardens Bluebelt began in the fall of 2012 and is ongoing. Despite the continuing work on stormwater and sewer upgrades, stormwater systems throughout the Community require additional hydrologic and hydraulic studies to determine the specific nature and extent of the sources of sewer backups and stormwater flooding within the low-lying areas. Additional study would determine where the low-lying flooding is still occurring, how the water is entering these areas (overland flow, groundwater, etc.), where and what networks need to be expanded to increase system capacity, and how the Community can use the existing wetlands and ponds within the parks for stormwater retention. Maintenance of not just the roadway catch basins but also residential trap/sump pump systems need to be adequately maintained for proper function. The

high groundwater table within the Community also affects stormwater runoff and capture.

Coastal Defenses
Superstorm Sandy coincided with a high tide, exacerbating flooding in southern Queens. Flood levels averaged three to six feet throughout the Community. In some areas, where floodwaters reached a height of 10 feet, homes and businesses were inundated with more than five feet of floodwater. Backwater inundation, or flooding from creeks and inlets, also flooded the Community from Hook Creek and overtopping of Idlewild Marsh and Thurston Basin. Even though the wetlands in Idlewild Park Preserve provide some natural protections to elevated tides, the Community lacks hardened protection, berms, and tide gates for events over the 10-year storm. Construction has also occurred within the adjacent wetland areas and has decreased natural defenses that were served by the marshes. In addition, understanding how the tide gates within JFK operate and affect the Community would help residents and businesses properly plan for future storm events.

Transportation Infrastructure
Rockaway Boulevard and Belt Parkway are the only major roadways within the Community that provide an east-west link to Nassau County and Brooklyn, while 147th Avenue is the only major east-west connection within the Community. These roads are often congested and lack sufficient connections to the neighborhoods. The Belt Parkway links the Community to Brooklyn, Manhattan, and Long Island. Since Superstorm Sandy, many of the roadways have fallen into disrepair due to lack of maintenance, frequent flooding, and a high groundwater table that causes sinkholes. Local flooding of roadways like Brookville Boulevard decreases the routes that are used for both evacuations and daily travel. The bridge on 147th Avenue just south of Brookville Park is prone to flooding during frequent rain events as well as heavy rains. Because 147th Avenue is one of the only east-west routes traversing the Community, the vulnerability of this bridge has an outsized effect on circulation and access in the Community.

The Idlewild Watershed Communities lack diverse public transit facilities and therefore many residents and workers rely largely on private vehicles for transport. During storm events, there is no designated high ground for residents to store their cars or transportation to get them to and from safe locations to protect vehicles from storm damage. Increased bus service would provide better connectivity and access to the subways and the LIRR stations at Rosedale, Laurelton, and Locust Manor. These LIRR stations did not flood during Superstorm Sandy, however, the parking lot adjacent to the Rosedale station experiences recurring flooding. Parking lots at the Laurelton and Locust Manor stations could be used as vehicle storage during future storm surge events.

Infrastructure Opportunities

Power Supply Network
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. More frequent tree pruning along power lines would reduce the outages experienced from fallen trees. In the event of an electrical power failure, backup power supplies from natural gas sources or renewable energy sources and microgrid facilities would be able to provide power to any critical assets identified by the Community.

Telecommunications Network
The telecommunications network in the Community requires upgrades to become more resilient in the face of future extreme weather. Since the Community has a very well-organized network of civic associations and community groups, a centralized location with emergency communication capabilities would allow for these resources to be readily accessible to Community residents. This would allow them to have better communications with each other, as well as with New York City, State, and Federal emergency management officials. One potential opportunity would be to expand upon the New York City franchise agreement with Time Warner Cable to maintain Wi-Fi services in parks and public spaces. Increasing public Wi-Fi access and providing solar charging stations would allow for telecommunication services within the Community in the event of a power outage.

Stormwater and Sewer Networks
NYC DEP has ongoing and planned drainage studies and capital projects to improve the stormwater and sewer systems throughout the Community. These efforts are in response to an extensive history of stormwater flooding in the Community, but could also help to mitigate the impacts of extreme weather such as Superstorm Sandy and Hurricane Irene by helping to prevent flooding in low-lying areas

Springfield Gardens Bluebelt Construction

and sewer backups in basements. The Idlewild Watershed Communities NYRCR Plan presents an opportunity to supplement the $175 million in ongoing upgrades of stormwater and sewer infrastructure underway by the NYC DEP, including the Springfield Gardens Bluebelt project. The current fourth phase of NYC DEP's build-out of stormwater and sewer infrastructure in Southeast Queens will install 84 new catch basins, 2.8 miles of new sewer lines, and three miles of water mains with associated street and sidewalk improvements. Expanding upon these capital projects would provide further protection against stormwater flooding and sewer backups. Installing check valves on pipes that flow into ponds and tidal water would reduce and slow the tidal water entering the system, allowing for more storage within the system. Increasing the frequency of routine maintenance of catch basins would ensure proper function and capacity. Implementing green infrastructure projects upstream in both watersheds would allow for more capture of water before it enters the system. Incorporating a residential trap clean-out program to ensure that these systems are operating efficiently could also serve to alleviate stress on the stormwater and sewer systems.

Coastal Defenses

Opportunities also exist to improve coastal protection measures that would help to reduce erosion and protect the Community from extreme tidal flooding. The Community has an extensive waterfront, including wetlands and areas with and without bulkheads. The Community could benefit from a strategy that incentivizes replacement and restoration of these erosion protection measures that would include raising existing bulkheads to ensure protection from a certain storm event, and increasing wetland acreage to improve ecosystem functions and enhance tidal flood protection. Increasing natural protection within the Community's existing natural coastal defenses in the Idlewild Park Preserve would increase their flood protection and resiliency.

Transportation Infrastructure

Opportunities also exist to improve the transportation network that would help to ease traffic congestion within the Community, provide for better-served evacuation routes, and in conjunction with roadway improvements could protect the Community from extreme tidal flooding. To maintain the roadways, construction of proper drainage and curb heights would alleviate overland flow onto properties. Increasing the functionality of the east-west transportation corridor would provide better and easier access for residents to stores and evacuation routes as well as increasing public transportation options by improving access to the LIRR or increased bus service.

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, which has significantly degraded these natural assets. Though the local topography and environment have been substantially altered, many natural assets still exist. These remaining resources often serve a protective function in the event of heavy rains and storm surge.

Natural and Cultural Resource Needs

The Community lacks contiguous natural tidal barriers within the existing systems of wetlands, parks, and natural spaces. The lack of tidal barriers creates a need to address unimproved shoreline conditions at the entrance of Head of Bay and in the neighborhoods adjacent to Hook Creek and the Idlewild Park Preserve. In particular, waterfront areas within the Community need improved bulkheads and increased development of natural shorelines.

These needs address critical issues this Community faces, and opportunities to enhance and improve the natural and cultural resource assets would directly address those issues by strengthening the watershed's capacity to hold water, creating more parks and open spaces and enhancing existing ones, improving the overall environmental quality in the Community, and increasing access to cultural resources. Natural and Cultural Resource needs have a broad impact on the Community and the surrounding areas in Queens and Nassau County.

Watersheds and Waterbodies

Through increased development over the last century, the Hook Creek and Idlewild watersheds are now considered urbanized and largely impervious. Some of Hook Creek has been channelized with bulkheading and rip rap. Sedimentation has increased within the creek due to urbanization and lack of flushing to move the sediment. Increased development along the Idlewild Park Preserve reduces the natural barrier system, flood protection, and ecosystem services the wetland provides.

Overall water quality in Hook Creek, Head of Bay, and the wetlands of Idlewild Park Preserve are negatively impacted by stormwater runoff and illegal dumping. Waterbodies in the Community require greater protections for water quality, natural processes, and flood mitigation. The needs identified by the Community are to return Hook Creek and the tidal wetlands in Idlewild Park Preserve into functioning water bodies that provide habitat and potential recreational opportunities.

Parks and Open Space

The Community prides itself on its open space system, with a network of natural features and active recreation areas. Idlewild Park Preserve is a major natural resource in the area, serving as tidal wetlands for ecosystem services and flood mitigation. Springfield Park and Brookville Park are the two main parks in the area with active recreational resources. To continue to act as an asset within the Community, the existing parks and open spaces need regular maintenance to enhance their function and to better provide co-benefits such as stormwater management and flood mitigation. Expansion of the Community's open spaces would add to the park system as well as capturing stormwater The Idlewild Park Preserve is already used for educational programming but, these programs could be expanded to provide additional education on the benefits that the wetlands provide for the Community. Education and creation of parks, open spaces, and green spaces were identified as opportunities to enhance and maintain existing parks and open space within the Community.

Environmental Quality

With the Community's close proximity to JFK Airport and the concentration of industrial uses supporting the airport, the Community is subject to impacts such as air pollution, noise, and other effects on public health. Existing monitoring locations for pollutants in Maspeth and Flushing are at a considerable distance from JFK Airport[63] and do not provide accurate data for the Community. Airport expansion is a concern within the Community in terms of the effects it will have on the environment and quality of life, such as the tree removal.

Natural and Cultural Resource Opportunities

Watersheds and Water Bodies

Existing parks and the Bluebelt system currently under construction provide a robust framework for improving the health of water bodies in the Idlewild Watershed Communities. The Community's ability to withstand severe storms can be increased by restoring natural resources, such as parks, wetlands, and marshes to increase their capacity in absorbing

flooding and rainwater. 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. They feed downstream waters, trap floodwaters, recharge groundwater supplies, remove pollution, and provide fish and wildlife habitat. Wetlands are also economic drivers because of their key role in fishing and recreation.

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. Bluebelt projects preserve natural drainage corridors, including streams, ponds, and other wetland areas. Preservation of these wetland systems allows them to perform their functions of conveying, storing, and filtering stormwater. In addition, Bluebelts provide important community open spaces and diverse wildlife habitats. The Bluebelt program saves tens of millions of dollars in infrastructure costs when compared with providing conventional storm sewers for the same land area. This program demonstrates how wetland preservation can be economically prudent and environmentally responsible. Coastal protection measures can also be implemented in addition to or in conjunction with wetland restoration.

Springfield Gardens Bluebelt near 145th Road

Parks and Open Space

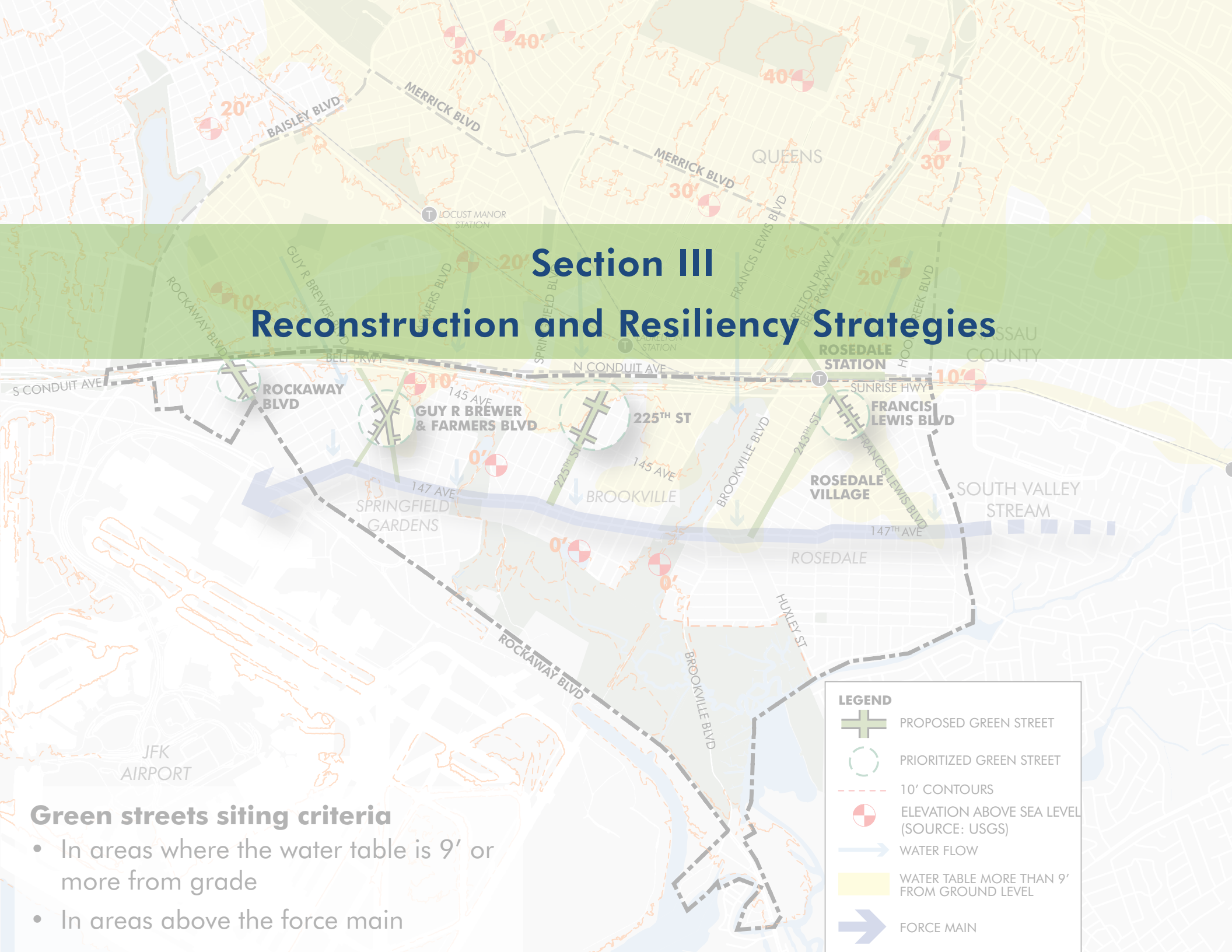
The potential to build upon existing resources, such as existing parks and the Springfield Park Bluebelt present an opportunity to create a contiguous park system within the Community that will help mitigate the effects of stormwater, provide flood mitigation, and generally promote a greener streetscape. Green infrastructure such as right-of-way bioswales and tree pits would add to the overall initiative of a greener streetscape and provide for stormwater mitigation upstream of and within the Community. Participating in the Million Trees NYC initiative by NYC DPR would also provide for a greener streetscape. Better maintenance of existing parks would allow for more stormwater storage during heavy rain events. Improvements to the Idlewild Park Preserve Environmental Science Learning Center, which are currently underway, provide a basis for broader education about the benefits that wetlands provide for the Community.

Environmental Quality

Environmental quality measures, such as noise mitigation, street cleaning, and addressing existing mold issues can be improved. Remediating mold issues in previously flooded homes and businesses would provide for better health and quality of life. Using construction applications such as triple pane windows may reduce the noise heard by residents from airplanes at JFK Airport. Reducing truck traffic on local roads would decrease the noise from these vehicles, provide for safer streets, and reduce overall air pollution from vehicle exhaust. Providing an ecological buffer between the industrial areas and residential neighborhoods would also reduce the air and noise impacts in these adjacent communities. Greater enforcement of illegal dumping throughout the Community would help prevent garbage from entering Idlewild Park Preserve and other parks and clean up local neighborhoods.

Section III

Reconstruction and Resiliency Strategies



Green streets siting criteria

- In areas where the water table is 9′ or more from grade
- In areas above the force main

SECTION III. RECONSTRUCTION STRATEGIES

Based on input from the Planning Committee, feedback from Public Engagement Events, and initial research, the following Reconstruction Strategies represent a framework that guided development and evaluation of the Proposed and Featured Projects described in Section IV.

The key strategies that guided the NYRCR Plan for the Idlewild Watershed Communities are:

- Strategy A: Alleviate Localized Flooding Conditions;
- Strategy B: Strengthen the Emergency Response Capacity of the Community;
- Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources; and
- Strategy D: Provide Safe and Reliable Access to Critical Goods and Services.

The role that these strategies played in the development of this NYRCR Plan, the benefits that they will provide to the Community, and the projects that the Committee has identified to achieve these strategies are described in more detail in Section IV. The list of Proposed and Featured Projects described in Section IV represents a compilation to increase the resilience of the Idlewild Watershed Communities. Based on the framework provided by these four strategies, projects evolved that addressed the needs of and risk to Community assets. Proposed Projects and Featured Projects have been assessed for their ability to mitigate future risk, were vetted by the Planning Committee and the public, and were categorized by their capacity to address needs within one or more of the Reconstruction Strategies.

Proposed Projects are projects proposed for funding through the Community's allotment of Community Development Block Grant-Disaster Recovery (CDBG-DR) funding. Featured Projects are projects and actions that the Committee has identified as important for the Community's resilience and has analyzed in depth, but has not proposed for funding through the NYRCR Program. Proposed and Featured projects are discussed in detail in Section IV.

Strategy A: Alleviate Localized Flooding Conditions

Develop a comprehensive approach to address localized flooding in the Community that accomplishes the following goals:

- Leverages ongoing and planned stormwater infrastructure projects conducted by the New York City Department of Environmental Protection (NYC DEP), New York City Department of Design and Construction (NYC DDC), and the New York City Economic Development Corporation (NYC EDC), including the Springfield Park Bluebelt;
- Takes into account projected benefits of ongoing and planned projects to maximize flood protection without duplicating those efforts; and
- Identifies additional projects that will increase stormwater retention capacity of parks and wetlands, address coastal flooding, and expand the green infrastructure network throughout the Community.

Although NYC DEP, DDC, and EDC all have projects underway to relieve stormwater flooding in the Idlewild Watershed Communities and other parts of Southeast Queens, the need remains to build upon these ongoing efforts to increase the stormwater retention capacity within the Community's parks and wetlands. The objective of Strategy A is not to duplicate these efforts, but to leverage the Springfield Park Bluebelt and other stormwater infrastructure projects to: 1) provide comprehensive protection against stormwater flooding through identifying gaps that the ongoing projects do not address; 2) work with City agencies to build upon the impact of existing projects; and 3) identify strategies to increase the stormwater capacity of natural resources and green infrastructure.

Strategy A represents an effort by the Committee to coordinate closely with NYC DEP on the implementation of Phase IV of the agency's stormwater infrastructure upgrades in Southeast Queens. Phase IV includes the Springfield Park Bluebelt as well as installation and upgrades to the stormwater sewer network. However, the Committee recognizes the need to identify complimentary projects in targeted locations that will not benefit from these improvements.

The Committee also views Strategy A as an opportunity to increase the stormwater retention capacity of the Community's valuable network of parks and wetlands. Construction of the Bluebelt is an example of this type of project that is already underway, however the Committee also looked to identify similar types of projects in Brookville Park and strategies to increase the functionality of the Idlewild Park Preserve as a means to detain stormwater.

Finally, Strategy A includes opportunities to expand the green infrastructure network throughout the Community and in adjacent upland areas. The existing network of green streets in Laurelton is an example of this type of project in action. The Committee recognized that large scale stormwater infrastructure—both green and grey—cannot solve the entire problem of stormwater flooding. Small-scale interventions such as green streets and bioswales, conceived as part of a larger, more comprehensive network that includes existing city capital projects will help to reduce the impact of stormwater runoff throughout the Community. While the Committee identified green infrastructure projects within the Idlewild Watershed Communities, they also recognize that stormwater flooding does not only result from localized conditions. Solutions to this problem in the Community also depend upon and expansion of the green infrastructure network in upland communities as well.

Table 3.1: Strategy A: Alleviate Localized Flooding Conditions

Project #	Project Name	Short Description	Estimated Cost	Project Category	Regional Project (Y/N)
A1	Green Infrastructure Community Master Plan (with pilot projects)	Provide funding for locally-specific Green Infrastructure Master Plan as a component of NYC DEP's larger southeast Queens green infrastructure study. In particular, the plan should emphasize interagency coordination, evaluate the potential for stormwater capture on both public and private properties, and identify critical gaps in stormwater management that are not addressed by ongoing and planned infrastructure projects in the area.	$750,000	Proposed	Y
A1a	Brookville Park Pond Restoration	Dredge Brookville Park Pond to increase stormwater storage capacity. Conduct riparian restoration in a 4' wide planting area around the perimeter of the pond.	$1,600,000	Proposed	N
A1b	Community Gateway Green Streets	Construct right-of-way (ROW) bioswales at key community gateways to increase stormwater retention and treatment, while improving the streetscape, fostering a sense of place, and supporting local business growth. Project would include construction of bioswales, rain gardens, planting of new street trees, and stormwater tree pits on Francis Lewis Boulevard between 248th Street and Brookville Boulevard, 225th Street between South Conduit Boulevard and 145th Road, and the crossroads of Farmers Boulevard and Guy Brewer Boulevard.	$2,900,000	Proposed	N
A1c	Green Infrastructure Pilot Project (School Green Roof and Raingarden)	Construct a green infrastructure pilot project at a public building, such as school or library. This pilot project would include a green roof, rain garden, and porous pavement, serving as a demonstration of various green infrastructure best management practices. Educational signage and associated educational curricula would illustrate the benefits of green infrastructure.This project could potentially receive partial funding through NYC DEP's NYC Green Infrastructure grant program.	$1,250,000	Proposed	N
A1d	Twin Pond Park Bluebelt Enhancement	As a complement to construction of outfalls by NYC DEP, conduct riparian restoration to beautify the park and construct bike path to connect Twin Ponds Park to Brookville Park.	$850,000	Featured	N
A2	DEP Oyster Restoration in Thurston Basin	Support the proposed NYC DEP Oyster Restoration project in Thurston Basin. Oyster restoration could improve water quality, help reduce wetland fringe erosion, and stabilize the banks of Thurston Basin.	$250,000	Featured	N

Table 3.1: Strategy A: Alleviate Localized Flooding Conditions

Project #	Project Name	Short Description	Estimated Cost	Project Category	Regional Project (Y/N)
A3	Coastal Management Plan	Study the impacts of coastal defenses to protect the Community from tidal flooding at a regional scale. Recommended projects could include constructing a berm along the Idlewild Park Preserve border to block storm surge, constructing tide gates at Hook Creek, and installation of green infrastructure upland to reduce flow of stormwater into areas with low elevation.	$465,000	Featured	Y
A1e	Advocate for Construction of Thurston Basin Park	Advocate for NYC DPR to construct the funded park project at the southern end of Thurston Basin. Project is to include wetland restoration along Thurston Basin and construction of comfort stations near the kayak launch.		Add'l Res Rec	
A1f	City Purchase of Privately Owned Parcels on Edges of Idlewild Park Preserve for Restoration/ Preservation as Wetlands	Use City funds to acquire 64 vacant privately owned parcels within and directly adjacent to Idlewild Park Preserve. Restore wetlands within the acquired properties, as needed.		Add'l Res Rec	
A4	Idlewild Park Preserve Culvert Expansion	Reconstruct culvert in Idlewild Park Preserve to install a larger opening. Improved tidal flow would help to restore areas by supporting natural vegetation and wetland functions.		Add'l Res Rec	

Strategy B: Strengthen the Emergency Response Capacity of the Community.

Expand the ability of existing Community Based Organizations (CBOs) to assist in disaster preparation, response, and recovery by:

- Providing resources to local groups to increase education and training to prepare residents for future disasters;
- Ensuring that critical community facilities have the resources they need to help vulnerable populations recover from major storms;
- Increasing the capacity of CBOs to expand their services to include disaster preparedness and response; and
- Increasing coordination between local groups and the New York City Office of Emergency Management (NYC OEM) to increase the reach of existing educational materials, training programs, and recovery assistance.

The objective of Strategy B is to provide resources for existing, established organizations within the Community to provide expanded and improved services in the event of future severe weather and other disasters. In some cases, these projects are directed towards improving existing organizations that were established to provide disaster recovery services, such as the local Community Emergency Response Team (CERT). However, other projects in Strategy B are meant to help organizations with a mission outside the scope of disaster preparedness and recovery expand their services to better address the needs of the Community pre- and post-disaster.

NYC OEM Educational Materials *Source: NYC OEM*

Backup Generator at School *Source: www.cquest.us*

Strategy B builds upon the established network of CBOs, civic associations, the CERT program, and Naturally Occurring Retirement Communities (NORCs) to provide resources to a broad network of residents within the Community. The objective of projects within this strategy is to expand the critical role that these organizations play before and after disasters by expanding educational outreach, providing training to local residents and businesses, and identifying locations within the Community for improved post-disaster recovery.

By utilizing the physical and social infrastructure of existing organizations, Strategy B capitalizes on some of the Community's greatest resources, including existing Health and Social Services assets and CBOs with established outreach strategies and membership.

Table 3.2: Strategy B: Strengthen the Emergency Response Capacity of the Community

Project #	Project Name	Short Description	Estimated Cost	Project Category	Regional Project (Y/N)
B1a	Southeast Queens Disaster Preparedness and Recovery Plan	*Phase I* Establish Idlewild Watershed COAD. Develop Southeast Queens Disaster Preparedness and Recovery Plan. Identify assets and vulnerabilities of local not-for-profit organizations. Identify potential locations for Resource and Recovery Centers. Establish communication between CBOs and NYC OEM. Training and education for CERT, COAD and residents.	$230,000	Proposed	Y
B1b	Implement Recommendations of the Southeast Queens Disaster Recovery Plan	*Phase II* Implement selected Recommendations of the Disaster Response and Preparedness Plan.	$500,000	Proposed	Y

Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources.

Lay out a plan that provides the Community with the resources it needs to promote, support, and enforce stewardship of the environment to foster sustainability and assure that natural and manmade resources can provide protections from flooding, using the following principles:

- Maintain and improve the ecosystems of the Community parks and wetlands;
- Support increased enforcement of illegal dumping and other threats to the health of parks, open space, and wetlands; and
- Expand educational campaigns about environmental stewardship.

With Strategy C, the Committee acknowledges that the Community is served by an enviable network of Natural Resource assets. However, the assets that make up this network require management, maintenance, and restoration in order to adequately provide stormwater protection, pollution mitigation, and recreation.

The objective of Strategy C is to identify ways that the Community can improve the function of its natural resources. The focus of this strategy is to provide for better maintenance and to improve the ecosystem of the Community's parks and wetlands. This strategy requires that the Committee identify specific capital projects to mitigate and restore natural resources, detail ongoing methods to fund maintenance in the future, and develop advocacy positions to support increased enforcement of illegal dumping and other threats to the health of parks, open space, and wetlands. In addition, the Committee viewed expanded educational campaigns about environmental stewardship as an important way to ensure that residents and businesses can play an active role in maintaining the health of the Community's natural resources in the future.

Springfield Park Pond

Idlewild Park Kayak Launch at Huxley Street

Table 3.3: Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources

Project #	Project Name	Brief Description	Estimated Cost	Project Category	Regional Project (Y/N)
C1	Phase 1: Green Infrastructure Workforce Training Program	Develop and implement workforce training and volunteer development programs to provide skilled training in green infrastructure installation and maintenance to Community residents while also encouraging environmental stewardship of the Community's natural and manmade stormwater management facilities.	$200,000	Proposed	N
C1	Phase 2: Idlewild Watershed Communities Open Space Restoration Fund	Establish a fund to provide ongoing maintenance of the Community's parks, wetlands, Bluebelts, and bioswales to ensure that they can adequately function as resources for stormwater flooding mitigation. Identify additional funding sources and secure City resources to conduct improvements and maintenance.	$350,000	Featured	N
C2	Home and Business Owner Education and Technical Assistance Program	Provide education and technical assistance to the Community's home and business owners on how to minimize flood damage, prevent sewer backflows, and the flood mitigation benefits of permeable surfaces. Establish a storefront resource center in the Community to provide educational materials. Provide technical assistance in the form of counseling and on-site building audits performed by case managers.	$250,000	Featured	Y
C3	Advocate for Idlewild Park Preserve Trail Network and Overlook Restoration	Advocate for improved connectivity of the overlook constructed by NYC DEP and NYC DPR to the network of trails in Idlewild Park Preserve.		Add'l Res Rec	
C4	Advocate for Municipal Agency Coordination to Prioritize Resilience	Advocate for all City agencies to view resilience to extreme weather and the impacts of climate change as top priorities when planning future program development and capital project planning.		Add'l Res Rec	
C5	Support for Creation of Greater JFK IBID	Advocate for the creation of the Proposed Greater JFK Industrial Improvement District. Advocate that the JFK IBID evaluate strategies to address recurring stormwater flooding within District boundaries and contribute to increased enforcement of illegal dumping.		Add'l Res Rec	

Strategy D: Provide Safe and Reliable Access to Critical Goods and Services.

Provide for reliable transportation, communication, and backup power networks to ensure that the Community is not isolated from critical goods and services after disasters by:

- Supporting retail/commercial districts so that businesses can quickly recover from disasters and residents have access to essential goods after storms;
- Strengthening the area's transportation infrastructure, power grid, and communications networks to improve their ability to operate during and recover more quickly after a disaster; and
- Reinforcing key connections to critical support services and regional shopping districts outside of the Community.

The Committee developed Strategy D to recognize the importance of maintaining access within a Community that is relatively isolated from mass transit, has few arterial roadways and significant traffic congestion, and depends in large part on outside areas for retail and commercial services. The need for access includes methods to ensure mobility within and outside of the Community as well as the health of retail corridors within the Community.

The objective of Strategy D is to improve the Community's access to critical goods and services after extreme weather by bolstering the area's transportation infrastructure, power grid, local retail corridors, and strengthening key connections to critical support services and regional shopping districts.

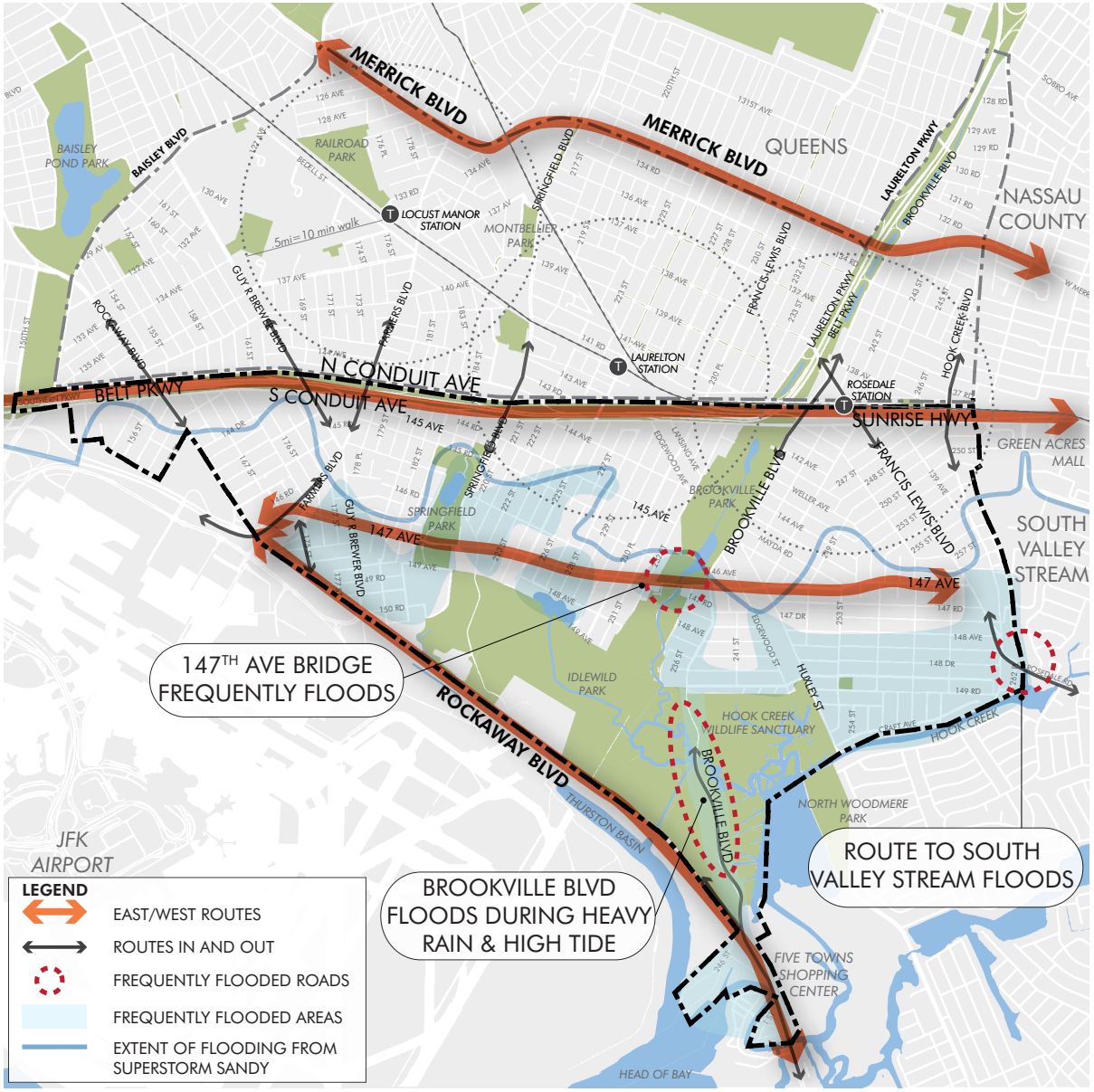


Table 3.4: Strategy D: Provide Safe and Reliable Access to Critical Goods and Services

Project #	Project Name	Brief Description	Estimated Cost	Project Category	Regional Project (Y/N)
D1	Install Backup Power Supply Systems at Critical Facilities	Install generators and/or solar power at critical facilities to provide a more reliable power source during and after major storm events. Critical facilities could include Schools, Senior Centers, Medical facilities, Resource and Recovery Centers, or Rosedale Pumping Station.	$500,000	Proposed	N
D2	Study to Elevate Brookville Boulevard (Snake Road) between 149th Boulevard and Rockaway Boulevard	Study the feasibility of elevating the entire length of Brookville Blvd (Snake Road) through the Idlewild Park Preserve on a trestle to prevent flooding of the roadway and encourage the passage of intertidal waters through the surrounding wetlands.	$450,000	Featured	Y
D3	Elevate 147th Avenue Bridge at Brookville Park	Advocate for NYC DOT to elevate the 147th Avenue Bridge between 232nd St and 235th St. Elevation of the bridge would reduce the occurrences of flooding, allowing safer access to the bridge.		Add'l Res Rec	
D4	Support Rockaway Turnpike/Nassau Expressway Resilient Corridor Study (NYRCR Plan for the Five Towns)	Advocate for the Rockaway Turnpike/Nassau Expressway Resilient Corridor Study from the NYRCR Five Towns Plan, with an expanded scope that addresses potential impacts and benefits for the Idlewild Watershed Communities.		Add'l Res Rec	
D5	Support for Existing or New Retail/Commercial	Advocate for NYC SBS to establish an information clearinghouse to provide information on flood insurance requirements and resiliency measures.		Add'l Res Rec	

Section IV

Implementation—Project Profiles

SECTION IV. PROJECT PROFILES

Governor Cuomo has allotted up to $6 million to fund eligible recovery and resiliency projects proposed by the NY Rising Community Reconstruction (NYRCR) Idlewild Watershed Communities Planning Committee (Committee). 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 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 projects and actions set forth in the NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in the NYRCR Plan does not indicate the Community's prioritization of these projects and actions.

- ***Proposed Projects*** are projects proposed 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*** are projects and actions that the Committee would like to advocate for, but are not categorized as Proposed Projects or Featured Projects.

NYRCR Project Profiles

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

- ***Project Title:*** Title of the project and accompanying project rendering, site plan or other graphics that illustrates the project or site (if applicable);
- ***Project Description:*** A brief summary of the project including tasks, components, or phases;
- ***Cost Estimate:*** Estimated cost of implementing the project, not including operating and maintenance costs;
- ***Benefits and Co-Benefits:*** A qualitative description of the direct benefits and co-benefits of the project, whether those benefits are local or regional in scale, and the population benefitting from the project. Benefits and co-benefits may include risk-reduction, sustainability, economic development, environmental quality, public health, social benefits, providing access to essential services during disaster events, and others;
- ***Cost-Benefit Analysis:*** A qualitative comparison of the costs associated with the project, including both capital and life-cycle costs, and the benefits of the project, including job creation and avoided costs;
- ***Risk Reduction:*** The anticipated reduction of risk associated with the project;
- ***Timeframe for Implementation:*** The general timeframe for completing implementation: Immediate (can be completed in two years or less), intermediate (two to five years), or long-range (more than five years);
- ***Regulatory Requirements:*** Consideration of the local, state and federal government regulatory requirements related to the project, if applicable; and
- ***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 to develop estimated costs for each Proposed and Featured project. All costs are preliminary and based on available data as well as an 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.

Maximizing the Benefits

All Proposed and Featured projects underwent a qualitative analysis of the anticipated costs and benefits. The purpose of the cost-benefit analysis is to assist the Committee in defining the scope of these projects and to identify

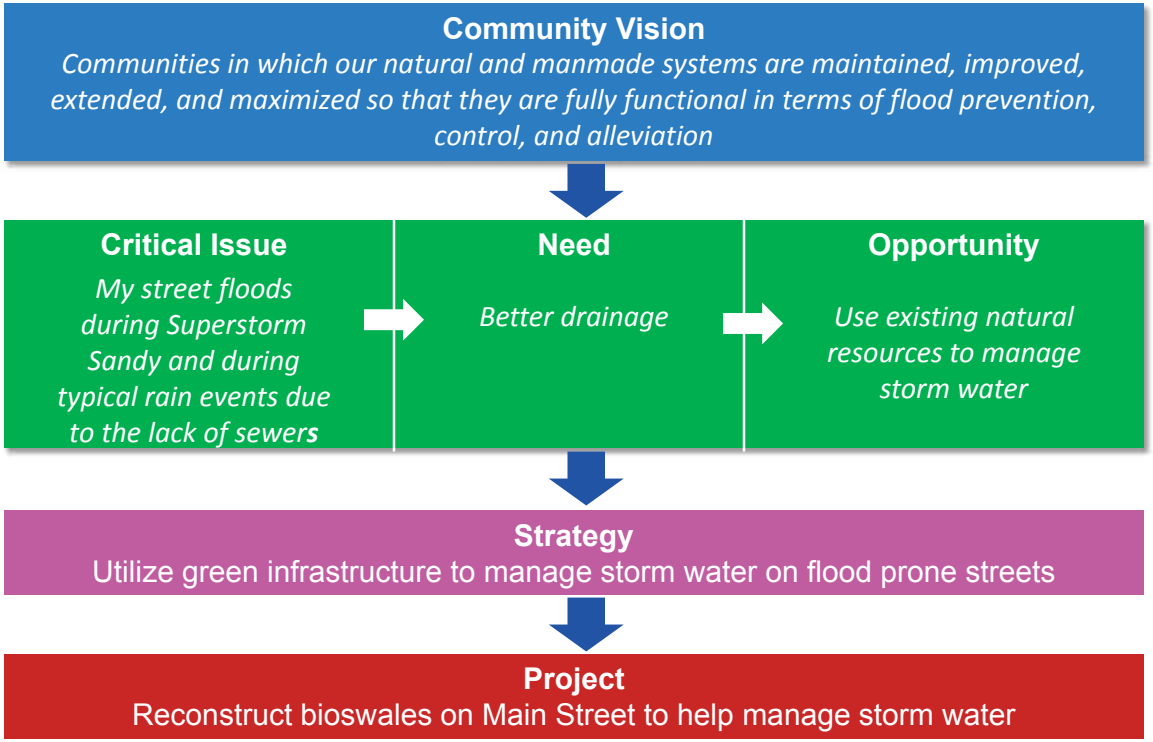
actions for implementation. The Committee utilized this cost benefit analysis to develop a proposed implementation schedule that identifies a comprehensive set of projects that are best able to achieve the greatest benefits at the lowest cost.

The following types of benefits were reviewed for the cost-benefit analysis:

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

Figure 4.1: NYRCR Planing Process—The Road to Projects



Strategy A: Alleviate Localized Flooding Conditions

A1: Green Infrastructure Community Master Plan (with pilot projects) [Proposed Project]

Project Description

This project would create a master plan, in coordination with the forthcoming New York City Department of Environmental Protection (NYC DEP) drainage improvement plan for Southeast Queens, which would outline the strategic implementation of green infrastructure projects on public and private property throughout the Community. The objective of conducting the Green Infrastructure Community Master Plan is to develop a comprehensive strategy for identifying and siting green infrastructure projects that would complement ongoing and planned expansion of the storm sewer system in the Community. NYC DEP is currently scoping and procuring services to develop a broad drainage improvement study for the greater Southeast Queens area, extending beyond the Idlewild Watershed Communities. CDBG-DR funds would be leveraged to fund the Green Infrastructure Community Master Plan as a specific task within the scope of the greater Southeast Queens plan, tailored to the Community (Figure 4.2).

This project evolved from the recognition that the Community needed a plan to manage stormwater and prioritize investment in green infrastructure with the Community. While there are extensive storm sewer improvements underway throughout Southeast Queens, it will be many years before those capital improvements are completed. In the meantime, the Green Infrastructure Community Master Plan would identify green infrastructure improvements that could be implemented more quickly, provide short term benefits in mitigating stormwater flooding, and also augment the long term impact of ongoing storm sewer improvements.

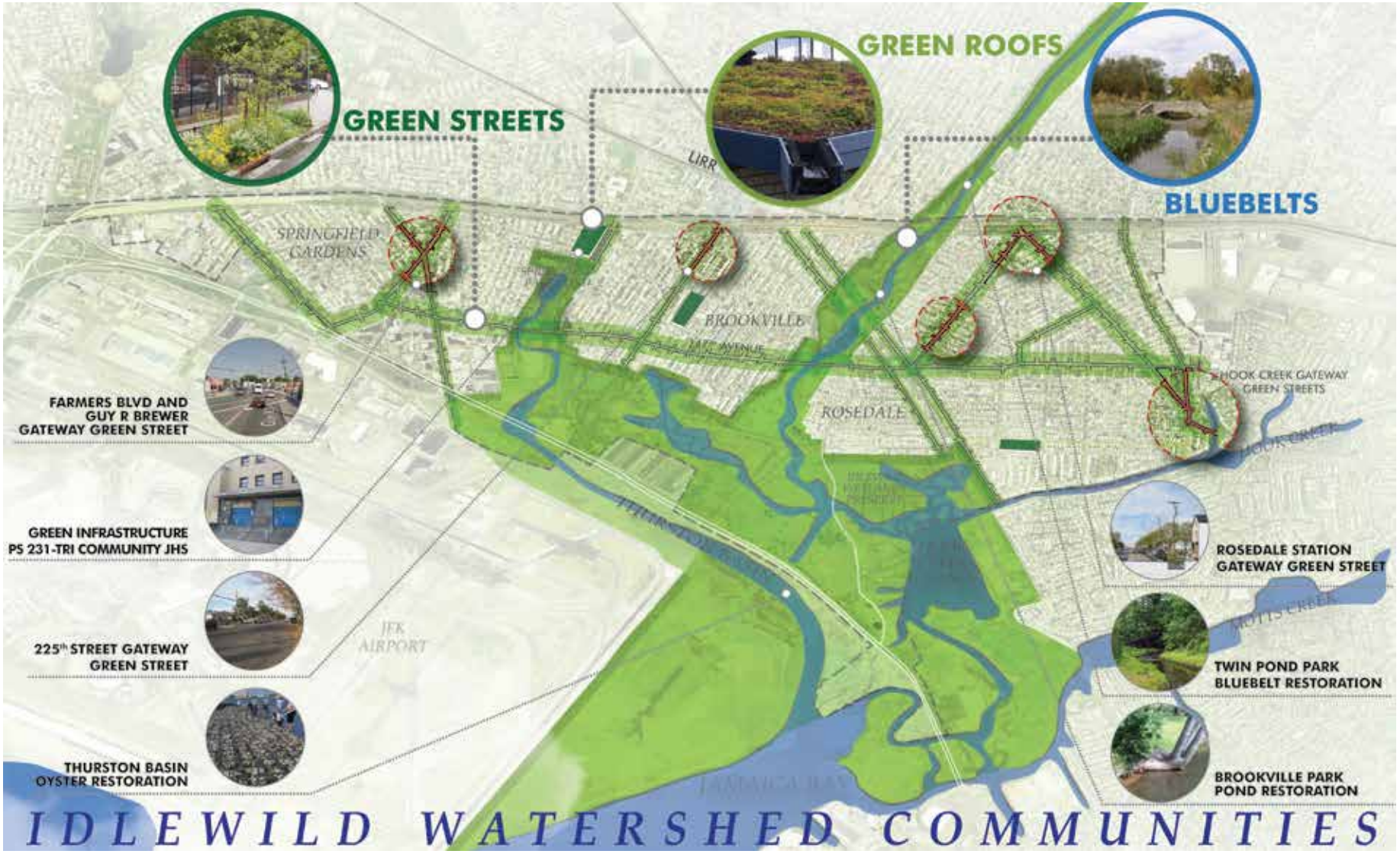
The recommendations of the Green Infrastructure Community Master Plan would be created in support of the NYC DEP NYC Green Infrastructure Program. The NYC Green Infrastructure Program is a multiagency effort led by NYC DEP to design, construct, and maintain green infrastructure on public property throughout New York City. The program presents a comprehensive approach to improving water quality that integrates green infrastructure—such as restoration of water bodies and Bluebelts, and the development of Right-of-way (ROW) bioswales, green streets, and green roofs—with grey infrastructure—such as upgrades to sewer system capacity and improvements to pump stations—for a cost-effective and sustainable approach to stormwater management.

The Green Infrastructure Community Master Plan would recommend green infrastructure best management practices (BMPs) that may include (but are not limited to): cisterns and rain barrels, porous pavement, ROW bioswales, rain gardens, green roofs, and constructed wetlands. Green infrastructure projects could also include the protection and restoration of wetlands. The goal of the recommended BMPs would be to:

- Retain stormwater during rain events to reduce the strain on the sewer system and reduce stormwater flooding;
- Capture contaminants and debris that would otherwise clog the storm sewer system;
- Decrease the cost and need for maintaining and upgrading stormwater infrastructure by implementing a green solution to water management;
- Improve water quality and assist the City with meeting permit requirements for its municipal separate storm sewer system (MS4);
- Reduce the urban heat island effect, reducing the amount of energy needed to cool buildings;
- Improve air quality in the Community; and
- Promote ecosystem growth at proposed project locations.

The scope of work for the Green Infrastructure Community Master Plan would begin with baseline studies that include a desktop review of existing GIS data (i.e., geology, property ownership, etc.) and drainage studies, completion of topographic and geotechnical surveys, and the development of impervious cover and sewershed mapping. Each of the

Figure 4.2: Green Infrastructure Community Master Plan



Springfield Park Pond

Brookville Park Pond

BMPs listed above has specific conditions and siting requirements (e.g., porous pavement should not be sited in the parts of the Community with a high groundwater table). The baseline studies would be utilized to conduct a green infrastructure siting analysis which would recommend ideal locations for implementing green infrastructure BMPs. Identified locations will be subject to further study as necessary (i.e., geotechnical borings, percolation testing, etc.).

One emphasis of the Green Infrastructure Community Master Plan would be to evaluate a proposal put forth to construct radial collection systems underground in appropriate locations throughout the Community. Radial collection systems would mimic the role that streams play in transmitting ground water and would help to restore groundwater flow to Brookville Park Pond, Springfield Pond, and Baisley Pond. The system under study could include slotted collector pipes, permeable reactive barriers, and regulating valves.

An implementation schedule would be developed that identifies potential funding sources, partners and milestones. As part of this implementation schedule, the plan would identify ways to encourage or incentivize private property owners to implement green infrastructure. Private property owners would be encouraged to apply for partial funding through the NYC Green Infrastructure Plan's Green Infrastructure Grant Program, which has already committed $11.5 million to 29 private property owners to build green infrastructure projects.[64]

The Committee has identified several pilot projects to be studied in conjunction with the master plan to demonstrate green infrastructure implementation and effectiveness in the Idlewild Watershed Communities. Profiles for each project follow (A1a-A1f).

Estimated Cost: $750,000

This estimate includes costs for the tasks outlined above, including a desktop review of existing data, recommendations of green infrastructure BMPs, and an implementation schedule.

Hydrogeological analysis, stream modeling, and soil analysis could be included in the Green Infrastructure Community Master Plan to evaluate the feasibility of this proposal.

Idlewild Park Preserve at Huxley Street

An estimated cost to implement the recommendations of the plan would be developed, including operations and maintenance costs and life cycle costs.

Benefits and Co-Benefits

The Green Infrastructure Community Master Plan would yield indirect economic benefits because the BMPs recommended in the Master Plan would have economic, environmental or ecological, and health and social benefits. The Master Plan would lay the foundation for implementing a series of pilot projects, whose benefits would be tied back to the Master Plan. For example, wetlands serve as a natural tidal barrier for the Community, and green infrastructure practices implemented Community-wide would make significant contributions in improving air and noise quality, beautifying the Community, and increasing property values.

Environmental Benefits:
The Master Plan would provide a framework for Community-wide implementation of green infrastructure BMPs, such as constructed wetlands, rain gardens, bioswales, and green roofs. These BMPs would significantly improve the air and water quality in the Community. Vegetated BMPs could filter out air pollutants, including carbon dioxide (CO_2), ozone, particulate matter with a diameter of 10 micrometers or less (PM-10), nitrogen dioxide (NO_2), sulfur dioxide, and carbon monoxide (CO). Increased vegetation would cool air temperatures, decreasing the urban heat island effect and reducing the demand for energy used to cool the Community. Consequently, air pollution from power plants could decrease as well.

Water quality benefits would result from vegetated BMPs that filter phosphorus from stormwater, preventing it from entering nearby water bodies. Phosphorus is known to reduce oxygen levels in water bodies, harming the water body's ecosystem. In addition, wetland restoration would mitigate tidal flooding, while green infrastructure would mitigate stormwater flooding. Reduced flooding would decrease non-point source pollution from stormwater runoff and point source pollution from combined sewer overflow events, improving water quality in Thurston Basin.

Improving air and water quality within the Community would benefit Community members and the diverse ecosystem in Jamaica Bay and the Idlewild Park Preserve. Jamaica Bay has 91 fish species, 325 species of birds, and many reptile, amphibian, and small mammal species, including the following endangered or threatened species that would benefit from improved water quality: the piping plover, red knot, roseate tern, and sandplain gerardia.[65]

Economic Benefits:
Development of the Green Infrastructure Community Master Plan would generate five fulltime equivalent jobs. The implementation of the BMPs recommended in the Master Plan would generate additional jobs due to the planning and design, construction, operation, and maintenance of the recommended BMPs.

In 2013, there were 775 reported street floods[66] and 2,197 confirmed sewer backups in the Community,[67] each requiring a repair, replacement, or cleaning of the sewer line. Typical costs for replacing sewer lines range from $8,000 to $12,000 and repairing sewer lines range from $4,000 to $6,000[68], while sewage above ground would add to the total cost of responding to these hazards. Implementation of the recommended BMPs would mitigate street flooding, sewer backups, and tidal flooding, reducing the cost of damages caused by these risks. There are 2,545 homes and 17 commercial lots within the FEMA Preliminary 2013 100-year flood zone, totaling a collective estimated market value of $1.4 billion,[69] which represents the property value at risk of damage from tidal flooding. Mitigating stormwater flooding, sewer backups, and tidal flooding would reduce the cost of repairing and replacing assets and would reduce the chance that businesses close due to these events.

A typical business in Queens generates an average of $6,300 in sales per day.[70] Implementation of Green Infrastructure Community Master Plan recommendations would reduce the vulnerability of businesses within the Community to closures from flood events, avoiding lost sales revenue for businesses and lost days of income generation for local employees, including socially vulnerable populations.

Green infrastructure projects recommended through the Master Plan would absorb stormwater, increasing the capacity of the sewer system and reducing the need to expand existing grey infrastructure to handle larger amounts of stormwater, while leveraging the ongoing NYC DEP grey infrastructure improvements for additional benefit. Since 2002, NYC DEP has spent $438 million to construct 84 miles of new storm sewers in Southeast Queens, with a projected cost of $6 billion to build out the remaining system to capacity.[71] Green infrastructure is being employed by NYC DEP in priority areas outside the Community due to its cost-effectiveness. The City's plan to use green infrastructure to reduce combined sewer overflow events could save $1.5 billion over 20 years by including both grey and green investments rather than relying on traditional infrastructure alone. [72]

If placed in the combined sewer shed, green infrastructure could reduce the severity and occurrence of CSOs discharged into Thurston Basin. CSOs cause damage to the ecosystem and the wetlands in the area surrounding the basin. Mitigating CSOs at this location would reduce future restoration costs and improve water quality. Wetland restoration at this location would cost approximately $300,000 to $400,000 per acre (can increase due to contamination issues), based on similar urban restoration projects constructed within the region.

Green infrastructure has been shown to increase property values for the surrounding area. In a study conducted by ECONorthwest in 2007, findings showed that property values were 5% higher in areas near green infrastructure versus areas that did not have green infrastructure.[73]

Health and Social Benefits:
The BMPs recommended by the Master Plan would increase the livability and quality of life in the Community. Improving air and water quality would decrease the occurrence of associated health risks. For example, poor air quality is linked to cases of asthma, which green infrastructure may reduce.[74] In addition, green infrastructure would create more opportunities for outdoor recreational activities.

The benefits listed above would significantly benefit socially vulnerable populations. The Community has 14,242 low-income households, 2,023 individuals with limited english proficiency, 6,338 households with at least one disabled individual, 10,727 elderly (over the age of 65), and 21,246 children.[75] These populations would benefit from reduced floods and sewer backups, in addition to the decreased risk of loss of income. Finally, this project would help to raise awareness about environmental stewardship by involving the Community in the process of identifying green infrastructure priority projects.

Cost-Benefit Analysis

The Green Infrastructure Community Master Plan is necessary to provide a framework to implement BMPs throughout the Community. The low cost (approximately $750,000) of the study would enable strategic implementation of BMPs that would provide significant benefits, including mitigation of stormwater flooding, tidal flooding, and sewer backups, saving costs on repairing and replacing damaged assets.

Businesses within flood-prone areas would experience decreased vulnerability of closure due to sewer backups, stormwater, and tidal flooding, benefitting business owners, employees, and overall economic activity in the Community, while also helping to increase property values near implemented green infrastructure by up to 5%.

Green infrastructure would reduce the need for sewer system upgrades to increase capacity because it would reduce peak flow volumes entering the system. Sewer system upgrades require capital projects that could total up to $6 billion in Southeast Queens.[76]

The recommended BMPs would also have unquantifiable benefits to air and water quality throughout the Community. Vegetated BMPs and wetlands would filter out pollutants in the air and water, and absorb water during rain events, preventing flood waters from soaking up pollutants from streets. The BMPs would reduce peak flows to the sewer system, reducing CSO events and mitigating the damage that sewage overflows have on the water quality and ecological health of Thurston Basin.

Risk Reduction

The Green Infrastructure Community Master Plan itself will not reduce risk within the Community, but the implementation of the plan's recommendations Community-wide would significantly reduce risk from flooding stemming from tidal floods and drainage issues, which can be exacerbated by extreme high tide events and tidal surge that blocks stormwater from exiting outfalls.

Recommended BMPs have the potential to decrease the occurrence and severity of storm sewer and sewer backups throughout the Community by increasing the capacity within the combined storm sewer network. This reduces risk by limiting disruption of service of businesses and flooding of homes that are in locations prone to storm sewer and sewer backups. Green infrastructure BMPs would be particularly effective at reducing stormwater flooding risks for properties located within the FEMA FIRM 100-year flood zone, which would benefit 2,545 homes and 17 commercial lots with a collective estimated market value of $1.4 billion.

In addition, roads would become safer and more reliable due to the decrease of combined sewer backups that flood streets decreasing the cost of repairing these roads after flood events. In New York City, the average cost of restoring damaged streets ranges from $1,500 to $2,000.[77] The Community would experience a reduced risk of accidents due to unsafe streets and the cost of repairing damaged streets.

The protection and restoration of wetlands would increase the function of the wetlands as a flood barrier. Wetlands act as a sponge and buffer during tidal events, so increasing this function directly reduces the risk of those that are in the low-lying areas surrounding the wetlands by reducing the number of homes, streets, and businesses that flood. In addition, preventing the flooding of key infrastructure facilities, such as Rosedale Pumping Station, would benefit all areas within the Community.

Timeframe for Implementation

The timeframe for implementation of the *Green Infrastructure Community Master Plan* is immediate and can be completed within two (2) years or less. Implementation of the recommended projects from the Plan is long range. Ongoing coordination between New York State and New York City regarding the partnership to fund implementation, as well as stakeholder involvement to guide the design of the plan and projects would need to be defined.

Regulatory Requirements

Depending on the location and specifications of implementation of project(s) recommended within the *Green Infrastructure Community Master Plan*, the project(s) would be subject to a regulatory review from a number of city agencies, including NYC DEP, the New York City Department of Transportation (NYC DOT), and the New York City Department of Parks and Recreation (NYC DPR). Due to the scale of the project and receipt of federal funding, various agencies would also likely be involved in the review and permitting of the project; such state agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC) and the NYS Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

A1a: Brookville Park Pond Restoration [Proposed Project]

Project Description

As a pilot project for the Green Infrastructure Community Master Plan, the objective of *Brookville Park Pond Restoration* is to increase filtration of stormwater by using natural wetlands systems to effectively slow peak stormwater flows, increase the capacity of Brookville Park Pond, and improve water quality.

During Superstorm Sandy, tidal surge flowed from Jamaica Bay through the Idlewild Park Preserve wetlands into Brookville Park Pond (also known as Conselyeas Pond). The pond is surrounded by a biking/hiking trail, baseball and football fields, tennis courts, and a playground for young children. Superstorm Sandy caused water to overflow Brookville Park Pond, flooding the surrounding area and the ball fields southwest of the park, as well as the pathways around the Pond. The riparian buffer is also degraded surrounding the pond and currently offers little function for sediment removal, habitat, or stormwater retention.

Sediment removal would increase the stormwater storage capacity of the pond, while restoring the riparian plantings around the pond would filter sediment and debris from future stormwater flows into the pond. The restored riparian zone would also absorb water and catch sediment before it enters the pond, effectively increasing the retention capacity of the pond. The stream restoration would improve the drainage from the pond to the nearby wetlands, mitigating future flooding in the area.

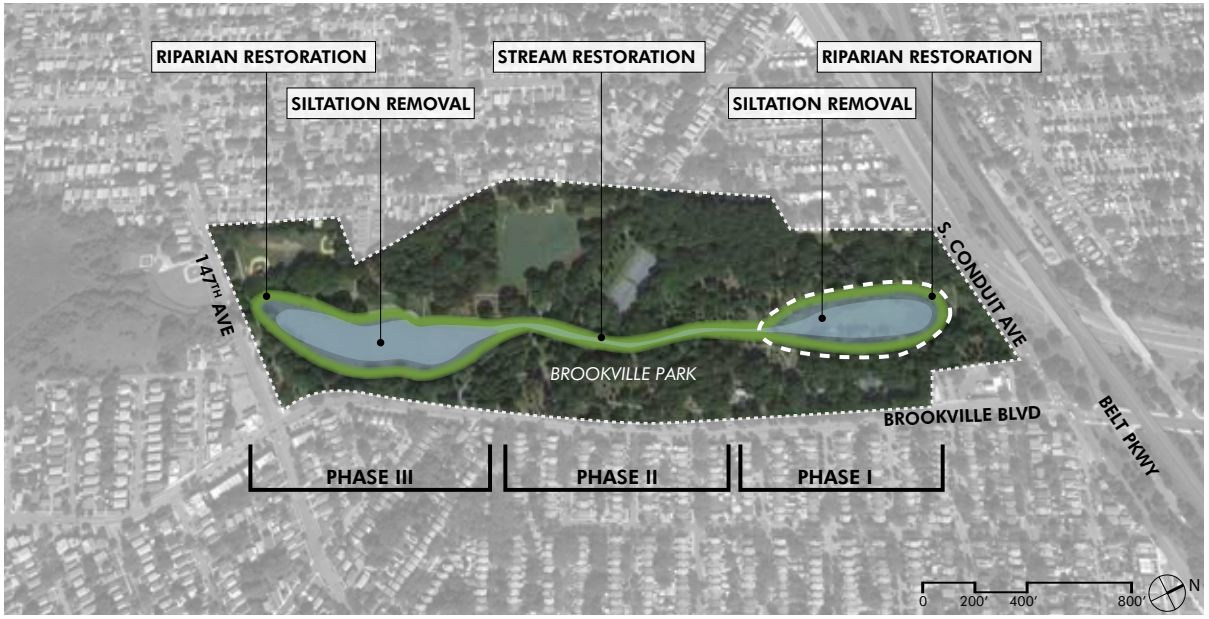
The scope of this project includes dredging Brookville Park Pond (totaling seven acres of siltation removal), restoring riparian plantings with native vegetation within a four-foot wide planting area surrounding the perimeter of the Pond (totaling 15,400 square feet of riparian plantings), and dredging the stream corridor and restoration of the stream bank connecting the northern and southern parts of the pond (totaling 1,100 linear feet of stream restoration) (Figure 4.3). *Brookville Park Pond Restoration* could be coordinated with other improvements of Brookville Park conducted by New York City Department of Parks and Recreation (NYC DPR) to improve the condition of the Park by expanding opportunities for active and passive recreation.

Cost: $1,600,000

The project cost estimate includes the tasks described in the project description as well as:

- Existing condition analysis, which includes:
  - Sediment characterization;
  - Wetland delineation/functional assessment;
  - Stormwater pipe and outfall flow monitoring;
  - Topographic and Bathymetric Surveys;
  - Bio-bench mark survey; and
  - Ecological surveys.

Figure 4.3: Phases of Restoration at Brookville Park Pond



- Preparation of construction plans.
- Preparation of regulatory approvals and permits.

The maintenance of the pond to prevent future silt buildup and riparian zone deterioration would cost $1,760,000 over the span of 25 years, which includes siltation removal every seven years and maintenance of the riparian zone. The funding for this maintenance is not included in this project, but provides the scope for additional costs.

Benefits and Co-Benefits

Brookville Park Pond Restoration would demonstrate and document the local-effectiveness and reliability of green infrastructure for the Idlewild Watershed Communities. This pilot project will increase awareness and educate residents and other neighborhood stakeholders about pond restoration. Brookville Park Pond has a large water capacity, which can be increased by pond restoration, and can be utilized as a stormwater detention location.

Environmental Benefits:
Removing the sediment in Brookville Park Pond would directly improve the water quality and increase water capacity of the pond. Excess sediments are known to impair water quality and harm the ecosystem within and around the pond.[78] Increased water capacity would help to mitigate stormwater flooding in the areas surrounding the pond. Stormwater absorbs pollutants from asphalt and concrete, harming the water quality of the pond when the stormwater flood subsides. Thus, increasing the water capacity would maintain the improved water quality that results from siltation removal. Restoring the riparian zone around the pond would result in healthy native vegetation that would filter out sediments and pollutants from stormwater that flows into the pond, further maintaining the improved water quality. Native vegetation would also improve the habitat for fish and avian species.

The restored vegetation would also improve air quality by annually removing up to 7.48 lbs of ozone, 6.68 lbs of particulate matter with a diameter of 10 micrometers or less (PM-10), 6.05 lbs of nitrogen dioxide (NO_2), 3.56 lbs of sulfur dioxide, and 1.83 lbs of carbon monoxide (CO).[79]

Economic Benefits
Brookville Park Pond Restoration will generate a total of 17 fulltime equivalent jobs. The maintenance of the pond would generate an additional 19 fulltime equivalent jobs over the span of 25 years.

Siltation removal of Brookville Park Pond would mitigate stormwater flooding during heavy rain events, decreasing damage caused to the riparian zone and recreational assets around the pond and reducing the cost of restoring and repairing these assets. Riparian zone restoration would cost $185,000 (includes construction costs only), while repairing the pathway around the pond would cost $400,000 and replacing a baseball field would cost at least $332,000.[80] A restored Brookville Park Pond would enhance the recreational experience at Brookville Park, potentially leading to an increase in the property values in the surrounding residential area.

Eroded Pond Bank at Brookville Park Pond

Health and Social Benefits
Improving the water and air quality in the Brookville Park area would benefit the health of Community members. Improved air quality has coincided with decreased in cases of asthma in nearby areas.

Brookville Park Pond Restoration would enhance the recreational experience at the park, encouraging more Community members to visit the park and could provide an educational benefit to the surrounding neighborhood. As the park is more utilized, the health of Community members would improve due to the increase in recreational activities. The World Health Organization recommends 150 minutes of physical activity per week,[81] only achieved by 41.1% of the Community.[82]

Existing Condition at Brookville Park Pond

Cost-Benefit Analysis

Although the project has a high cost, Brookville Park Pond Restoration offers significant benefits. The water and air quality in the area surrounding the pond would improve, leading to health benefits for the Community. With restoration, the pond would have an increased water capacity, mitigating stormwater flooding. Mitigating stormwater flooding would reduce the need and cost to repair and restore the recreational assets surrounding the pond as well as future restoration of the riparian zone.

With this project, the Brookville Park area would be improved, providing the Community with a vibrant recreational area. The park would become a greater asset to the Community, increasing physical activity in the area. The improvement may also increase property values in the surrounding area.

Overall, the benefits of the project outweigh the cost. The restoration of the Brookville Park Pond would allow Brookville Park to be a valued recreational asset and a natural stormwater detention facility for the Community.

Risk Reduction

This pilot project would improve the drainage of the area around Brookville Park Pond. Improvements in drainage would decrease the severity and occurrence of stormwater flooding in this area, mitigating damage to the adjacent environmental and recreational assets. This project would also increase the drainage of stormwater for parcels surrounding Brookville Park, since the stormwater in this area flows into the pond.

Timeframe for Implementation

The timeframe for implementation of the project is intermediate and can be completed within two to five years. Ongoing coordination regarding the partnership to fund implementation, as well as stakeholder involvement to guide the design of the plan and project, will need to be defined and procured.

Regulatory Requirements

Brookville Park Pond Restoration would be subject to regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Parks and Recreation (NYC DPR), and the New York City Department of City Planning (NYC DCP). Due to the scale of the project and the project location, various agencies would also likely be involved in the review and permitting of the project; such agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC), NY Coastal Zone Management and NYS Department of State.

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

A1b: Community Gateway Green Streets [Proposed Project]

Project Description

As a pilot project for the Green Infrastructure Community Master Plan, this expansion of the Green Streets program—a component of the NYC Green Infrastructure Plan—aims to capture stormwater in order to reduce peak flows that contribute to flooding. Community Gateway Green Streets would construct right-of-way (ROW) bioswales at Community gateways to increase resiliency through stormwater retention and treatment, while improving the streetscape, fostering a sense of place, and supporting local business growth (Figure 4.4).

The project would include construction of bioswales and rain gardens and planting of new street trees and stormwater tree pits along three key gateways to the Community:

- Francis Lewis Boulevard between South Conduit Boulevard and 248th Street, Rosedale (Figure 4.5 and Figure 4.7);
- 225th Street between South Conduit Boulevard and 145th Road, Brookville (Figure 4.6); and
- Rockaway Boulevard between the Belt Parkway and 144th Street.

In addition to these three locations, the Committee also advocates for future construction of green infrustructure at the crossroads of Guy R. Brewer and Farmers Boulevards (Figure 4.8). The crossroads is located at the intersection of two key Community gateways. NYC DEP has long-term plans to install new sewer mains along Farmers Boulevard, and therefore this location is not ideal of green infrastructure implementation currently. However, the Committee believes that future sewer main construction at this gateway should be accompanied by complementary green infrastructure that could help to mitigate stormwater flooding and ease the burden on grey infrastructure within the Community.

These green streets would help mitigate the stormwater flooding that is common to these areas by intercepting and reducing runoff by encouraging infiltration. Reducing stormwater runoff before it reaches the east-west force main that runs along 147th Avenue would reduce the strain on the sewer system, leading to less water flowing into Thurston Basin. Because groundwater is more than nine feet below street level in these areas and geology is conducive to infiltration, green infrastructure would be feasible.

Figure 4.4: Community Gateway Green Streets

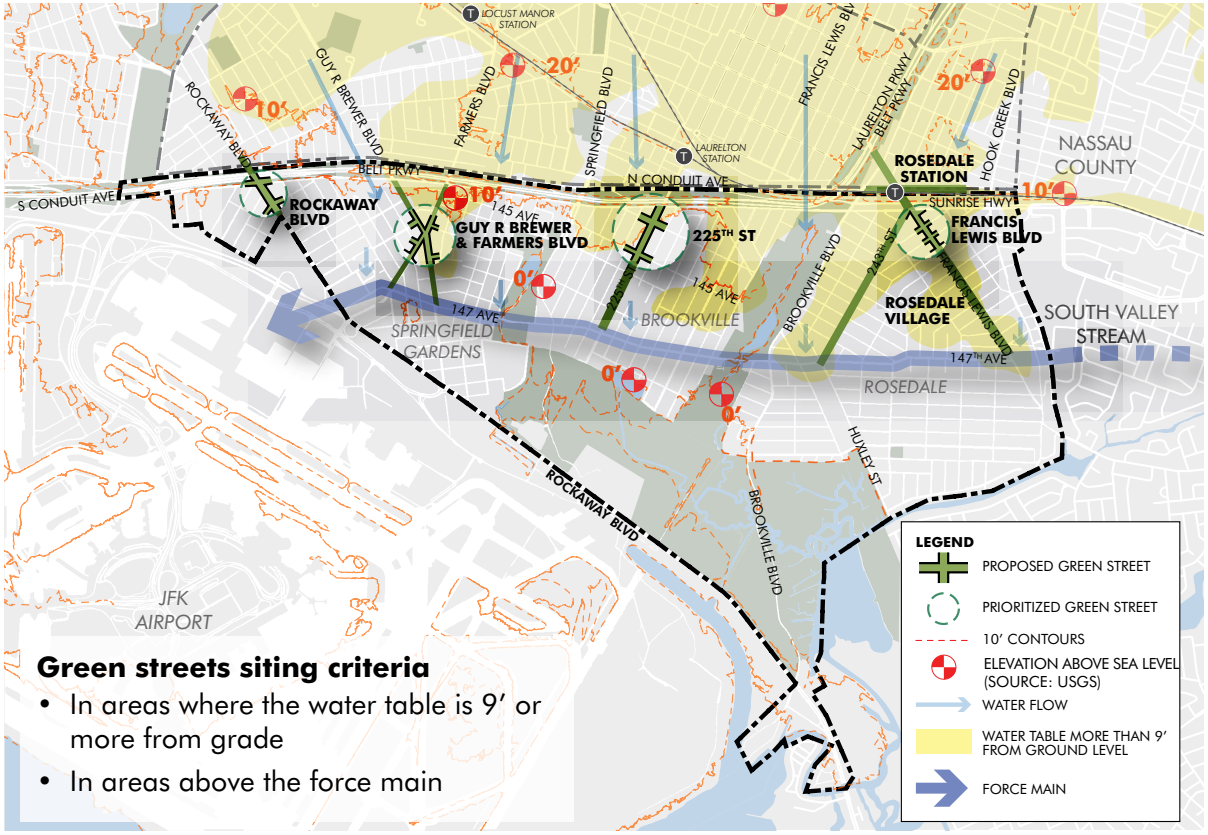
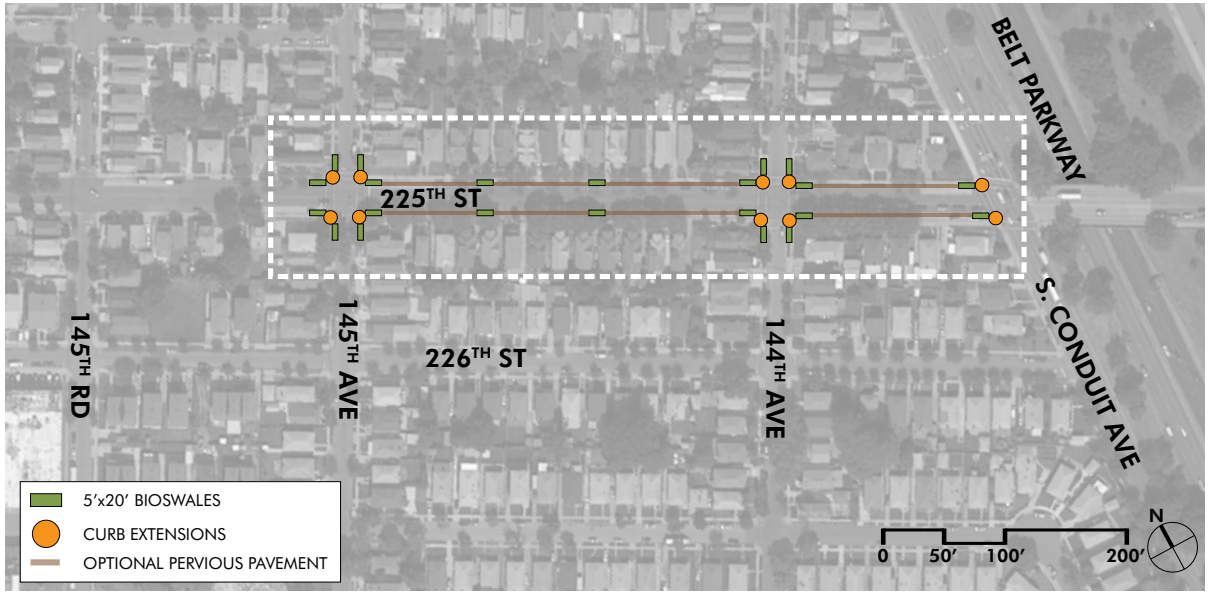


Figure 4.5: Conceptual Rendering of Rosedale Station Community Gateway Green Street, Francis Lewis Boulevard

Figure 4.6: Scope of Gateway Green Street at 225th Street



225th Street

The new green infrastructure would be part of more comprehensive streetscape improvements including lighting, paving, and street furniture. Strategic investment to improve the quality of the public realm at these key Community gateways would be aimed at improving the streetscape at entrances to the Community and attracting private investment to increase retail offerings that better serve the local market. Expanding and improving the range of retail amenities in local neighborhood nodes would help increase the ability of local residents to obtain food and other daily needs in the aftermath of major storm events. It would also decrease the need for local residents to travel outside the Community, which has proven to be difficult due to frequent flooding along the area's major east-west streets.

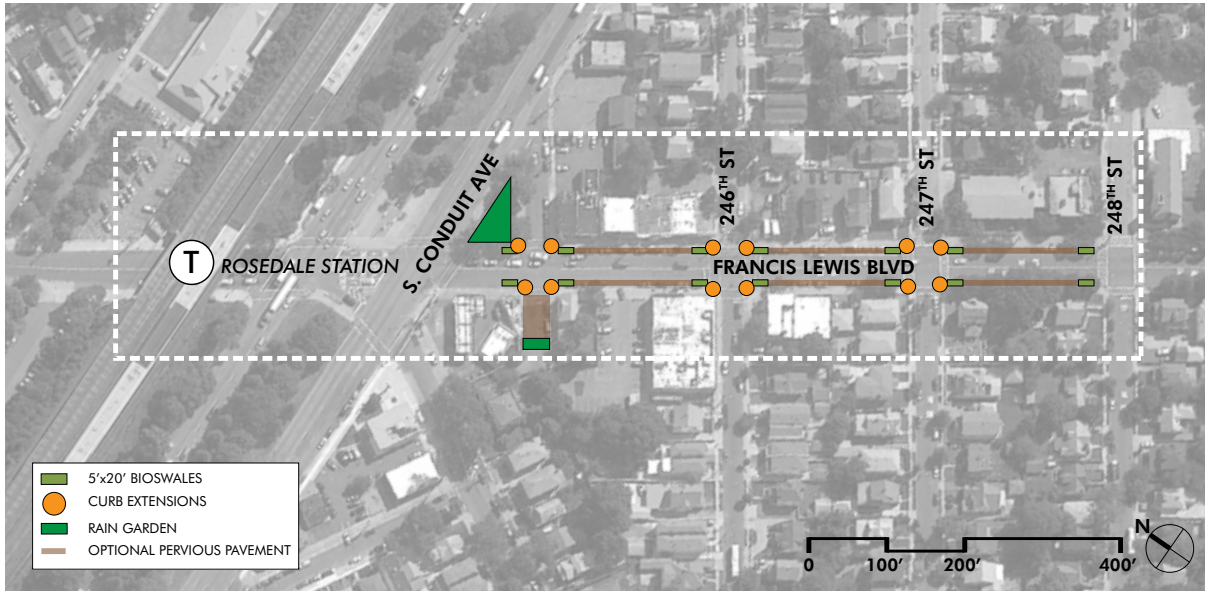
An additional co-benefit of siting the proposed green streets at highly visible key gateways to the Community is to help raise awareness of the value of stormwater management. All three locations also have either train or bus facilities:

- Francis Lewis Boulevard is the primary pedestrian route for residents to access the Rosedale LIRR station;
- 225th Street is a primary pedestrian route for residents to access the Laurelton LIRR station and the Q85 bus route along Conduit Boulevard; and
- Rockaway Boulevard is served by the Q6 bus route, and is a key axis through the Springfield Gardens Industrial area, which is a major employment center in the Community that includes a commercial district, industrial businesses, and hotels.[83]

The crossroads of Farmers and Guy R. Brewer Boulevards—which the Committee advocates as a future site of gateway green streets upon completion of planned sewer main installation—also has three bus stops and 13 commercial and mixed use parcels (total).

The proximity of these Community Gateways to local rail stations and along existing bus corridors could promote transit oriented land uses and increase opportunities for transit connections within the Community. As such, addressing localized flooding in these areas will also increase the Community's resilience by improving access to transit.

Figure 4.7: Scope of Gateway Green Street at Rosedale Station



Francis Lewis Blvd. Near Rosedale Station

Figure 4.8: Scope of Gateway Green Street at Farmers Blvd and Guy R Brewers Blvd

Farmers Boulevard

Source: Google Earth

The location and construction of green streets will conform to the design guidelines provided by the NYC Department of Transportation (DOT) Street Design Manual[84] and NYC Department of Environmental Protection (DEP) Standards for Green Infrastructure[85] which provide specifications for the siting and implementation of green infrastructure. These guidelines provide general considerations and design principles typical of a green stormwater solution and identify City-led strategies for managing stormwater in targeted areas that have the greatest need. The underlying stormwater system will also be considered to maximize the effectiveness of these green streets.

The Committee has the option of choosing any combination of the possible locations for green infrastructure upgrades. The benefit of choosing only one site is the reduced cost of the overall project. On the other hand, developing green infrastructure at all three sites yields greater cost efficiency by combing project administration fees and contract support. It should also be noted that this project would be eligible for funding through the Green Infrastructure Grant Program (a grant within the NYC Green Infrastructure Program), which has already funded $11.5 million to 29 private property owners for the implementation of green infrastructure.

Cost: $900,000–$2,900,000

This project would have different costs based on the combination of streets that are chosen to have green infrastructure implemented. The costs for each project are listed below:

- Francis Lewis Boulevard: Approximately $1.15 million;
- 225th Street: Approximately $900,000;
- Rockaway Boulevard: Approximately $940,000 million; and
- All 3 sites as one project: Approximately $2.9 million.

Francis Lewis Boulevard would have 14 ROW bioswales and a 1,000 sq. ft. rain garden; 225th Street would have 12 ROW bioswales; and Rockaway Boulevard would have 12 ROW bioswales and a planted median. Additional costs include an existing condition analysis and the preparation of construction documents.

External costs associated with this project would include traffic, noise, and air impacts. Construction of the project would either fully or partially block off traffic at these sites. Construction would also cause noise impacts to nearby properties due to the construction equipment. Although each green street project would remove CO_2, the CO_2 gain from the construction and maintenance of the projects result in a net increase of CO_2. Air quality impacts may result from the release of dust particles during construction and pollutants generated by construction equipment.

Benefits and Co-Benefits

The green streets would capture stormwater runoff, reducing the amount of stormwater entering the sewer system. The amount of stormwater that each green street would remove each year is approximately:

- Francis Lewis Boulevard: 0.19 million gallons (MG)/year;
- 225th Street: 0.24 MG/year; and
- Rockaway Boulevard: 0.18 MG/year.[86]

Environmental Benefits:
Green infrastructure would capture stormwater, filtering out pollutants such as phosphorus and nitrogen. The amounts of phosphorus and nitrogen removed annually by each green street project are listed below:

- Francis Lewis Boulevard: 13% of the total phosphorus and total nitrogen load would be removed with a reduction of 8% total phosphorus and 13% of total nitrogen in effluent concentration;[87]
- 225th Street: 10% of the total phosphorus and total nitrogen load would be removed with a reduction of 6% of total phosphorus and 10% of total nitrogen in effluent concentration; and
- Rockaway Boulevard: 9% of the total phosphorous and total nitrogen would be removed with a reduction of 5% total phosphorous and 9% of total nitrogen in effluent concentration.[88]

Water quality in nearby water bodies, such as Thurston Basin, would be improved through the mitigation of stormwater flooding.

Implementation of green infrastructure projects can increase retention, infiltration and evapotranspiration of stormwater runoff during heaving rain events. This can improve water quality to nearby receiving waters as well as decrease energy, chemicals, and costs of treatment.

Green streets would also improve air quality by filtering out pollutants. The amounts of pollutants annually removed by green infrastructure are listed below. It should be noted that although each green street project removes CO_2, the CO_2 gain from the construction and maintenance of the projects result in a net increase of CO_2:

- Francis Lewis Boulevard: 2.41 lbs of ozone, 1.75 lbs of particulate matter with a diameter of 10 micrometers or less (PM-10), 1.72 lbs of nitrogen dioxide (NO_2), 0.97 lbs of sulfur dioxide (SO_2), and 0.38 lbs of carbon monoxide (CO);
- 225th Street: 2.1 lbs of ozone, 1.5 lbs of PM-10, 1.5 lbs of NO_2, 0.8 lbs of SO_2, and 0.3 lbs of CO; and
- Rockaway Boulevard: 2.07 lbs of ozone, 1.5 lbs of PM-10, 1.48 lbs of NO_2, 0.83 lbs of SO_2, and 0.33 lbs of CO.[89]

Green streets would also reduce the urban heat island effect, which is a phenomenon in which temperature in urban areas tend to be higher due to the abundance of impervious surfaces such as pavement. Increasing the amount of vegetated areas can help alleviate the elevated temperatures found in urban areas. In addition, increased vegetative cover can improve shading and insulation, reducing energy demand associated with heating and cooling.

Economic Benefits

The construction of green streets would generate fulltime equivalent jobs. The amount of fulltime equivalent jobs generated for various combinations of green streets are provided below:

- Construction of the Francis Lewis Boulevard green street alone would generate 13 fulltime equivalent jobs;
- Construction of the 225th Street green street would generate 11 fulltime equivalent jobs;
- Construction of the Rockaway Boulevard green street would generate 10 fulltime equivalent jobs; and
- Construction of all green streets would generate 35 fulltime equivalent jobs.

The operations and maintenance of the projects, whose costs are not included in this project, would generate additional fulltime equivalent jobs over the span of 25 years.

The project would reduce the amount of stormwater entering the sewer system, reducing the frequency and severity of flooding and sewer backups and minimizing the cost of repairing these damages caused from these floods. The reduction of stormwater runoff within the sewer system would lessen the occurrence and severity of floods on Francis Lewis Boulevard, 225th Street and Rockaway Boulevard. This would decrease traffic congestion and reduce road repair costs resulting from flood damages. In addition, home repair costs and the loss of assets would decrease for the 110 residential units within the tributary areas in which stormwater runoff is decreased. The 22 commercial and mixed use lots, two transportation and utility parcels, one public parcel, and five vacant parcels in the area would experience a reduced interruption of service due to floods. Flood risk would be reduced to the properties listed above, whose residential, commercial, and mixed use parcels have an estimated market value of $38 million.[90]

Green streets would also reduce the strain on the sewer system, reducing the cost of expanding grey infrastructure in order to improve stormwater management. In addition, the cost of maintaining the sewer system would be reduced. Properties surrounding the green street sites would also face a reduced risk of flood damage.

Mitigation of the urban heat island effect could result in reduced localized air temperatures which could result in energy savings for nearby properties.

Additionally, green streets have coincided with property value increases due to the aesthetic, environmental, and economic benefits that they provide. Green streets have been modeled to increase the value of nearby properties by up to 5%.[93] The potential property value increases for each green infrastructure project is listed below:

- The Francis Lewis Boulevard green street would result in property value increases of up to $774,663.
- The 225th Street green street would result in property value increases of up to $463,934.
- The Rockaway Boulevard green street would result in property value increases of up to $3,053,535.

In addition, the green streets would enhance the aesthetics of the streets, encouraging potential commercial shoppers to visit the areas. Thus, the green streets would potentially increase commercial spending at these locations.

Health and Social Benefits
Green streets would help to beautify key gateways to the Community, providing additional recreational assets for the Community. Green streets could also increase pedestrian and bicycle safety along the transportation corridors. With these benefits, the Community Gateways would be an attractive hotspot for Community members to go for commercial shopping.

By mitigating stormwater flooding, green streets would reduce the risk of flood damage to at-risk properties. Socially vulnerable populations near the green streets would benefit, especially those who are lower income and more heavily impacted by the cost of flood damage or may have trouble relocating.

Cost-Benefit Analysis

Green streets would improve the water quality and air quality of the Community, while also mitigating stormwater flooding. These projects would save money on costlier grey infrastructure upgrades, which are an alternative to green streets as a solution for stormwater management. The project would reduce the amount of stormwater from entering the sewer system, reducing the frequency and severity of flooding and sewer backups, and minimizing the cost of repairing these damages to the residential and commercial properties in the tributary area in which the green streets are located in. The projects would also result in less traffic congestion and reduce road repair costs as a result of the floods. The urban heat island effect would be reduced for areas near the green streets, resulting in energy savings that would have otherwise been spent on cooling buildings. Lastly, these benefits would result in an increase in property values for areas near the green streets.

It should be noted that this project is scalable and can be implemented in phases for increased feasibility. Upon success of this project, the construction of additional green streets would be encouraged, increasing the scale of the benefits listed above.

Risk Reduction

Green streets—which include bioswales, planted medians, and stormwater street trees—would decrease the occurrence and severity of stormwater flooding throughout the Community. Green streets achieve this by reducing the amount of stormwater and debris that enters the sewer system. Thus, the properties surrounding the green streets would face a reduced risk of flood damage.

Timeframe for Implementation

The timeframe for implementation of the project is intermediate and can be completed within two to five years.

Regulatory Requirements

Depending on the location and specifications of Community Gateway Green Streets, the project(s) would be subject to a regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Transportation (NYC DOT), and the New York City Department of Parks and Recreation (NYC DPR). Due to the scale of the project, various agencies would also likely be involved in the review and permitting of the project; including but not limited to New York State Department of Environmental Conservation (NYS DEC), NYS Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over Community Gateway Green Streets.

A1c: Green Infrastructure Pilot Project (School Green Roof and Raingarden) [Proposed Project]

Project Description

As a pilot project for the Green Infrastructure Community Master Plan, the Green Infrastructure Pilot Project seeks to capture stormwater at a public facility, such as a school, in order to reduce peak flows that contribute to flooding. This project would include construction of a green infrastructure pilot project at a public or non-profit facility within the Community, consisting of a green roof, rain garden, and porous pavement, serving as a demonstration of various green infrastructure Best Management Practices (BMPs). This project could provide park space to the Community in conjunction with the City's Schoolyards to Playgrounds program.

Public facilities would be evaluated throughout the Community as potential locations for this green infrastructure pilot project. Suitable locations for green infrastructure depend on site geology (soils permeability, depth to water table, and depth to bedrock), site geometry (size of the potential site, open areas of potential green infrastructure implementation), topography, and sewer infrastructure (including direction of flow). Locations north of 147th Avenue within the combined sewer shed would be ideal candidates for green infrastructure projects because the geologic conditions in this area, including greater than nine feet in depth to the water table and well infiltrating soils, are conducive to stormwater infiltration through green infrastructure BMPs (Figure 4.9 and Figure 4.10).

The conceptual design for a sample green infrastructure project was developed for PS 156 Laurelton. The green roof would cover nearly the entire rooftop of the school, aside from utilities systems located on the rooftop, spanning approximately 10,000 square feet (rough estimate pending selection of a specific location). It would utilize a modular green roof technology with an engineered growing medium intended to be self-sustaining, designed to be easily maintained. Porous asphalt would be installed in general areas of the school parking lot not presently used for recreation, spanning approximately 10,000 square feet. Both the

Figure 4.9: Proposed Green Infrastructure at PS 231

PS231

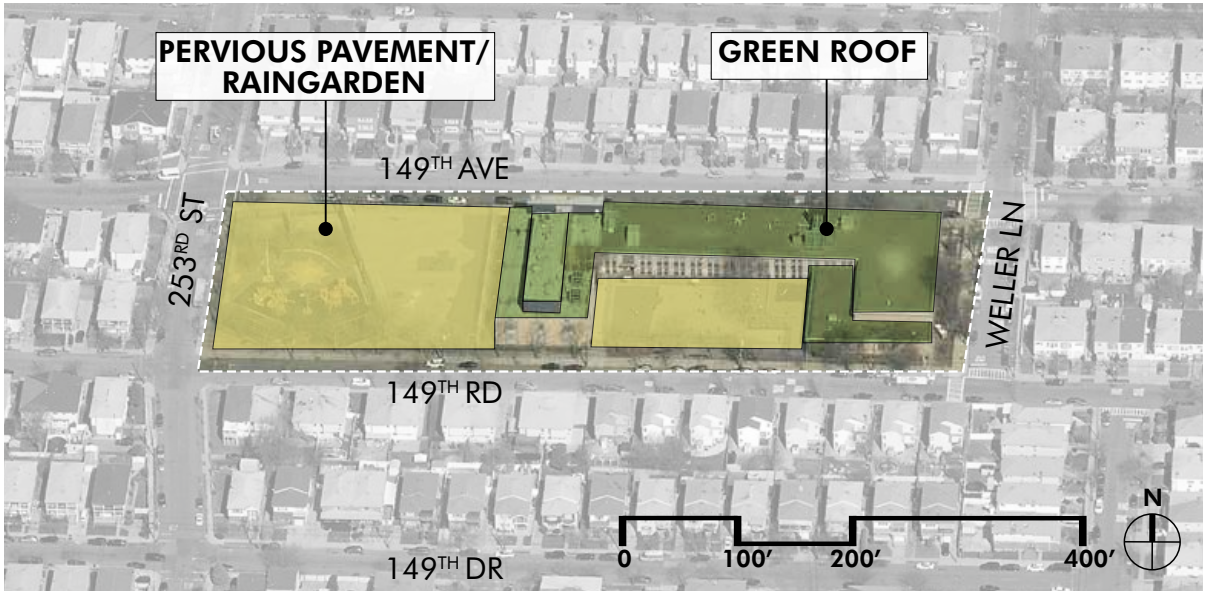
green roof and porous pavement would capture rain water where it falls, mimicking natural pervious surfaces. The green roof would slowly release filtered stormwater into the drainage system, while the porous pavement would allow water to filter through various layers of gravel and sand into the soil. Right-of-way (ROW) bioswales would be installed to capture runoff from 229th Street and 230th Street.

The pilot project would illustrate the benefits of green infrastructure to students and the Community through public outreach—which includes educational signage and associated development of educational materials and curricula, in addition to transparency of the project results.

The results of the project can be quantified through the stormwater volume absorbed by the green infrastructure, reduction in energy costs due to the cooling effects of the green roof, and avoided costs due to the reduced need to upgrade traditional stormwater infrastructure. Green infrastructure within the combined sewer shed would mitigate Combined Sewer Overflow (CSO) events at the outfalls in Thurston Basin. CSOs are discharges of stormwater and sewage that typically occur during heavy rain events when the sewer system is overtaxed and cannot pump the combined sewage to the Jamaica Bay Wastewater Treatment Plant (WWTP). Green infrastructure would capture stormwater where it falls, detaining it on-site, and allowing it to evaporate or release slowly into the ground or sewer system. Thus, green infrastructure would relieve pressure off the sewer system, allowing a larger volume of combined sewage to be pumped to the WWTP and reducing the occurrences and severity of CSOs at Thurston Basin.

This project could possibly be funded by a grant through the NYC Department of Environmental Protection's (DEP) NYC Green Infrastructure Plan. Within the Green Infrastructure Plan, the DEP, Trust for Public Land (TPL), School Construction Authority (SCA), the Department of Parks and Recreation (DPR), and the Department of Education (DOE) have collaborated to provide funding for the construction of green infrastructure at public school playgrounds. The collaboration has already identified 10 recipients—2 recipients already have constructed the green infrastructure—for a total of up to $5 million in funding. This project could be eligible for the next round of funding, which would greatly decrease the cost of this project to the Community.

Figure 4.10: Proposed Green Infrastructure at PS 195



PS 195

Cost: $1,250,000

The cost estimate includes an existing condition analysis, issue of regulatory approvals and permits, preparation of construction documents, construction of the green infrastructure system, and outreach. The operation and maintenance of the green infrastructure system—not included in the funding of this project— would cost an additional $1.32 million over the span of 25 years. As this project is based off of the construction of the sample project, which may differ from the implemented green infrastructure project, the degree of uncertainty with this cost is high.

External costs that would be anticipated with this project includes the potential disruption to traffic around the green infrastructure site, the disruption to the school operations, and public health impacts resulting from the construction, such as increased air and noise pollution.

Benefits and Co-Benefits

Environmental Benefits

The green infrastructure would improve water quality within nearby water bodies, such as Thurston Basin. Green infrastructure would increase the water capacity of the sewer system mitigating CSOs at these water bodies. In addition, water pollutants, such as phosphorus, are filtered out from the stormwater captured by the green infrastructure. The project would remove about 0.12 MG of surface water runoff annually.[91] The only portions of the site that would be considered pollutant-generating[92] are the adjacent roadways which would be served by the ROW bioswales. Of the pollution-generating surfaces, the project would remove about 14% of the total phosphorus and 15% of the total nitrogen load. In addition, the project would reduce the total phosphorus and nitrogen concentration from the pollution-generating surfaces by about 14% and 23%, respectively.[93]

Improved water quality at Thurston Basin would benefit the health of the ecosystem in the area. 91 fish species, 325 species of birds, and many reptile, amphibian, and small mammal species live in the area, including two endangered bird species, the common tern and least tern.[94]

Green Infrastructure would improve air quality in the surrounding area as well. For the sample project shown above, construction of a green roof and rain garden would annually remove 7.25 lbs of ozone, 3.25 lbs of particulate matter with a diameter of 10 micrometers or less (PM-10), 1.99 lbs of nitrogen dioxide (NO_2), 6.03 lbs of sulfur dioxide (SO_2), and 2.29 lbs of carbon monoxide (CO).[95]

This project would also support the reduction of the urban heat island effect, which is a phenomenon in which temperature in urban areas are higher due to the abundance of impervious services such pavement. The urban heat island effect increases energy demand, air conditioning costs, air pollution, and greenhouse gas emissions. Reduced energy demand would also lead to air pollution benefits at the local power plant.

Economic Benefits

As stated above, green infrastructure would reduce the urban heat island effect, potentially reducing energy demand. For the sample project, green infrastructure may reduce energy costs by up to $4,010 per year, based on a model defined within the NYC DEP Green Infrastructure Plan.

The reduced stormwater runoff would help to mitigate stormwater flooding and sewer backups, reducing the cost of damages caused from these events to properties near the project site. Green infrastructure would also decrease the occurrence and severity of CSOs at Thurston Basin, helping to reduce the cost of restoration of the area. Ultimately, green infrastructure would reduce the need to upgrade and expand the current sewer infrastructure system.

The project would also increase property values for nearby properties. In a study conducted by ECONorthwest, property values near green infrastructure increased by 5% due to the reduction of risk from damages resulting from stormwater flooding and sewer backups.[96] For the sample project shown above, this would result in a $245,910 increase in market value.

Additionally, this project would generate 14 fulltime equivalent jobs. The operations and maintenance of the green infrastructure, whose cost is not included in this project's funding, would generate an additional 14 fulltime equivalent jobs over the span of 25 years.

Health and Social Benefits

The water bodies near the Community are used for a variety of recreational activities, such as kayaking. Green infrastructure would improve the water quality at nearby water bodies, decreasing the negative health impacts for those that come in contact with the water. In

addition, improved air quality would support the decrease of associated health impacts, such as asthma.[99]

The project would also educate Community members and, in the case of the sample project, students of the benefits of green infrastructure. The Community would learn the effectiveness of the implemented green infrastructure, primarily measured by the amount of stormwater capture, within the Idlewild Watershed Communities. Upon success of the project, property owners and stakeholders would be encouraged to implement additional green infrastructure projects. Students would have the opportunity to learn about the benefits of green infrastructure via the green roof pilot projects and associated educational curricula. Educational programs could be enhanced by engaging and partnering with the New York City Department of Education (NYC DOE), including development of a curriculum focused on green infras

This green infrastructure pilot project would encourage other facilities to also implement green infrastructure. With Community-wide green infrastructure projects, the entire Community would benefit, including socially vulnerable populations. The Community has 15,720 low-income households, 2,023 individuals with limited english proficiency, 6,338 households with at least one disabled individual, 10,727 elderly (over the age of 65), and 21,246 children.[100]

Edible Schoolyard at PS 216

Source: www.inhabitat.com

Cost-Benefit Analysis

The project would serve as a model for future green infrastructure projects. The results of the green infrastructure would be transparent to the public, and upon success of the project, additional facilities would be encouraged to implement green infrastructure projects. Considering this and the benefits listed above, the project is well worth the cost.

Stormwater flooding and sewer backups would be mitigated for properties near the project site. In addition, this project and others like it could reduce the need to upgrade the sewer system with costly grey infrastructure. Green infrastructure would improve the water and air quality within the Community, benefitting the health of nearby ecosystems and Community members. Green infrastructure would cool the project site, saving on energy costs to cool the building.

Risk Reduction

As stated in the risk reduction for the Green Infrastructure Community Master Plan (project A1), green infrastructure—in the case of the sample project, green roofs, bioswales/rain gardens, and porous pavement—reduces risk by decreasing the occurrence and severity of stormwater flooding and sewer backups. These events would be mitigated through the additional water capacity that green infrastructure provides, which benefits areas both upstream

Green Roof at Sidwell Friendship School Washington DC

Source: www.asla.org

and downstream from the project site. Thus, the entire Community would experience a reduced risk of stormwater flooding and sewer backups.

In addition, this pilot project would serve as a test case for potential green infrastructure projects in the future. With the success of this pilot project, green infrastructure could be installed in other public facilities, which would add to the overall risk reduction effect of green infrastructure.

Timeframe for Implementation

The timeframe for implementation of the project is intermediate and can be completed within two to five years.

Regulatory Requirements

Implementation of the Green Infrastructure Pilot Project would require coordination and input from state agencies in developing the project. Depending on the location and specifications of the project, the project would be subject to regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Design and Construction (NYC DDC), the New York City Department of Education (NYC DOE), the New York City School Construction Authority (SCA), and the New York City Department of Parks and Recreation (DPR). State agencies would also likely be involved in the review and permitting of the project; such state agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC) and NYS Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction.

A1d: Twin Pond Park Bluebelt Enhancement [Featured Project]

Project Description

As a pilot project for the Green Infrastructure Community Master Plan, the Twin Pond Park Bluebelt Restoration would increase stormwater filtration by using natural wetlands systems around the perimeter of the Ponds to effectively slow peak stormwater flows and improve water quality.

The New York City Department of Environmental Protection (NYC DEP) Bluebelt program provides an ecologically sound and cost-effective drainage system that captures stormwater and directs it to one of several facilities known as Best Management Practices (BMPs). BMPs include constructed wetlands, stormwater detention ponds, and stream restoration projects that serve the role of mitigating the negative effects of discharging stormwater into the environment.

In 2013, DEP began dredging Springfield Lake as part of Phase IV of its $175 million upgrade of sewer and water infrastructure in Southeast Queens to alleviate flooding. Springfield Lake is part of a new network of nearly 10 acres of Bluebelt wetlands in the Community that will receive and filter stormwater before it is released into Jamaica Bay. DEP is currently planning a similar Bluebelt project at Twin Ponds, which will include the installation of stormwater outfalls.

Twin Pond Park Bluebelt Restoration would supplement NYC DEP's current project by clearing any debris and dead trees from the ponds, restoring wetlands within the riparian zone, and installing a porous pavement walkway surrounding the ponds for passive recreation (Figure 4.11). Wetlands restoration would enhance existing four foot wide riparian plantings which include native grasses and emergent wetland species. The Bluebelt project would lead stormwater away from the area around Twin Ponds Park—including Merrick, Brookville, and Hook Creek Boulevards—and into the restored wetlands located near the ponds. These wetlands would filter stormwater before it flows into the Ponds, which would slow the pace of runoff and improve water quality. This restoration project would enhance ecosystem health and restore habitat near Twin Ponds, while increasing the storage capacity of the ponds.

The passive pedestrian walkway surrounding the ponds would both capture stormwater and allow it to infiltrate where it falls, while improving the public use, enjoyment and quality of life in the Park. Park benches would be installed on the walkway to increase usage of the park. Trash receptacles would also be installed to encourage the maintenance of the cleanliness of the walkway.

Cost: $850,000

The cost estimate includes the above restoration and construction tasks in addition to:

- Existing condition analysis;
- Sediment characterization;

Figure 4.11: Twin Pond Park Bluebelt Restoration

- Wetland Delineation;
- Stormwater pipe and outfall flow monitoring;
- Topographic and bathymetric surveys;
- Bio-benchmark survey;
- Preparation of construction documents; and
- Issue of regulatory approvals and permits.

The maintenance of the restored structures—including the riparian plantings, porous pavement, park bench, and trash receptacles—would cost an additional $780,000 over 25 years. The maintenance cost is not included in this cost estimate.

Benefits and Co-Benefits

Environmental Benefits

Riparian plantings would provide Twin Ponds with a layer of vegetation that would act as a protection perimeter, filtering pollutants and sediments from stormwater that would have otherwise entered the ponds. Improved water quality would encourage aquatic life in the ponds to thrive. Soil quality would benefit as a result of the improvements of the water quality. Thus, the vegetation that relies on the soil would also thrive.

Restored riparian plantings would also improve the air quality in the surrounding area. The plantings would annually remove 2.05 lbs of ozone, 1.83 lbs of particulate matter with a diameter of 10 micrometers or less (PM-10), 1.65 lbs of nitrogen dioxide (NO_2), 0.97 lbs of sulfur dioxide, and 0.50 lbs of carbon monoxide (CO).[97]

Furthermore, the walkway and park benches would generate public interest in the Twin Ponds Park area. Public interest would promote the maintenance of Twin Ponds Park and its ecosystem, providing a long-term solution for the welfare of the park.

Economic Benefits

Twin Pond Park Bluebelt Restoration would generate a total of nine fulltime equivalent jobs. The operation and maintenance of the project components would generate an additional eight fulltime equivalent jobs over the span of 25 years.

Riparian restoration around Twin Ponds would mitigate stormwater flooding, reducing costs for additional maintenance of Twin Ponds and the repair of the surrounding traffic infrastructure. Riparian restoration of Twin Ponds Park costs $50,000. The riparian zone would prevent sediments from entering the pond, increasing the water capacity of the pond. Increased water capacity would mitigate stormwater flooding of the pond. Mitigating stormwater flooding would reduce the cost of future riparian restorations and repair of the surrounding roads that would have otherwise been damaged by the floods.

The riparian restoration would also maintain the water quality of Twin Ponds, reducing the need and cost for water treatment methods such as siltation removal. The upkeep of the Twin Ponds water quality would be necessary to maintain its water capacity and the ecosystem of the ponds.

The project would improve stormwater management near Merrick, Brookville, and Hook Creek Boulevards. This could decrease traffic congestion during localized flood events and reduce road repair costs as a result of flooding.

Health and Social Benefits

Restoring the riparian plantings would improve the air quality of the Twin Ponds Park area. Improved air quality would reduce the health risks associated with poor air quality, such as asthma.

Improved water quality would increase the water capacity of the Twin Ponds Park, which would mitigate stormwater flooding at the pond. Improved water quality would also increase stormwater drainage at the pond, benefitting the planned Bluebelt project at the ponds.

The constructed walkway and park benches would provide the Community with an additional recreational area. Increasing the recreational areas within the Community would promote the health and well-being of Community members. The World Health Organization recommends 150 minutes of physical activity per week,[101] only achieved by 41.1% of the Community.[102] The new recreational area at Twin Ponds Park would encourage more Community members to participate in physical activities. In addition, there is currently a bike path that connects Merrick Boulevard, which is just north of the Twin Ponds Park, and Brookville Park. With the addition of Twin Ponds Park as a recreational area, the usage of the bike path would increase.

Cost-Benefit Analysis

In addition to contributing to the mitigation of stormwater flooding, the project would provide

additional economic, environmental, and health and social benefits. The restored riparian planting would improve the water quality and air quality in the surrounding area by filtering out pollutants and sediments from stormwater entering the pond and pollutants from the air. Improved air quality would decrease the risk of associated health risks, such as asthma. Improved water quality would promote the growth and health of the surrounding ecosystem. Improved water quality would mitigate stormwater flooding at the pond and the surrounding Community by increasing the water capacity of the pond. The mitigation of stormwater flooding would reduce damages to Twin Ponds Park and nearby road infrastructure. The project would also provide a recreational area for the Community, promoting physical activities that would improve the health of Community members.

Risk Reduction

The restoration of the Twin Ponds Park would enhance the planned Bluebelt project, improving stormwater drainage within the Community. The restoration itself also would improve stormwater drainage at the pond, mitigating flooding of the park during heavy rain events. Thus, the Twin Ponds Park, surrounding road infrastructure, residential units, and businesses would face a reduced risk of stormwater flooding.

Timeframe for Implementation

The timeframe for implementation of the project is intermediate and can be completed within two to five years. Ongoing coordination regarding the partnership to fund implementation, as well as stakeholder involvement to guide the design of the plan and project, will need to be defined.

Regulatory Requirements

Twin Pond Park Bluebelt Restoration would be subject to a regulatory review from NYC DEP, the New York City Department of Parks and Recreation (NYC DPR), and the New York City Department of City Planning (NYC DCP). Due to the scale of the project and the project location, various agencies would also likely be involved in the review and permitting of the project; such agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC), NY Coastal Zone Management and NYS Department of State.

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

A2: NYC DEP Oyster Restoration in Thurston Basin [Featured Project]

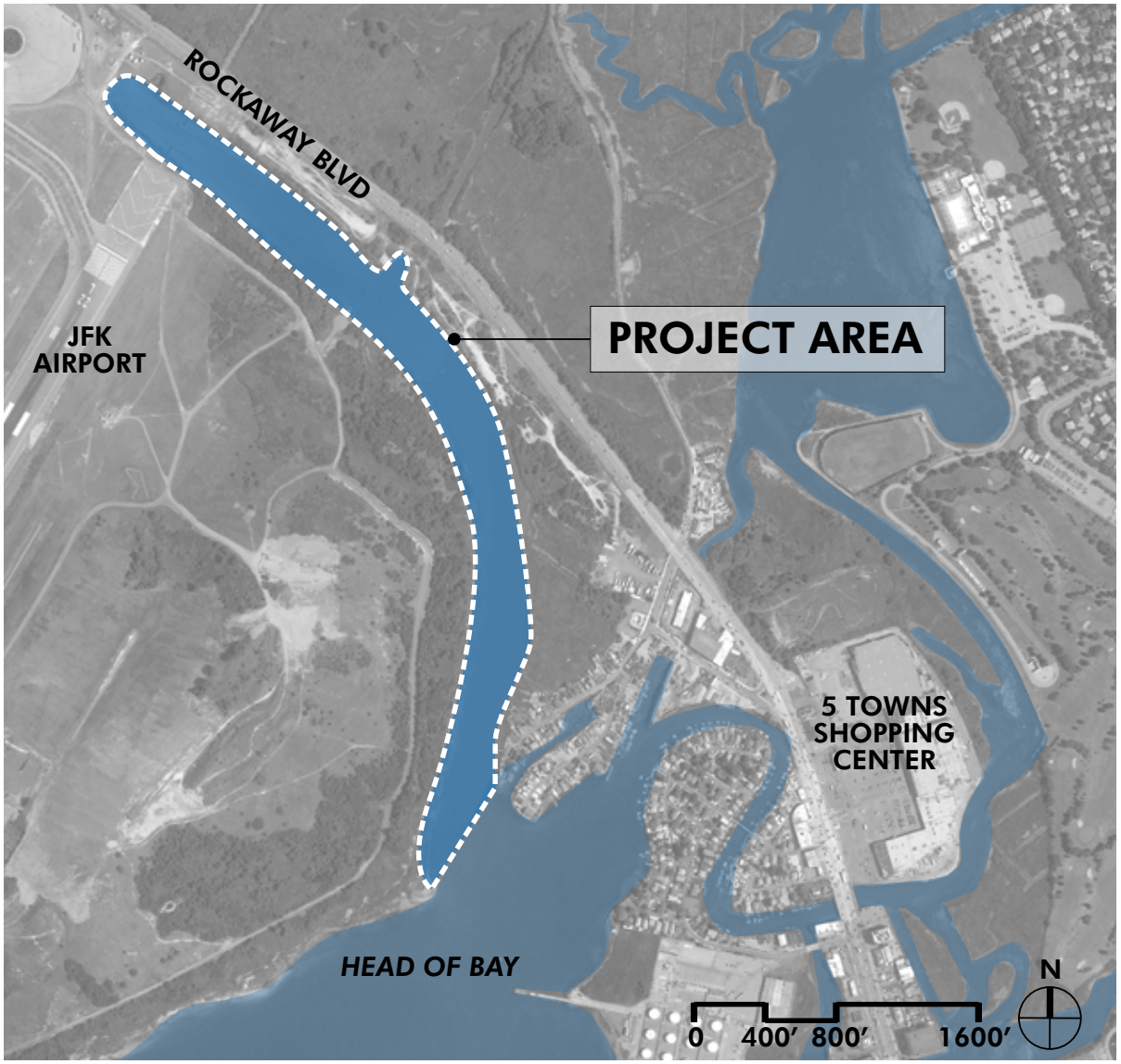
Project Description

During Superstorm Sandy, tidal flows surged through Jamaica Bay into Thurston Basin and the wetlands of the Idlewild Park Preserve. Successful oyster restoration in the Thurston Basin may be able to slow tidal surge flows into the Basin and adjacent wetlands and improve the water quality within the basin.

Oyster restoration has been proposed by the New York City Department of Environmental Protection (DEP) for Thurston Basin, but has not yet been completed. The head of Thurston Basin is three feet deep which is suitable for restoration of oyster reefs. Shallow parts of the Basin along Idlewild Park Preserve have the potential to offer opportunities for other aquatic habitat restoration. Oyster restoration in Thurston Basin can lead to a series of protective oyster reefs that can dissipate wave energy and slow tidal flows. Oyster restoration would also improve the habitat and health of both Thurston Basin, known as a top location for bird watching in New York State, as well as adjacent Idlewild Park Preserve.

This project would provide support for DEP's project to establish oyster reefs in Thurston Basin by providing funds to initiate the project (Figure 4.12). Oyster restoration in Thurston Basin is an effective and resilient project complimentary to the ongoing Hudson-Raritan Estuary projects such as the Jamaica Bay Oyster Bed Pilot project and the New York Harbor Schools Billion Oysters Project in addition to other projects initiated by NY/NJ Baykeeper.

Figure 4.12: NYC DEP Oyster Restoration in Thurston Basin



Oysters have the following benefits:

- Oysters are an indicator species and can be used to gather information on overall health of the estuary;
- Oyster reefs can provide habitat for many other marine organisms;
- Oyster reefs can improve water quality and protect shorelines by reducing wetland fringe erosion and stabilizing banks; and
- Oysters are filter-feeders that can improve water quality through filtration of sediments and other contaminants, such as nitrogen, fine sediments and toxins from water column.

Through the above benefits, oysters will improve the overall health of the wetlands surrounding Thurston Basin. This improved health would enhance the function of the wetlands as a tidal barrier.

Cost: $250,000

The project would provide funding to DEP's project to establish oyster reefs in Thurston Basin. The project cost would include the following tasks:

- Engineering and design of the oyster reef;
- Preparation of construction documents;
- Oyster seeding, substrate seeding, and oyster monitoring; and
- Issue of regulatory approvals and permits.

External costs of this project would include potential impacts to the existing ecosystem within Thurston Basin.

Oyster Restoration *Source: www.marinediscoverycenter.org*

Benefits and Co-Benefits

NYC DEP Oyster Restoration in Thurston Basin will have environmental, economic, and social and health benefits for the Community, primarily the Idlewild Park Preserve area. This project would have the following local benefits as well as long term regional benefits.

Environmental Benefits

Oyster reefs protect from erosion, enhance water quality, and provide substrate for the recruitment of new larval oysters. The project would improve the health of the ecosystem in Thurston Basin by filtering nitrogen, nutrients, bacteria, and sediments from coastal waters. A typical oyster filters between 20 to 50 gallons of water per day.[103] The improved water quality resulting from the oyster restoration would benefit species that live in Thurston Basin's low and high marsh, forested/shrub, and brackish water habitats.

Oyster reefs provide hard substrate for settlement of sessile organisms, such as barnacles and oysters, and increase foraging areas for fish. In addition, marsh systems may develop on the sediment that accumulates behind reef, providing intertidal marsh habitat. Endangered or threatened species in these habitats that would benefit from improved water quality include the piping plover, red knot, roseate tern, and sandplain gerardia.[104] Thurston Basin is also designated as providing essential fish habitat for nineteen federally mandated species, including winter flounder, windowpane flounder, bluefish, and black seabass. Oysters would serve as an indicator of the health of the ecosystem within the basin, alerting the Community to poor ecosystem health in the future.

Economic Benefits
The funding from this project provided to DEP's proposed oyster restoration project would generate three fulltime equivalent jobs.

Economic benefits would result from the increased risk reduction resulting from the oyster restoration, which would increase the function of the wetlands as a natural tidal barrier. Thurston Basin is one of the main entry points of water into the Community. Improving the health of the wetlands in this area would increase the water capacity of the wetlands, slowing tidal floods entering the Community. As an example, restoration of oysters in the northern Gulf of Mexico reduced wave height by 51-90% and reduced wave energy by 76-99% at the shore.[105] A similar dynamic at Thurston Basin would reduce the cost of flood damages to the Idlewild Park Preserve and nearby properties. Oyster restoration would also reduce the cost of additional infrastructure projects that aim to mitigate tidal flooding from the Thurston Basin.

Health and Social Benefits
Improving water quality within Thurston Basin would mitigate the health impacts of poor water quality to those who use nearby water bodies for recreation, such as the kayak launch in Hook Creek. Improving water quality would make this recreational area safer, encouraging more Community members to participate in recreational activities, while providing an educational opportunity on the importance of shellfish habitats to wetlands and water bodies.

Cost-Benefit Analysis

Oyster reef restoration would provide moderate environmental, economic, and health and social benefits in comparison to the project's low capital costs of $250,000. Further, oyster reefs are "self-maintaining," meaning that if they are alive, they could continue to build new reef, which may multiply their cost-effectiveness.

The oyster restoration would provide unquantifiable benefits to water quality and ultimately ecosystem health in Thurston Basin. Community members that use nearby water bodies for recreational activities would also benefit, facing a reduced risk of adverse health effects from poor water quality. Improved functioning of the nearby wetlands as a natural tidal barrier would mitigate tidal floods, providing economic benefit through avoided costs of repairing or replacing damaged assets.

Risk Reduction

As stated in the Benefits and Co-Benefits section above, NYC DEP Oyster Restoration in Thurston Basin would benefit the health of the adjacent wetlands in Idlewild Park Preserve. Healthy wetlands would have an increased capacity to retain water, improving their function as a tidal barrier. Therefore, the restoration of the oysters in Thurston Basin would reduce the risk of tidal surges within the area around the Thurston Basin. Since Thurston Basin is one of the main entry points of tidal water into the Community, the wetlands here are critical to the defense of the Community against tidal surges.

Timeframe for Implementation

The timeframe for implementation of the project is immediate and can be completed within two (2) years or less. Ongoing coordination between New York State and New York City regarding the partnership to fund implementation, as well as stakeholder involvement to guide the design of the system, will need to be defined and procured.

Regulatory Requirements

Depending on the specifications of implementation of project, the project would be subject to a regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Transportation (NYC DOT), and the New York City Department of City Planning (NYC DCP). Due to the scale and location of the project, State and Federal agencies would also likely be involved in the review and permitting of the project; such agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC), the Port Authority of New York and New Jersey (PANYNJ), the U.S. Coast Guard (USCG), and U.S. Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), the New York City Local Waterfront Revitalization Program (LWRP) within the Department of City Planning (NYC DCP), and the New York State Coastal Zone Management (CZM) Program through the New York State Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

A3: Coastal Management Plan [Featured Project]

Project Description

The southern part of the Idlewild Watershed Communities includes Idlewild Park Preserve and is bordered by Hook Creek and the Head of Bay. Areas surrounding Idlewild Park Preserve experience recurring flooding, including Rosedale south of 147th Avenue, Brookville in the vicinity of Brookville Park, and Springfield Gardens southwest of Guy Brewer Boulevard as well as in the vicinity of Springfield Park south of 145th Avenue. There are a variety of economic assets here, ranging from small businesses that employ up to 20 people and select large businesses that have a workforce of up to 500 people. Three key roads in the area, Hook Creek Boulevard, Rockaway Boulevard, 147th Ave, and Brookville Boulevard, provide access points to and from surrounding communities. In addition, the Rosedale Pumping Station is a key infrastructure asset that pumps water away from the Combined Sewer Outfalls located in Thurston Basin.

The areas described above are in a low lying area that is vulnerable to tidal flooding. Most of the tidal inundation during Superstorm Sandy was water that flowed in from Jamaica Bay and entered the Community through Hook Creek and Thurston Basin overtopping the wetlands. During Superstorm Sandy, many of the homes, businesses, and roads were flooded in these neighborhoods. In addition, Rosedale Pumping Station lost functionality during the storm, leading to 6.8 million gallons of untreated sewage overflows discharging into Thurston Basin.[106] A comprehensive and regional coastal management plan is needed to prioritize improvements and integrate flood protection measures that mitigate the flood risk to the Community with broader objectives such as economic development, recreation, and public health.

This project would focus on developing strategies to protect low lying areas that are prone to tidal flooding at certain flood levels and studying the impacts of various coastal defenses for mitigation of tidal flooding on a regional scale, serving to protect the Community and parts of adjacent Nassau County. The goal of the study would be to identify a coastal management system that protects the Community from 100-year flood events. This study would be completed in coordination with the NYRCR Five Towns Project Rockaway Turnpike/Nassau Expressway Resilient Corridor Study as well as other regional coastal protection projects.

Among the potential coastal defense measures that would be studied are: a berm along the perimeter of the Idlewild Park Preserve to block minor storm surges; and tide gates at Hook Creek to prevent water from flooding the creek and the surrounding area. The project would investigate the technical feasibility of these and other coastal defense measures, the possible regional coordination that the implementations may require, and the timeline, estimated cost, and schedule to implement the potential projects.

A potential recommendation of this project would be to construct a berm that begins south of Springfield Park, continues along the northern border of Idlewild Park Preserve, and ends at the kayak and canoe launch near Hook Creek. Future extensions could implement a floodgate at Hook Creek and continue the berm into North Woodmere Park. The layout of the potential project is shown in Figure 4.13. The extension would construct a floodgate to allow the flow of water during regular conditions and block water from flooding the creeks during flood events. The berm could also include a bike path or walking trail on top of it. The bike path or trail would allow travel between key points along the berm, including Springfield Park, P.S. 181 Brookfield, Brookville Park, and the kayak and canoe launch at the end of Huxley Street on Hook Creek.

The berm would serve as a tidal barrier that would supplement the wetlands in Idlewild Park Preserve. It would be designed to a height of 14 feet NAVD, which is equal to the base flood elevation plus three feet, and would protect the Community from small scale tidal floods up to 147th Avenue and on the east side of the Community as well as the south side of Rosedale. Bioswales and culverts would be built along the berm to maintain the drainage of stormwater that would flow downstream into the Idlewild Park Preserve wetlands. In order to protect against a 100-year flood, this regional coastal barrier could extend into neighboring communities, mainly North Woodmere east of the Idlewild Watershed Communities.

The potential flood gates along Rockaway Turnpike, as advocated for in Project D6 Support

Figure 4.13: Conceptual Coastal Management Plan

Rockaway Turnpike/Nassau Expressway Resilient Corridor Study (NYRCR Plan for the Five Towns), would provide an additional level of resiliency by protecting against a 100-year flood. Pairing these two projects together could offer a tiered approach to resiliency. If this regional strategy were implemented, then a berm would protect against smaller, more frequent, flood events, while the regional project would protect against larger, less frequent, flood events.

Cost: $465,000

The development of a coastal management plan would have a low cost. The development of the plan would include the following components:

- Baseline studies:
  - Existing information review;
  - Topographic surveys;
  - Geotechnical surveys;
  - Wetland delineations;
  - Evaluation of threatened and endangered species; and
  - Tidal analysis
- Conceptual feasibly report;
- Alternatives analysis;
- Review of potential regulatory approvals and permits; and
- Public outreach.

Implementation of the recommended coastal management solution would have additional costs, which are not included in this project's cost estimate. The construction of such a solution would have external costs, including but not limited to, traffic, noise, and air impacts, as well as impacts to the local ecology.

Benefits and Co-Benefits

The coastal management plan for Idlewild Park Preserve would have few direct benefits. However, if the project or projects recommended in the plan are implemented, they would have several benefits for the Community, as well as adjacent communities. Because the coastal management plan is a necessary step in implementing a coastal management solution, the benefits of the implemented solution would be tied back to the plan funded by this project.

The area protected by the potential project described above is referred to as the mitigated flood zone. A summary of the mitigated flood zone is provided in Table 4.1.

Table 4.1: Summary of Mitigated Flood Zone

Residential units	4,073
Commercial lots	20
Market value	$73.1 million
Low income households	650
Households with disabled individuals	324
Non-English speaking residents	119
Children (age under 18)	1,496
Elderly (age over 65)	509

Source: NYC Department of City Planning's PLUTO data and U.S. Census Bureau; 2008-2012 ACS Population Summary. Data obtained from ESRI Community Analyst

Environmental Benefits

Implementation of a coastal management solution would protect upland parks and water bodies, including Idlewild Park Preserve, Brookville Park, Twin Ponds Park, and Springfield Park, and the water bodies that reside in them. The ecosystems within these parks would also benefit, including 91 species of fish, 325 species of birds, and other animals, including endangered species such as the common tern and least tern.[107]

These measures would also improve water and air quality by reducing stormwater runoff and potential damages from floods. During tidal floods, floodwaters absorb pollutants from the street, harming the water quality of the water body that they return to; the reconstruction of damaged assets from tidal floods would cause significant air quality impacts. These water and air quality impacts would be mitigated through the coastal management plan.

The bike path on the berm would generate public interest in the Idlewild Park Preserve, which would aid in the preservation of the wetlands within the preserve. The bike path would also divert automobile traffic since it connects a large part of the Idlewild Watershed Communities, further improving the air quality throughout the Community.

Additional potentially avoided environmental costs include those from home heating oil spills in which oil mixes with flood waters and can contaminate water bodies and adjacent properties;[108] flood damaged homes which can contain hazardous materials; flooded heating systems which can contain asbestos; and sheet rock which can contain lead paint.[109] By

avoiding common sources of water pollution following floods, this phase of the project could improve ecosystem health in the Jamaica Bay, protecting the Bay's endangered species, such as the common tern and least term, and critical habitat for marine species. The implementation of shoreline defenses could also reduce coastline erosion along the 9,000 linear feet of coastal erosion hazard areas within the Community.

Lastly, the coastal management plan would reduce the risk of combined sewer overflows in Thurston Basin. In the potential coastal management recommended shown above, Rosedale Pumping Station would be protected from floods, decreasing the chance that the pumping station loses functionality and the subsequent release of untreated sewage into the basin, as occurred during Superstorm Sandy.[110]

Economic Benefits

The development of a coastal management plan would generate five fulltime equivalent jobs. Due to the mitigated flood zone, 4,073 residential units and 20 commercial lots residing in the mitigated flood zone would be protected, with an approximate total market value of $73.1 million.[111] In addition, vulnerability of businesses would decrease, reducing their risk of temporary closure, and benefitting the economic activity of the Community through avoided loss of sales revenues and income for employees. With $2.3 million in annual revenues generated on average per business, in the mitigated flood zone, an estimated $519.9 million in annual business revenues are generated, which on average translates to $1.42 million in sales generated in the mitigated flood zone per day.[112]

Implementation of the plan's recommendations would reduce or avoid damages to infrastructure, utilities, and other commercial assets. For example, during Superstorm Sandy, Rosedale Pumping Station lost functionality due to flood damage, causing 6.8 million gallons of untreated sewage to discharge into Thurston Basin.[113] The Station is currently equipped with three pumps rated at 4,150 gallons per minute (gpm) (6 MGD) each. Repairing the damage to the Rosedale Pumping Station would cost an estimated $5.2 million, which would be avoided under the mitigated flood event.[114] In addition, costs to restore wetlands following such an event would also be reduced or avoided.

The protection provided by the coastal management measures and project could result in an increase in property value due to improved livability of and amenities within the area. Increased amenities for residents would result from the project, including a bike path or trail, bioswales and additional wetlands and vegetation. The protection would also generate interest in commercial investments in the area. With increased coastal protection, existing businesses would remain in the area, providing jobs and income for the local economy.

In the example coastal management recommendation provided above, the bike path on the berm would enhance the recreational value for residents and visitors of the Idlewild Park Preserve area, and would trigger additional visitor spending, sales taxes, and economic activity in the area.

One critical objective of the Coastal Management Plan is to coordinate design of coastal flood mitigation measures with FEMA to ensure that implementation of the coastal management plan has insurance benefits for residents and businesses currently located within the floodplain. Infrastructure measures that reduce risks to structures located in the floodplain may reduce insurance premiums for these high-risk coastal areas, contingent on design and coordination with FEMA.

Health and Social Benefits

This project would result in health and social benefits by protecting a large part of the Community, including socially vulnerable populations and the facilities that serve them. In the mitigated flood zone, there are 650 low-income households, 324 households with one or more persons with a disability, 119 non-English speaking residents, 1,496 children, and 509 residents over the age of 65.[115] These socially vulnerable populations may have trouble repairing flood damages or relocating to a safer location or to facilities that provide the services they require. Thus, the coastal management plan would reduce this risk to these populations.

In the case of the potential solution shown above, the proposed vegetated berm with bike path would enhance the recreational opportunities at Idlewild Park Preserve by protecting a series of recreational assets, such as Springfield Park, Brookville Park, and the Idlewild Kayak Launch. These recreational opportunities would also improve the fitness of Community members by encouraging physical activity.

Cost-Benefit Analysis

The coastal management plan would be a necessary step in a solution that would mitigate recurring tidal flooding in the Community. Implementation of the plan's recommendations would protect the Community's environmental assets, residences, and businesses within the mitigated flood zone from future flood damage; the properties within this zone have an approximate total market value of $73.1 million,[111] representing the collective property value protected by the berm from mitigated floods.

The cost of lost functionality of critical infrastructure within the Community should also be considered. For example, during Superstorm Sandy, Rosedale Pumping Station was flooded and lost functionality, releasing untreated sewage into Thurston Basin. Estimated costs to repair the Rosedale Pumping Station would be $5.2 million, which would be avoided under the mitigated flood event. An implemented coastal management project would protect the pumping station, mitigating the costs of repair and the damage of releasing untreated sewage into Thurston Basin.

Mitigating tidal floods would also improve water quality in nearby water bodies and air quality throughout the Community would improve. The protection from tidal floods and improvement in water and air qualities would benefit the native species that reside in the Community.

Overall, improved livability within the Community would increase property values, encourage commercial investments, and benefit economic activity. The coastal protection solution would also include a bike path, connecting parks in the Community and providing recreational opportunities.

The coastal protection plan would provide the framework for developing a coastal management solution, which would have economic, environmental, and health and social benefits. Thus, the low cost of the plan ($465,000) would be outweighed by the benefits of implementing its recommendations.

Risk Reduction

This project would also reduce the risk for the parcels in flood zones north of the Idlewild Park Preserve from small scale tidal surges. This area includes 4,073 residential units and 20 commercial lots for a total market value of $73.1 million.[116] The project would also protect Rosedale Pumping Station, which lost functionality during Superstorm Sandy, from tidal inundation. Protection of the Rosedale Pumping Station would reduce the number of sewer backups throughout the Community. Therefore, this project would reduce the risk of both tidal inundation for parcels in areas close to Idlewild Park Preserve and the risk of sewer backups throughout the Community.

Timeframe for Implementation

The timeframe for implementation of the study is immediate and can be completed within two (2) years or less. Implementation of the recommended projects from the Plan is long range. Ongoing coordination between agencies, as well as stakeholder involvement to guide the design of the system, will need to be defined and procured.

Regulatory Requirements

Depending on the location and specifications of implementation of the project recommended within the coastal management plan, the project(s) would be subject to a regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Transportation (NYC DOT), and the New York City Department of City Planning (NYC DCP). Due to the scale of the project and the project's likely location on the waterfront, City, State, and Federal agencies would also likely be involved in the review and permitting of the project; such agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC), the Port Authority of New York and New Jersey (PANYNJ), the U.S. Coast Guard (USCG), the U.S. Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), the New York City Local Waterfront Revitalization Program (LWRP) within the Department of City Planning (NYC DCP), and the New York State Coastal Zone Management (CZM) Program through the New York State Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

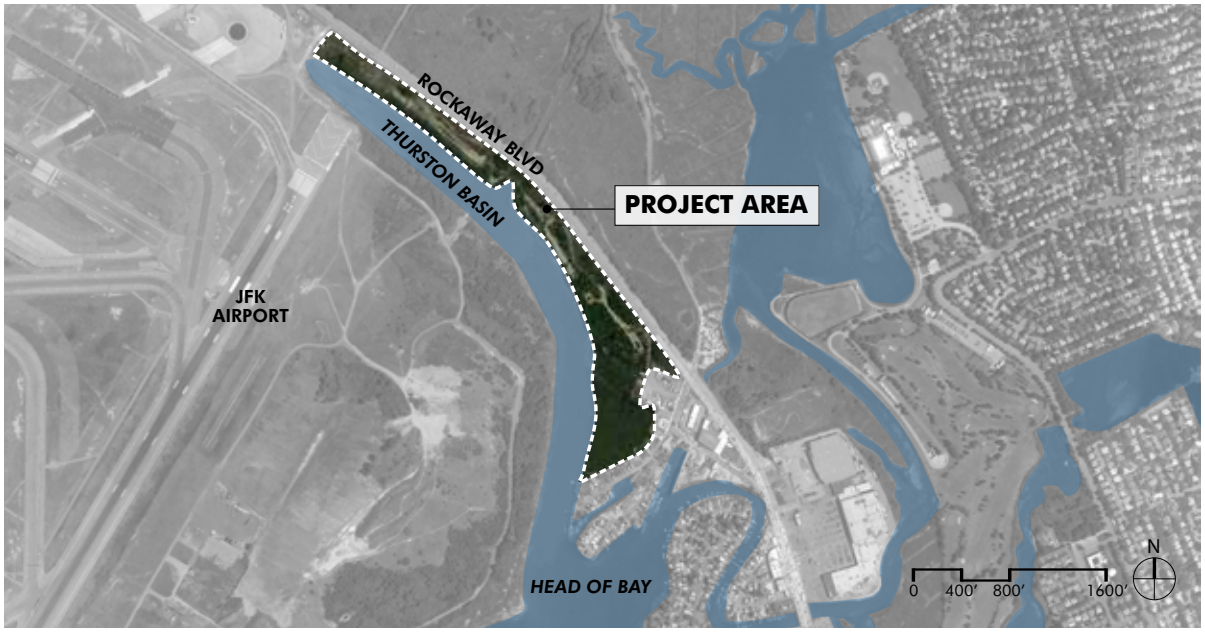
Strategy A: Additional Resiliency Recommendations

A1e: Advocate for Construction of Thurston Basin Park

During Superstorm Sandy, tidal flows surged through Jamaica Bay into Thurston Basin and the wetlands of the Idlewild Park Preserve. This project would restore the health of the wetlands in in Thurston Basin. Restoring wetlands in Thurston Basin would serve to increase their ability to absorb tidal flows from Jamaica Bay. The restoration and creation of wetlands along the Thurston Basin can increase the acreage of wetlands on the east side of the creek to approximately 7 acres,[117] therein increasing the water retaining capacity of Thurston Basin (Figure 4.14).

The objective of this project is to advocate that New York City Department of Parks and Recreation begin construction of the already-funded plan to build a park at the southern end of Thurston Basin. The Committee also advocates that the City include comfort stations as part of the park construction near the planned kayak launch. The proposed comfort stations would increase the usage of the future kayak launch, which will generate public interest in the area, promoting the protection and further restoration of the Thurston Basin wetlands.

Figure 4.14: Advocate for Construction of Thurston Basin Park



A1f: City Purchase of Privately Owned Parcels on Edges of Idlewild Park Preserve

Phase I: City Purchase of Privately Owned Parcels

New York City public agencies own most of the area in the Idlewild Park Preserve. Within this area of ownership, City agencies are able to initiate programs to protect and restore wetlands. However, within privately owned parcels, they are unable to take action to preserve wetlands.

This project advocates that City funds be used to acquire the 64 vacant privately owned parcels

Figure 4.15: City Purchase of Privately Owned Parcels

within and adjacent to Idlewild Park Preserve. The purchase of these areas would provide public agencies with the jurisdiction to initiate steps to restore and protect the wetlands in the purchased areas (Figure 4.15).

Phase II: Restoration of Wetlands within Purchased Parcels

This phase of the project would restore the remaining areas as wetlands. As with all wetland restoration projects, the results of the restoration would increase the Idlewild Park Preserve's capacity to retain water and improve health of the ecosystems residing in the restoration area. The increased water capacity of the wetlands and improved health of their ecosystems would increase its function as a tidal barrier. This is important for the Communities, since the Idlewild Park Preserve is a natural tidal barrier against flood surges coming from Hook Creek and Thurston Basin.

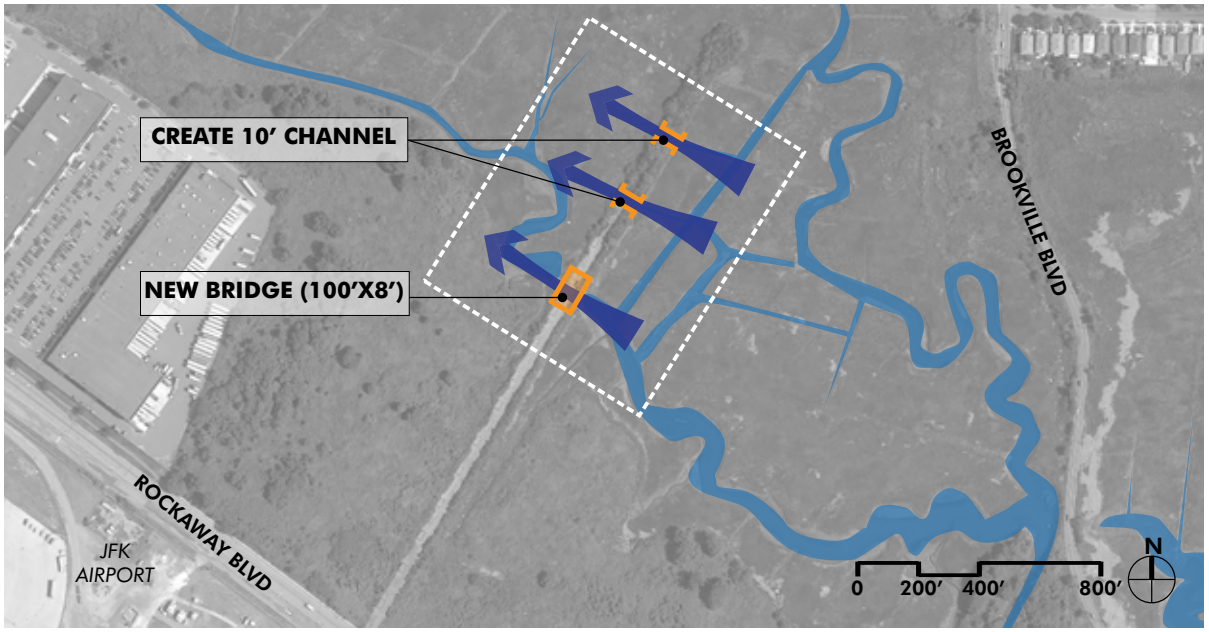
A4: Idlewild Park Preserve Culvert Expansion

Currently, there is a culvert within Idlewild Park Preserve that allows water to flow beneath a service road used by JFK Airport. This culvert allows the passage of water to and from the east and west sides of the Idlewild Park Preserve, impacting the surrounding wetlands that provide major water retention capacity for the Community.

The culvert is undersized for the volume of water passing through it, resulting in flooding of the service roadway during Superstorm Sandy, and affecting the hydrology of the adjacent wetlands. This project would advocate for the expansion of this culvert by reconstructing the existing culvert opening to provide a larger pass through for water and adding additional culverts for more channels for water flow (Figure 4.16). Expansion of the existing culvert would improve tidal flow, improve the health of presently impacted wetlands in the preserve, allow for the passage of sediment and water during surge events (improving sediment water balance) and provide infrastructure stability for the roadway.

Improved tidal flow would help to restore areas that are not adequately inundated twice per day with tidal water to support natural vegetation. Improved health of the natural vegetation would help stabilize the wetland ecosystem and stabilize the functionality of the wetlands as a tidal barrier. In addition, improving tidal flow would improve local hydrology to increase the water capacity of the wetlands during tidal surges, mitigating flood effects.

Figure 4.16: Idlewild Park Preserve Culvert Expansion



Strategy B: Strengthen the Emergency Response Capacity of the Community

B1: Southeast Queens Disaster Recovery Plan [Proposed Project]

Project Description

In order to strengthen long term recovery and build capacity to respond to future disasters, the Idlewild Watershed Communities require a coordinated planning effort among the New York City Office of Emergency Management (OEM), nonprofit organizations, Community Emergency Response Teams (CERT), and other relevant City, State, and Federal agencies. Superstorm Sandy highlighted the need for a centralized plan that coordinates effective disaster preparation and recovery strategies between government agencies and community based organizations (CBOs).

The Southeast Queens Disaster Recovery Plan would facilitate community-level coordination between City agencies and community organizations in two phases (Figure 4.17). The first phase would include the development of a comprehensive disaster recovery plan for the Community. The second phase would implement selected recommendations from the Phase I plan. Project descriptions for both phases are below.

Phase I: Establish COAD and Develop a Southeast Queens Disaster Recovery Plan

Phase Ia: The first step in the planning process would be to establish a Community Organizations Active in Disasters (COAD) that would serve as the advisory committee to oversee development and implementation of the Southeast Queens Disaster Recovery Plan. In addition to being responsible for planning and oversight, the COAD would create a registry of local CBOs and coordinate activities among and between community groups for the mutual benefit of the greater Southeast Queens region. The COAD would build upon established networks between existing community groups to provide training for disaster recovery assistance, develop relationships with citywide and regional agencies to ensure communications in times of crisis, and facilitate communication and shared resources between COAD members.

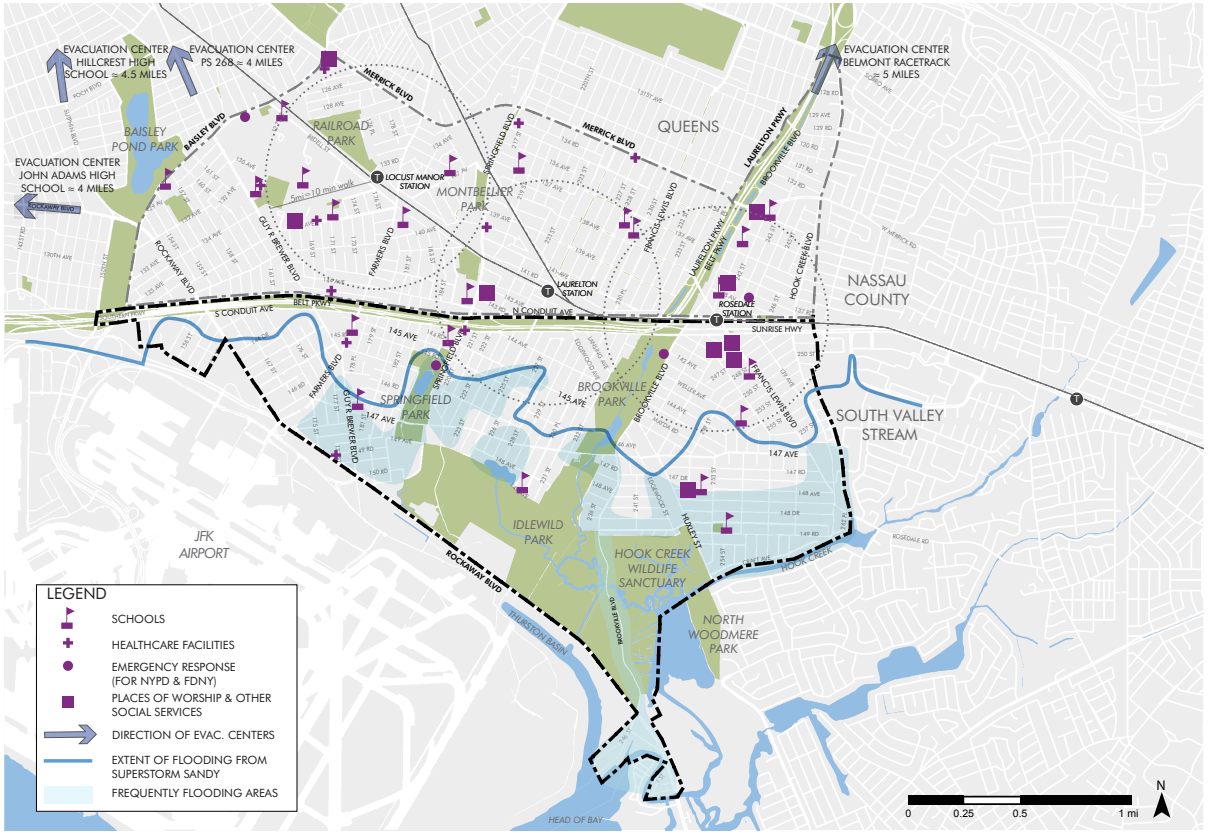
Phase 1b: The second step in the planning process would be to develop the Southeast Queens Disaster Recovery Plan. The objective of the Plan would be to build capacity for the Community to respond effectively to a range of hazards. The scope of the Southeast Queens Recovery Plan would include, but is not limited to:

- Identify assets and vulnerabilities of local not-for-profit organizations, and define roles and responsibilities of COAD member groups in disaster response (e.g., the CERT may need additional training programs for locally specific disaster threats, fixed resources, equipment storage, etc.).
- Identify existing social services facilities that could operate as Resource and Recovery Centers in the Community. These Resource and Recovery Centers would allow for coordination of emergency and relief services following a disaster, such as access to food, water, power, medical services, information, and special services for vulnerable populations.
- Assess the feasibility of these facilities to serve as Resource and Recovery Centers and determine necessary improvements to aid in disaster recovery (e.g., meeting space for the CERT and/or COAD, backup power supply, warming and cooling centers, charging stations).
- Determine protocols for effective communication between the COAD, CERT, community based organizations, NYC OEM, and other City agencies.
- Provide recommendations for improving standard evacuation procedures during major storm events and determine the evacuation and disaster response needs for vulnerable populations, including seniors.
- Develop training and education programs to prepare member organizations of the COAD to provide disaster recovery assistance.
- Determine the training and education needs for local residents for disaster preparedness and recovery.

Phase II: Implement Recommendations of the Southeast Queens Disaster Recovery Plan
The second phase of this project would provide assistance to the local COAD to implement the recommendations of the Southeast Queens Disaster Recovery Plan in coordination with NYC OEM. Such recommendations may include the following measures, subject to the findings of the Plan:

- Create a registry of privately owned recovery equipment and a plan for Community use during disaster recovery (e.g., generators, radios, space heaters, wet vacuums).
- Provide fixed assets for COAD members engaged in emergency preparedness and/or recovery.
- Establish one Resource and Recovery Center through a competitive process.
- Install fixed generators at the Resource and Recovery Center—generators will be able to provide backup power to the Center(s) during power outages. A phone charging station and a Wi-Fi network can be connected to the generator, which would enable the reliable use of communication devices during disaster events.
- Develop educational materials and provide storm recovery assistance to vulnerable populations, including seniors, in coordination with NYC OEM.
- Create a voluntary registry of elderly residents for use by the newly created COAD, NORC, CERT, and other community groups to provide evacuation assistance, distribute medical supplies during power outages, and to facilitate door to door check-ins of homebound residents after disasters.
- Create a task force among local community groups to coordinate with NYC OEM in developing locally relevant Homeowner Education and Storm Preparedness materials that are targeted directly towards the needs of the Idlewild Watershed Communities.
- Implement a pilot project for a Locally-Based Evacuation Strategy—the strategy is envisioned as a comprehensive approach to disaster preparedness that would include development of a plan in coordination with community based organizations (CBOs) to address the individualized evacuation needs of Community residents. The strategy would involve outreach and education for residents and businesses to establish personalized evacuation plans

Figure 4.17: Southeast Queens Disaster Recovery Plan



(e.g., route, location, shelter, etc.) in advance of future disasters.

Cost: $230,000 – 750,000

The estimated cost of first phase of this project—Establish COAD and Develop a Southeast Queens Disaster Recovery Plan—is roughly $230,000. This estimate includes costs for the establishment of a COAD and a disaster recovery plan. The cost to establish the COAD includes developing a COAD structure and recruitment of members, establishment of roles and responsibilities, and training for member organizations. Training would include approximately three workshops and associated curricula for members. The cost of a disaster recovery plan includes the scope of services outlined in the project description above, with an emphasis on identifying feasible locations for Resource and Recovery Centers and developing effective disaster communications.

The estimated cost of the second phase of this project—Implement Recommendations of the Southeast Queens Disaster Recovery Plan— is approximately $500,000. This includes the cost for providing assistance to the COAD to implement the recommendations from the first phase, the establishment of one Resource and Recovery Center through a competitive solicitation process, and community education. Components of this community education campaign include the development and distribution of Community-specific educational materials to vulnerable populations and the development of an emergency response website and mobile app for the Community.

The estimated cost for this project has a low degree of uncertainty, and no externalities are expected as a result of either phase of the project.

Food Bank Volunteers

Source: www.ready.gov

Benefits and Co-Benefits

Economic Benefits

This project would create an estimated eight fulltime equivalent jobs[118] (FTEs) through the developmental and implementation phase.

The Southeast Queens Disaster Recovery Plan would create a COAD, which would have positive economic benefits. The COAD will increase the capacity of disaster preparedness and recovery for nonprofit and community groups, which would significantly increase the productivity of volunteer labor and moderately offset the need for disaster recovery personnel which could result in a more efficient disaster recovery response. The COAD would have a greater understanding of the specific Community needs during a disaster event and would coordinate the response to those needs in a more cost effective, timely fashion. Therefore, this program could reduce the costs of disaster

recovery, potentially providing more services to individuals and households, including vulnerable populations. The COAD could qualify for a variety of funding that would not be available to government agencies. In addition, local organizations and regional emergency agencies could save money and resources by responding in an organized and coordinated manner during and after a disaster event. The COAD would expedite disaster preparation and recovery efforts, allowing residents to return home and businesses to reopen faster. Therefore, this project would decrease the costs of temporary business closures, avoiding lost profits, lower sales tax revenues, and lost wages for employees.

In addition, implementation of the plan may help to reduce the costs of evacuations in the Community. These costs, which are incurred by both private and government entities, can be significant. Better planning and preparedness can help reduce these costs and increase the likelihood that lives are saved which is the ultimate goal of evacuation plans.

The Recovery and Resource Center created through the Southeast Queens Disaster Recovery Plan would provide similar benefits. It would also reduce disaster preparation and recovery costs by consolidating multiple social service and emergency response functions into a single building, increasing efficiency. The Resource and Recovery Center would be known through the Community as the first stop for Community members, minimizing the confusion that comes with disaster recovery.

Additionally, the Locally-Based Evacuation Strategy would facilitate the evacuation process. Overall, implementation of the plan would decrease disaster preparation and recovery costs.

Health and Social Benefits

Health and Social benefits would be significant due to increased coordination and efficiency of disaster preparation and recovery. Efficient and faster disaster preparedness and recovery will benefit socially vulnerable populations living in the Community, who may need assistance preparing for and recovering from disaster events. 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 due to loss of infrastructure or other lifelines (e.g., power, sewage, or water).[119] These services may also result in lower incidents of illness and morbidity associated with disaster situations. In addition, the COAD will communicate with nonprofit organizations and local agencies to create a list of socially vulnerable populations that would need assistance before, during, and after disaster events. This would help ensure that all socially vulnerable individuals are appropriately assisted.

The Southeast Queens Disaster Recovery Plan would focus on increasing communication and assistance to the 2,023 individuals with limited english proficiency, 6,338 households with at least one disabled individual, 10,727 elderly (over the age of 65), and 21,246 children within the Community.[115] This communication may include expanding outreach through other channels such as social media, email, and other technologies such as Notify NYC. The plan would create a voluntary registry of elderly residents for use by the COAD, CERT,

NYC OEM Educational Materials *Source: www.nyc.gov/oem*

CERT Networking *Source: Joe Loong*

and proposed NORC to provide evacuation assistance, distribute medical supplies during power outages, and as a means to check on vulnerable residents after disasters.

Cost-Benefit Analysis

The cost of this project is outweighed by its economic and health and social benefits. The Community will gain an understanding of the assets and socially vulnerable populations that must be protected, the process for evacuating flood zones, and the tasks required for disaster recovery, such as coordinating the distribution of emergency supplies, accounting for the livelihood of socially vulnerable populations, and providing resources for repairs to damages. The Southeast Queens Disaster Recovery Plan would save City agencies, residents, and businesses in the Community on disaster preparation and recovery costs and ensure that critical assets and socially vulnerable populations are protected against disasters. These significant benefits would increase the capacity of CBOs and government agencies to respond to future storm events, compounding the project's benefit to cost ratio.

Backup Generator *Source: www.cquest.us*

Risk Reduction

This project would reduce risk for all Community members within the Idlewild Watershed Communities. It would enhance the disaster preparation and recovery capacity of the Community by improving the ability of the CBOs and City agencies to provide assistance for vulnerable populations, protect assets that are critical to the Community, and recover from disaster events.

Timeframe for Implementation

The timeframe for the first phase of this project is immediate and can be completed within one (1) year or less. The implementation of the plan recommendations in the second phase is also immediate and can be completed within one (1) year or less. Ongoing coordination as well as stakeholder involvement to guide the design of the Plan, will need to be defined.

Regulatory Requirements

No regulatory requirements are anticipated for this project, however it will require close coordination with NYC OEM.

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

Strategy C: Support Environmental Stewardship of the Community's Natural and Manmade Resources

C1: Idlewild Watershed Communities Green Infrastructure Workforce Training Program [Proposed] and Open Space Restoration Fund [Featured]

Project Description

Neighborhoods in the Idlewild Watershed Communities experienced flooding during Hurricane Irene due to heavy rainfall and during Superstorm Sandy due to extreme storm surge and storm sewer backups. All of these sources of flooding could be mitigated by extensive implementation of green infrastructure to complement the storm sewer system by capturing stormwater, slowing runoff, and easing the burden placed on the storm sewer system by heavy rainfall and storm sewer backups. The NYRCR Plan for the Idlewild Watershed Communities emphasizes planning and implementing green infrastructure projects, but these capital programs are only one piece of the puzzle. The Committee has identified a two-phased approach in order to maximize the impact of these projects and to support municipal agency partners in constructing and maintaining them. This approach provides economic benefits to Community residents and sets forth a strategy for establishing a maintenance partner to assist New York City agencies to ensure that new green infrastructure and existing parks and wetlands are maximally functional at mitigating stormwater flooding.

This two-phased approach has been split into one Proposed Project and one Featured Project. The objective is to develop a strategy that brings together New York City agencies, a non-profit maintenance partner, and Community residents to build environmental stewardship for the Community's natural resources and manmade green infrastructure as critical components of the stormwater management network. The project would develop a plan for long-term maintenance of and advocacy for green infrastructure in the Community, while also providing job training, workforce development, and volunteer programs to improve economic opportunities for Community residents. The primary benefits of the Idlewild Watershed Communities Open Space Restoration Fund are to ensure that residents benefit from expanding green infrastructure programs, increase awareness of the importance of natural resources in reducing flood risks, and taking the first steps towards ensuring that an organization exists to provide critical, ongoing maintenance of the Community's stormwater management infrastructure, including Bluebelts, bioswales, ponds, creeks, and wetlands.

Phase 1: Green Infrastructure Workforce Training [Proposed Project]

The first phase of the project is development of a workforce training and volunteer development program. The Green Infrastructure Workforce Training Program will provide workforce training and volunteer development and training programs to encourage stewardship of the Community's parks and open space by local residents and businesses. As demand grows for green infrastructure as a complementary strategy to reduce the risk of stormwater flooding, the need for workers with specialized skills will also grow. According to the U.S. Environmental Protection Agency (U.S. EPA), as green infrastructure installations become more prevalent across the country, the demand for related job skills will continue to rise. Green jobs training programs would provide outreach to local youth and unemployed residents in the Community to teach them skills related to the initial design and installation of green infrastructure practices, as well as for long term maintenance.[120]

With the initial funding provided by NYRCR funds, an intensive pilot course would be provided that could train up to 80 individuals, with priority for unemployed, Section 3, and/or low- to moderate-income individuals. The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent possible, provide job training, employment, and contract opportunities for low- or very-low income residents in connection with projects and activities in their neighborhoods.[121] This course could be modeled after successful courses, such as those run by DC Greenworks

in Washington, D.C. or Rutgers Water Resources Program in New Jersey.[122]

In addition to establishing the Green Infrastructure Workforce Training Program, the Proposed Project would also include development of a strategy to establish a maintenance partner to work with New York City Department of Environmental Protection (NYC DEP) and New York City Department of Parks and Recreation (NYC DPR) in maintaining green infrastructure on an ongoing basis. The project would not include funding for ongoing maintenance, but would take initial steps for identifying a partner who could collaborate with NYC DEP, NYC DPR, and Community representatives to seek additional funding to carry out necessary maintenance.

Phase 2: Idlewild Watershed Open Space Restoration Fund [Featured Project]

Stewardship and maintenance of wetlands and green infrastructure was identified as a critical need by the Committee, members of the public, and City agencies as a strategy to prevent stormwater flooding and to maximize the stormwater storage capacity of the Community's natural resources. A maintenance partner would need to be established in order to coordinate between City agencies—in particular NYC DEP and NYC DPR—and a local group with intimate knowledge of the priorities and needs of the Community. Similar programs are operated by citywide organizations such as the New York Restoration Project (NYRP), City Parks Foundation, and Design Trust for Public Space.

Superstorm Sandy and Hurricane Irene resulted in significant flooding within the Community's stormwater system, in particular within the Idlewild watershed. Even during regular conditions, stormwater flooding is a problem for the Community. As part of this NYRCR Plan for the Idlewild Watershed Communities, several vegetated green infrastructure projects are recommended to mitigate stormwater flooding (see Strategy A). However, green infrastructure best management practices require regular maintenance to function properly over time. Without maintenance and funding for such maintenance activities, these projects may experience a reduced capacity in providing the intended risk reduction benefits. For example, green infrastructure may become clogged with sediment and debris and fail to absorb stormwater.[123] The Open Space Restoration Fund would provide funding to support a revolving fund that puts in place adequate resources for the ongoing maintenance of existing parks for stormwater management and recreation, in particular for Bluebelts, wetland areas, and bioswales. It would also provide a mechanism for maintenance of the proposed NYRCR green infrastructure pilot projects, including the Brookville Park Pond Restoration, Twin Pond Park Bluebelt Enhancement, and Green Infrastructure Pilot Project (School Green Roof and Raingarden).

Springfield Park

Cost: Proposed–$200,000; Featured–$350,000

The Green Infrastructure Workforce Training Program (Proposed Project) would include $200,000 allotted to workforce training, volunteer development, and developing a plan to establish an ongoing maintenance partner. The Idlewild Watershed Community Restoration

Fund (Featured Project) would include $350,000 to establish seed funding to support stormwater facility maintenance tasks.

The cost estimate has a low degree of uncertainty, but it is flexible and scalable, should the Community wish to expand or continue it beyond the initial two-year implementation period. No additional operations and maintenance costs are expected with this program aside from those already included and no external costs are anticipated.

Benefits and Co-Benefits

The Green Infrastructure Workforce Training Program will contribute towards continuity of the benefits generated by green infrastructure and related projects in the Community. The Idlewild Watershed Community Open Space Restoration Fund would provide the seed money for a variety of projects that could not have been otherwise initiated, with indirect environmental, economic and health and safety benefits.

Environmental Benefits

The Green Infrastructure Workforce Training Program would provide workforce training and volunteer development programs to prepare members of the Community to care for critical stormwater management resources in their neighborhoods and contribute to the continuation of the environmental benefits provided by green infrastructure, such as mitigation of stormwater flooding and improved air and water quality. Specifically, when properly maintained, green infrastructure can retain and filter pollutants from stormwater before it enters the sewer system and receiving water bodies.

Springfield Park Pond

This would reduce non-point source pollution, improve surface water quality and aquatic habitat, potentially decrease occurrences of sewer overflows and disruptions, and mitigate the damage to the environment caused by stormwater flooding. Improved water quality would benefit species that rely on the aquatic habitat, some of which are listed as endangered or threatened, including the piping plover, red knot, and roseate tern.

Green infrastructure projects also provide for greening of the Community and improve the aesthetics of the surrounding neighborhoods. In addition, green infrastructure reduces the urban heat island effect and cools ambient air temperatures through shading and evapotranspiration, with potential for reduced energy consumption.

Economic Benefits

The Green Infrastructure Workforce Training Program would provide training to local residents to work on a variety of Green Infrastructure projects, which would support an estimated two full time equivalent jobs (FTEs) for two years.[118] The monies would fund training and volunteer development programs to increase stewardship of green infrastructure and the stormwater management system in the Community. Green infrastructure, including ponds, wetlands, bioswales, and open space, can increase the value of surrounding properties due to improved aesthetic quality, viewscapes, air quality, and reduction in noise. This would have benefits for the entire Community, including the 15,720 low-income households.[124]

Brookville Park Pond

By developing a network of skilled workers within the Community, the program could help to facilitate implementation of green infrastructure projects that may not have otherwise been implemented due to lack of proper training. The Restoration Fund could help to increase implementation of maintenance programs that would otherwise not be undertaken due to lack of funding. By increasing the feasibility of implementing such projects, green infrastructure implementation could increase. Additional green infrastructure projects would provide shading and insulation that effectively cools urban heat islands, decreasing the energy required to cool surrounding buildings. Therefore, energy costs for these buildings could decrease.

The Green Infrastructure Workforce Training Program would help satisfy the growing demand for specialized skills sets and develop local, reliable, and qualified labor force and volunteers. The workforce development programs provided by the project would improve knowledge and skills of primarily low-wage workforce and other socially vulnerable populations which may improve employment prospects for the Community's 15,720 low-income households and 7.0% unemployed labor force.[125] Training would enable at-risk populations to advance in careers in the construction, development, and home repair industry. In addition, the project may reduce unemployment rates, which would improve the local economy. The training program would improve the ability of the local workforce to meet the demand for workers trained in disaster recovery efforts, which may decrease the cost of disaster efforts by avoiding the need to bring temporary workers in from outside the area. Local workers would also spend their wages and income in the Community, supporting economic development and growth of the area, whereas non-local workers would spend the majority of their earnings outside the Community.

Depending on the funded green infrastructure maintenance projects, the Community may experience the indirect benefit of a decrease in repair and restoration costs after a flood event. The continued functioning of green infrastructure projects would decrease the stress on sewer infrastructure and increase the retention of stormwater, reducing the severity of floods and damage to streets, infrastructure, and properties. Therefore, in or after a flood event, the project would reduce or avoid damage to infrastructure, utilities, roadways, and 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.

As this project is scalable, its benefits are scalable. Likewise, as it would provide funding, its benefits could grow exponentially in the future as that funding is leveraged against other public and private sources. Each $1 million of additional funding from other sources would lead to at least 11 additional FTEs generated.

Green infrastructure has been demonstrated to be more cost-effective than traditional "grey" infrastructure. Maintaining green infrastructure is necessary to facilitate these benefits, including reduced operational costs, reduced wear and tear, and longer life span of "grey" infrastructure

and its components, which can reduce long-term capital costs and costs to comply with municipal storm sewer system (MS4) permits.[126]

Health and Social Benefits:
All 93,792 residents of the Idlewild Watershed Communities would benefit from this program, including approximately 15,720 low-income households (income under $67,000), 10,727 elderly (over the age of 65), and 21,246 children.[127] The workforce training program offered through this project could train up to 40 individuals, with priority for unemployed, Section 3,[121] and/or low- to moderate-income individuals.

Public health benefits would result from maintaining green infrastructure that functions as designed, including improved water quality that reduces water-borne illnesses, improved air quality that could reduce asthma and other respiratory illnesses, which are common among socially vulnerable populations, such as children and the elderly. Especially in areas subject to sewer backups, the reduced occurrence of such events would also reduce the health hazards associated with such events.

Cost-Benefit Analysis

The economic benefit of 80 additional skilled laborers in the local workforce who are trained to maintain green infrastructure would provide benefits well beyond the fund's $200,000 cost estimate for workforce development. These benefits include local employment opportunities, increases in green jobs, income and economic growth in the Community, and the availability of trained workforce to meet the ongoing and increased demands of the market and to appropriately respond in the event of a flood.

The Open Space Restoration Fund could fund the maintenance of existing greenspace and green infrastructure throughout the Community, as well as the pilot projects proposed in project A1. The pilot projects in Strategy A will only function effectively with continued maintenance and therefore the benefits resulting from those projects would be sustained by the Idlewild Watershed Community Open Space Restoration Fund. Consequently, the continued and cumulative environmental, economic, and health and social benefits of the green infrastructure pilot projects described in Strategy A above are likely to be much higher than this fund's low cost of $350,000 in funding for maintenance. Important benefits include increased property values, reduced property damage costs and public service interruptions in the case of a flood event and continued cost-savings for stormwater treatment.

Risk Reduction

By contributing to the maintenance of the projects implemented through Strategy A above, this project would have the cumulative risk reduction benefit of those projects, benefitting the entire population (93,792) of the Idlewild Watershed Communities. Although indirect, the risk reduction benefit of this project includes ongoing reduction in peak stormwater volumes through green infrastructure that can mitigate stormwater flooding.

Timeframe for Implementation

The timeframe for implementation is immediate and can be completed within two (2) years or less.

Regulatory Requirements

It is assumed that the Workforce Training Program and Restoration Fund would operate as a 501(c)(3) nonprofit organization and as such all rules and procedures that pertain to organizations under section 501(c)(3) of the International Revenue Code would apply.

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have general jurisdiction over areas and locations that may be affected by the project.

C2: Home and Business Owner Education and Technical Assistance Program [Featured Project]

Project Description

This program would provide education and technical assistance to Community home and business owners on effective measures of flood damage mitigation, the impact these measures have on flood insurance rates, and potential resources for financial assistance. Education and technical assistance would be delivered through two different strategies:

- Educational Programs: Educational campaigns, workshops, and outreach; and
- Technical Assistance: Home Resiliency Needs Assessments and Business Continuity Audits and Counseling.

Workshops and audits would be conducted by trained staff that are able to answer technical questions and identify resiliency needs and improvements. The program would seek to hire Section 3 qualified workers or businesses.[121]

According to preliminary Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), 1,856 residential units and 10 commercial lots within the Community have been added to the 100-year flood zone. As home and business owners face new requirements and challenges related to flooding and flood insurance, they will need help understanding their options. The goal of this program is to streamline the education process, help home and business owners understand flood insurance options and requirements, and provide them with practical and concrete steps to limit the risk of flood damage to their home or business. Property owners can make their homes and businesses more resilient and potentially reduce their flood insurance rates by implementing certain flood protection measures, such as installing check valves, dry or wet floodproofing, building elevation, adding vents to enclosures, or installing breakaway wall units.[128]

Educational Workshops

Educational workshops would leverage existing programs conducted by City agencies, such as the NYC Department of Environmental Protection (DEP) green infrastructure pilot projects,[129] by providing funding for additional education campaigns which agencies may be unable to fund. By combining educational materials from multiple City agencies, this program would create a suite of materials with interagency information.

The NYC Department of City Planning's (DCP) report, Retrofitting Buildings for Flood Risk (October, 2014[130]) is one resource that could be utilized to help property owners understand how they can adapt their buildings to reduce flood risk. The report provides a step-by-step approach to an adaptation project with a range of retrofit solutions for various property types. The report 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 Figure 4.18.

Workshops in the Community for home and business owner education would be a key component of the program. Educational materials would be distributed at the workshops (with funding for two years) as well as through on an online clearinghouse.

Other topics of education provided at the workshops would include education about changes to FEMA's flood maps, flood insurance requirements, how to obtain flood insurance, and guidance for grants, loans, legal support, and financial planning. Additionally, guidance would be provided on best practices for building retrofits and various physical resiliency measures including installation of backflow preventers in wastewater service lines, prevention of basement flooding through flood barriers placed on driveways, proper disposal of fats, oil, and grease, the flood mitigating effects of permeable surfaces, and residential green infrastructure practices. The workshops would also guide property owners to appropriate loan and contracting resources that can implement retrofits and resiliency measures.

Outreach would be another important component of the education program, as some Community members may not be aware that they have options to reduce their flood insurance and reduce their flood risk. Outreach would be particularly important to reach socially vulnerable populations in the Community (e.g., low to moderate income households, those with limited english proficiency, the elderly, and the disabled). Program outreach would focus on distributing educational materials as well as making sure that residents and business owners are aware of the services offered.

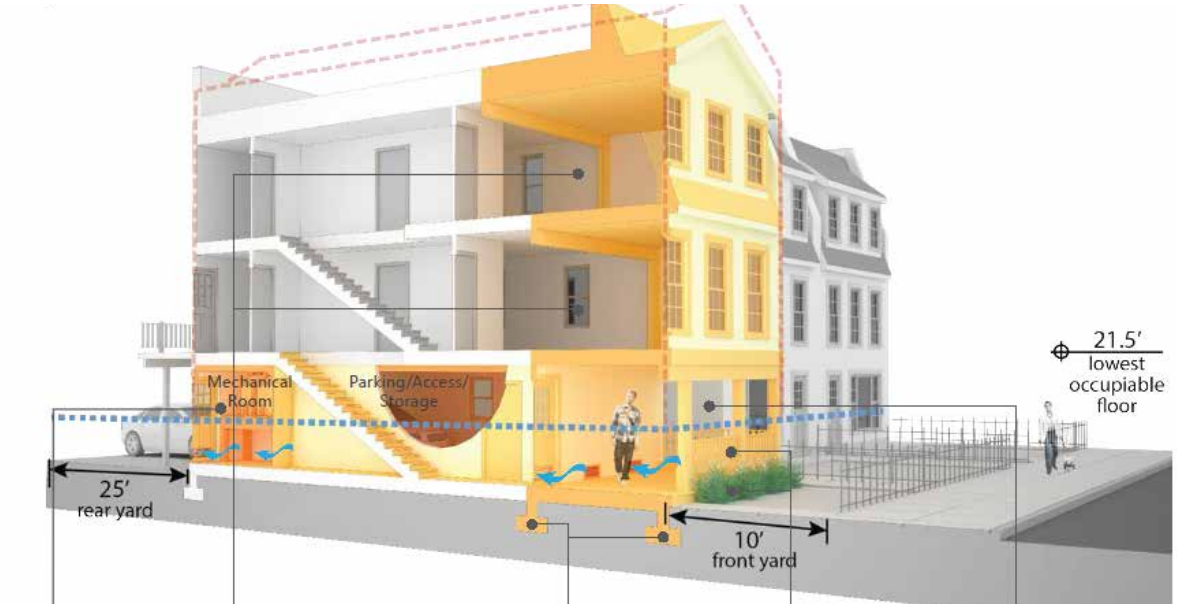
Technical Assistance

Technical assistance would be delivered in the form of on-site building audits and counseling performed by trained case managers.

Individual building audits would provide homeowners with a Resiliency Needs Assessment report and business owners with a Business Continuity Needs Assessment report. Priority for the audits would be given to residents and businesses in the 100-year flood zone (according to FEMA Preliminary FIRM maps) and low- to moderate-income individuals. The Community may partner with other organizations and NYRCR Communities that have been working on similar educational programs.

A report would be provided to the home or business owner after an audit is performed, which would include recommendations on measures to mitigate flood risks and minimize flood insurance rate increases. Recommendations will take into account guidelines distributed by FEMA [National Flood Insurance Program (NFIP)], NYC DCP (Flood Resilience Zoning Text Amendment), and the NYC Department of Buildings (NYC DOB). Case managers would discuss the report with the home or business owners to make sure that they understand their various options, specific steps they can take to mitigate flood risks, and potential methods for reducing flood insurance costs. Recommendations for short-, medium- and long-term actions would be provided.

Figure 4.18: Elevate and Wet Floodproofing—Semi-Detached Homes



Source: Coastal Climate Resiliency: Retrofitting Buildings for Flood Risk, NYC Department of City Planning, 2014

Counseling would be provided by case managers in similar topics, including business continuity and building retrofits. Specific topics covered may include flood insurance, flood risk, rebuilding and resiliency retrofits, and assistance finding organizations to complete retrofits. Examples of retrofit options to be discussed include building floodproofing measures, installation of backup power generators, and elevation of mechanical systems, where appropriate.

Housing counseling and audits would be available to assist low- and moderate-income households with flood risk reduction measures and to provide guidance to first time homebuyers in evaluating the flood risk of a potential home purchase.

Cost: $250,000

This program would include three workshops for business owners, six workshops for homeowners, and the hiring of a field team to audit properties and prepare customized recommendations for floodproofing homes and businesses. Individual property audits would provide approximately 155 property owners with technical assistance.

The costs for this program have a low degree of uncertainty, assuming that each audit costs approximately $850. The program is scalable and flexible, should the Community wish to expand or continue it beyond the initial two-year implementation period. No additional operations and maintenance costs are expected with this program.

This project would give homeowners and business owners the knowledge and technical

assistance to retrofit their properties and undertake flood damage mitigation measures. Therefore, the indirect costs of the project would include the future costs of mitigation and floodproofing construction activities as well as external costs associated with construction, such as potential noise and air quality impacts and potential business closures during the temporary construction activity.

Benefits 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 home audits. Homes that no longer experience flooding would avoid or minimize potential environmental impacts of flood damages, such as home heating oil spills in which oil mixes with flood waters and can contaminate nearby wells, water bodies and adjacent homes or businesses.[131] Other potential environmental hazards that could be averted due to improved flood mitigation measures could include hazardous materials, heating systems which can contain asbestos, and sheet rock which can contain lead paint.[132]

Economic Benefits

This project would generate a total of three full time equivalent jobs[133] (FTEs) for one year through workshops and training for home and business owners and hiring a field team for individual on-site property audits. The total market value of residential and commercial properties eligible to be audited is $311.5 million. With the audit team in the Community for just under two years, it is estimated that approximately 155 properties in the 100-year FEMA flood zone (according to FEMA Preliminary FIRM maps) could benefit from this program. Construction and other activities to mitigate flood risks would generate economic activity in the area, benefiting local jobs and income.

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. The resiliency retrofits and flood mitigation improvements would avoid damage and repair costs in future storm events. The risks of flooding would be reduced for approximately 155 properties, , which would lead to reduced damage and insurance claims after a flood event. By way of comparison, paid insurance claims by the NFIP for the New York City region as a result of Superstorm Sandy were $750 million through February 2013, with the average payment of $54,000.[134] 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.

Based on the FEMA Preliminary FIRM maps, 2,545 housing units and 17 commercial lots in the Idlewild Watershed Communities would be in the updated FEMA 100-year flood zone. This represents a 269% increase in housing units and a 143% increase in commercial lots that will now require flood insurance. Providing education and technical assistance on flood mitigation measures could lead to the implementation of flood protection measures, which could reduce insurance premiums.[135,136] For example, elevating a residential building or floodproofing a commercial structure may lower flood insurance premiums.[137] 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 insurance for a property owner is often transferred to a renter through rent payments. There are 356 renter-occupied housing units within the FEMA preliminary 100-year flood zone.[138]

Floodproofed businesses are likely to reopen more quickly after a flood event, decreasing business disruptions, benefitting business revenues, local employees and income. Businesses in Queens generate $2.3 million in revenues per year, averaging to $6,300 per day for each business.[139] Without the implementation of flood mitigation measures, business disruptions during and after a flood even would incur lost sales for every day that businesses are closed. In addition, businesses will have reduced financial strain, leading to a lower likelihood of furloughs or permanent layoffs after a flood event.

In addition, the program would seek to hire low- or very low-income residents and certified Section 3[121] businesses to conduct the workshops, providing workforce training opportunities in flood mitigation. Section 3 businesses would gain further experience in resiliency retrofits and flood insurance plans; such experience will empower these businesses by strengthening their presence in NFIP related projects.

Health and Social Benefits

Residents and businesses in the 100-year FEMA flood zone (according to FEMA Preliminary FIRM maps) would be eligible for the technical assistance program. The educational workshops would be open to the entire Community within the 100-year flood zone. This population includes approximately 15,720 low-income households (income under $67,000), 2,023 individuals with limited english proficiency, 10,727 elderly (over the age of 65), and 21,246 children.[140] This program will provide low income households, which comprise 54% of all households in the Community, with the tools and resources to floodproof their homes. It will provide them with the tools that they need to learn how to floodproof their homes, which would decrease their risk to future floods. Measures to mitigate against flood risks will benefit the health, safety, and mental well-being of residents, reducing the risks of flooded properties, time evacuated, exposure to contaminants, and other life disruptions during and after a flood event.

Repeated flooding of residential properties has lasting public health impacts, which could be mitigated by improving the resiliency of the Community's housing stock and businesses. According to the World Health Organization, the main health impacts associated with flooding are fatalities, injuries, and mental health illnesses during the flood event itself and during the restoration process.[141] Hypothermia, electrocution, burns, and carbon monoxide poisoning are all associated with the use of equipment to recover from flooding in poorly ventilated indoor areas, while 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 socially vulnerable populations through this program will provide residents with the information they need to make flood mitigation retrofits that would reduce their vulnerability to flooding and the associated public health risks.

Cost-Benefit Analysis

Through the education provided by this program, property owners would gain the practical knowledge they need to make their business or residence less vulnerable to flood damage in future storm events. Indirect benefits would include avoided environmental contamination and public health impacts associated with flooded homes and businesses and reduced costs of repairs and restoration after flood events. Floodproofed businesses are likely to reopen more quickly after a flood event, decreasing business disruptions, benefitting business revenues, local employees and income generation. In addition, retrofit and reliance measures could reduce insurance premiums and may also help to offset any property value losses that may occur with the new requirements to obtain flood insurance. These economic, environmental, and health and safety benefits are likely to be greater than the direct costs of the technical assistance ($250,000) as well as the indirect costs of constructing the retrofits and mitigation projects, which could be as low as $2,000 per property.[142]

Risk Reduction

Home and business owners would gain a better understanding of their flood mitigation needs through this technical assistance program. Through this understanding, they would be able to initiate steps to implement resiliency measures at their homes or businesses. Thus, this project could increase the number of buildings that would be floodproofed. This would reduce risk for residents, as well as business owners and workers that rely on commercial properties for income. Depending on the floodproof measure implemented, residences and businesses will experience a vulnerability reduction to a score of one or two.

Timeframe for Implementation

The timeframe for implementation is immediate and can be completed within two (2) years or less.

Regulatory Requirements

N/A

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

Strategy C: Additional Resiliency Recommendations

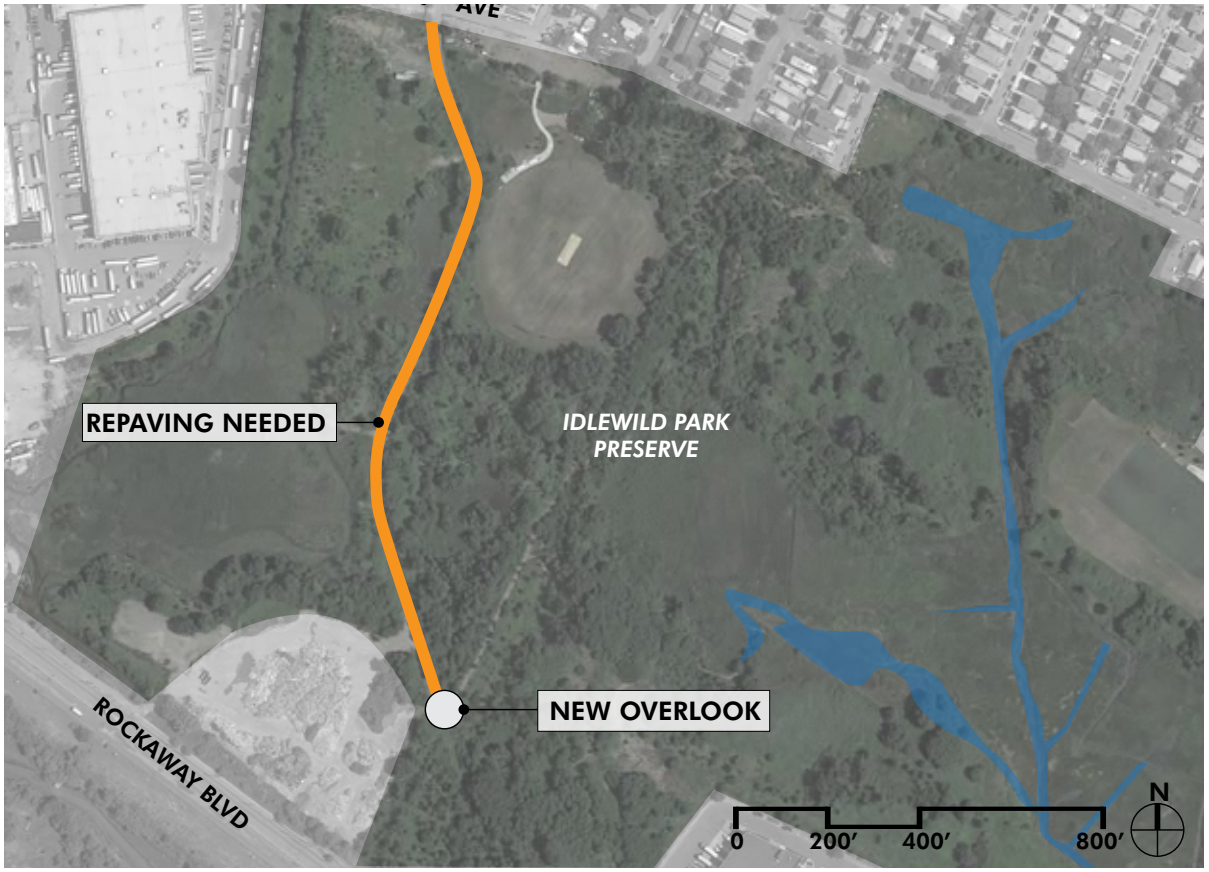
C3: Advocate for Idlewild Park Preserve Trail Network and Overlook Restoration

This project would advocate for improved connectivity of the overlook constructed by the NYC Department of Environmental Protection (DEP) and NYC Department of Parks and Recreation (DPR) in Idlewild Park Preserve. The overlook is currently being restored by creating a network of trails and nature walks within the Park. Idlewild Park has been designated a Forever Wild Preserve, a natural area within New York City that supports diverse wildlife and plant populations, including numerous rare, threatened, and endangered species. The goal of this project is to increase awareness of the purpose and function of Idlewild Park Preserve by providing user friendly outdoor activities and educational opportunities for the public to experience and interact with the park (Figure 4.19).

The first step in this project would be to develop a conceptual plan that considers the location of sensitive areas, scenic overlooks and vistas, contiguous uses, access, connectivity, and transportation to both the new Idlewild Park Preserve Environmental Learning Center and the Idlewild Park Preserve overlook. This would include maps and three dimensional renderings that illustrate key features. While the length of trails would be determined by the plan, it is estimated that a trails network of at least two miles would be feasible. Costs to implement the plan will be estimated and itemized, including operations, maintenance, and cycle costs. Partners will be identified for implementation, which will include blazing the trails, installing interpretive and educational signage, constructing platforms or boardwalks as necessary, and installing new benches in scenic viewing areas. The project would also include funding for necessary permits and species assessment, and soil erosion and sediment control measures.

The project would further enhance the natural features and character of the Preserve by guiding hikers along designated routes to avoid environmentally sensitive areas and habitats. It would also provide healthy recreational opportunities by providing uninterrupted pedestrian connectivity to existing trails, in a park that is a valued Community asset.

Figure 4.19: Idlewild Park Preserve Trail Network and Overlook Restoration



C4: Advocate for Municipal Agency Coordination to Prioritize Resilience

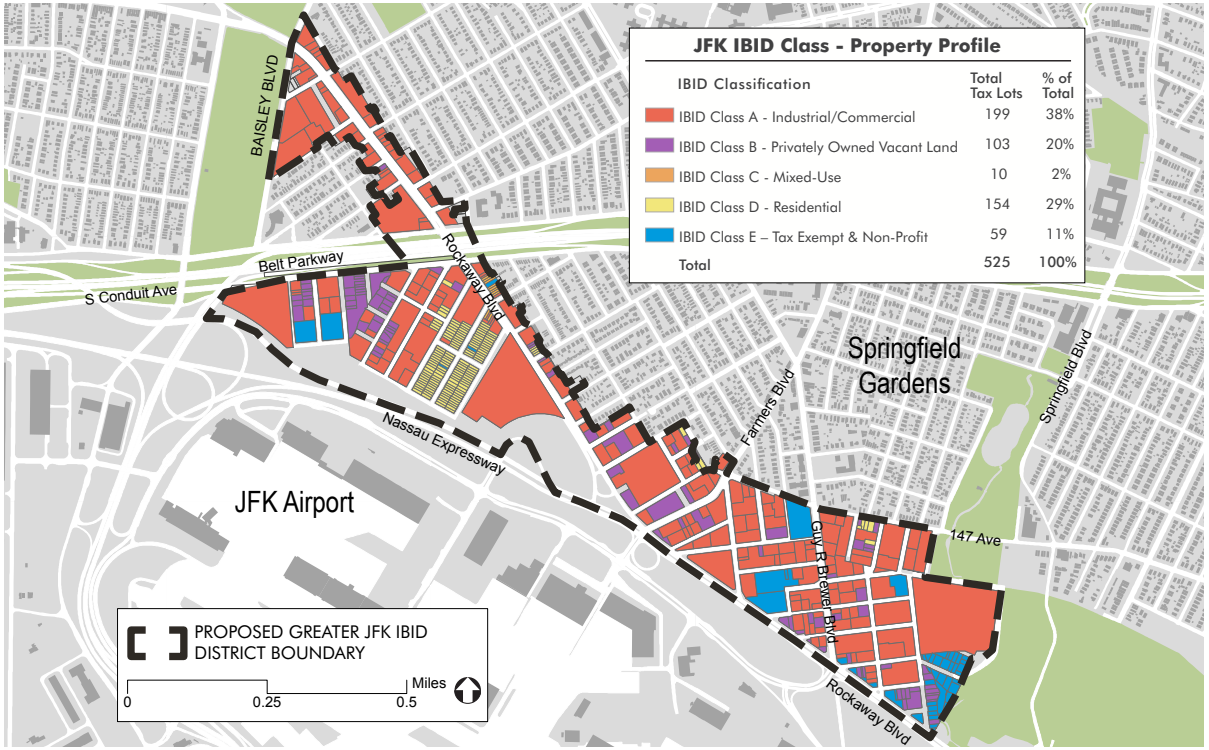
This project would establish a policy position to advocate for City agencies to better coordinate their activities to prioritize resilience. Through the NYC Office of Recovery and Resiliency, PlaNYC,[143] and A Stronger, More Resilient New York,[144] resilience to extreme weather and the impacts of climate change have emerged as critical priorities for the future of the City. While these planning documents provide City agencies with a framework for formulating agency-level priorities that are in line with City-wide resilience goals, some local projects in the Idlewild Watershed Communities are viewed by the Community as not being supportive of the critical goal of increasing resilience. In addition, there is a perceived lack of enforcement of current laws, especially with regards to illegal dumping.

The Committee would like for all City agencies to not only view resilience to extreme weather and the impacts of climate change as top priorities when planning future program development and capital project planning but also to coordinate these efforts on an interagency level.

C5: Support for Creation of Greater JFK Industrial Business Improvement District (IBID)

This project would establish a policy position to advocate for the creation of the Proposed Greater JFK IBID with specific recommendations for roles that the JFK IBID could play in increasing resilience (Figure 4.20). In particular, the Committee advocates that the JFK IBID evaluate strategies to address recurring stormwater flooding within the District boundaries, which impacts both residents and businesses. In addition, the Committee advocates that the JFK IBID contribute to increased enforcement of dumping within the District. Dumping along 150th Road, within the JFK IBID Boundary, has an impact on the health of the wetlands in the Idlewild Park Preserve, which could limit the capacity of the wetlands to absorb stormwater. Further, the JFK IBID could evaluate whether dumping in other parts of the Community results from activities by businesses that are located within the District. Dumping along Springfield Lane and Brookville Boulevard has a negative impact on the health of the wetlands.

Figure 4.20: Map of Proposed Greater JFK IBID



Source: BFJ Planning

Strategy D: Provide Safe and Reliable Access to Critical Goods and Services

D1: Install Backup Power Supply Systems at Critical Facilities [Proposed Project]

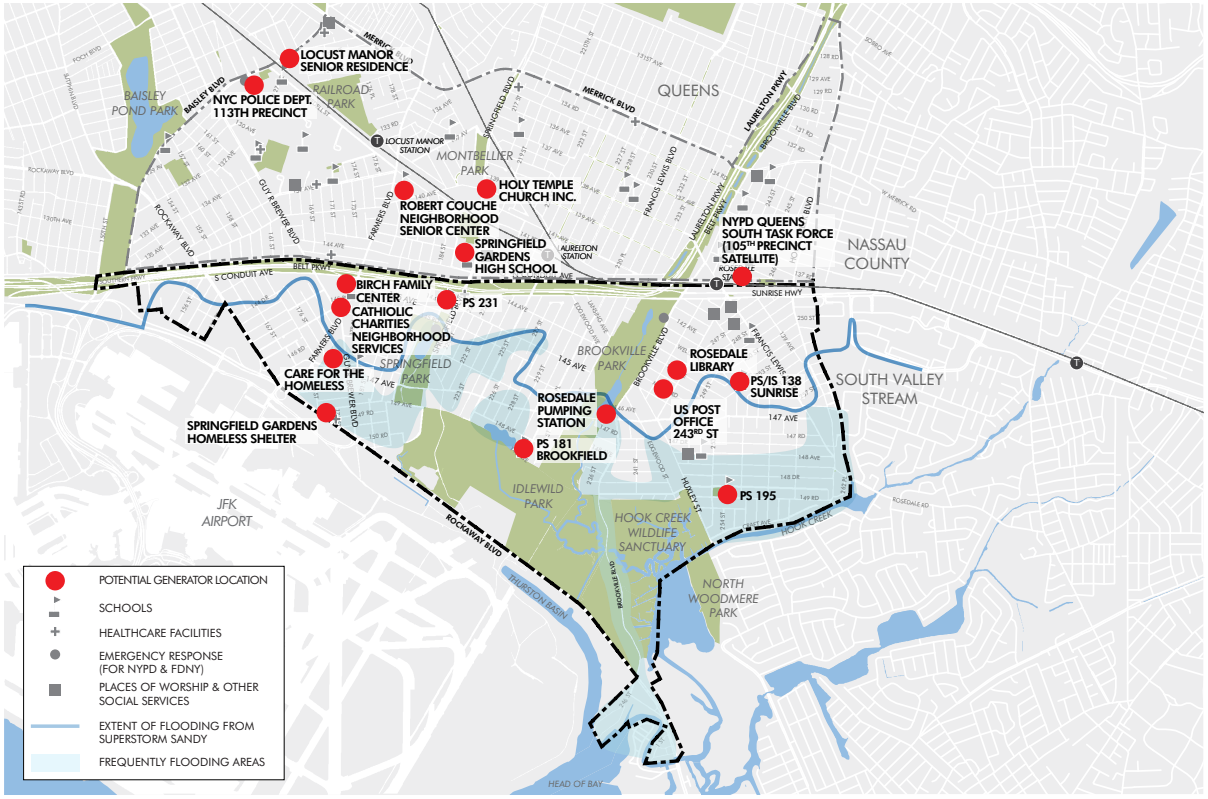
Project Description

During Superstorm Sandy, the Community's electrical grid was compromised and failed to provide power to facilities that served vulnerable populations, such as the young, elderly, and disabled. Unreliable power or complete power failure at these facilities impeded the use of critical facilities after the storm, which slowed disaster recovery. Ensuring power at critical facilities and those that serve vulnerable populations would benefit the entire Community before, during, and after storm events. For example, schools with reliable power will not need to temporarily transfer their students to a different school; senior centers would not need to evacuate their residents because of a power failure; and functioning traffic lights and street lights would maintain safe transportation infrastructure.

This project would initiate a competitive process to provide funding to install fixed, permanent generators or renewable energy sources —such as solar panels with backup batteries—at critical facilities to provide reliable power during and after major storm events (Figure 4.21). Funds would be provided exclusively for the backup power supply systems. Funding for necessary site preparation, including elevation of the power supply, constructing or hardening the structure where the generator would be located, or other site improvements would be secured separately by the respondents. The power supply installed would switch on automatically, activated by an automatic transfer switch that transfers the load from the utility feed to backup generators without intervention of a human operator. This would allow the facility to function during and after storm events when the surrounding power infrastructure fails.

Critical facilities eligible for this project could include emergency response facilities, evacuation centers, MTA facilities, and critical infrastructure such as the Rosedale Pumping Station. Eligible facilities that serve socially vulnerable populations include schools, healthcare facilities, disability clinics, and

Figure 4.21: Potential Locations of Backup Generators



government services. However, facilities located in the 100 year floodplain would not be eligible.

The installation of generators at critical facilities opens up the ability to develop a potential microgrid network. A microgrid network can create a small-scale power network that uses the generator as a power source. The network would be independent from the main power network and would continue to function if the main power network were to fail.

Cost: $500,000

The cost of the program would enable one location to install a backup power supply system, including either:

- The installation of a 250 kW natural gas generator capable of powering over 40,000 sq. ft. (with HVAC systems), insurance for the generator, and an assessment with cost estimate of site preparation required to install the generator; or
- The installation of 2,000 sq. ft. of solar panels that could produce 100 kW of solar power per day for two days with backup batteries, capable of powering 25,000 sq. ft. (without HVAC systems); and an assessment with cost estimate of site preparation required to install the solar panels.

The recipient of the funding would need to provide matching funds for site preparation.

Natural gas generators and solar power were utilized for the purpose of estimating costs associated with this project, yet that is not to the exclusion of other power supplies, such as fuel cells or other renewable energy technologies. When a facility responds to the competitive solicitation, it would be required to indicate its energy demand during an emergency event, the proposed location for the backup power supply, and an initial proposal of the most appropriate type of backup power given site conditions. For example, if a facility does not have existing natural gas service yet has a large roof area; it may apply for a photovoltaic system with backup batteries. Therefore, this cost estimate has a significant level of uncertainty given that the exact facility where the power supply would be installed is unknown. However, the project is both flexible and scalable, depending on the needs of the facilities that respond to the competitive solicitation and the matching funds that these facilities can provide. The $500,000 allotment of CDBG-DR funds could be divided to meet the needs of one facility, or multiple facilities, depending on the competitive solicitation responses.

The cost of natural gas generator may vary, depending on the needs and size of the facility. Table 4.2 below shows the facilities and needs that various generators can accommodate.

Operations and maintenance costs for the natural gas generator are estimated at $480,000, which includes the cost of natural gas needed to run the generator, general cleaning, periodic emissions testing, and periodic part replacements for an average operating life of approximately 25 years. Conversely, operations and maintenance costs for the solar powered backup system are estimated at $1,784,800 for the useful life of 25 years.

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, as illustrated in Table 4.3. Any form of backup power installation may require the temporary closure of the building.

Benefits and Co-Benefits

Environmental Benefits

Environmental benefits would vary depending on the backup power supply source utilized for each facility. A natural gas backup power supply will not have direct environmental benefits, but would have several social and health benefits. A solar system with backup batteries would provide significantly greater environmental benefits, as the average solar power system can offset 30 tons of carbon dioxide over 30 years; equal to approximately 60,000 miles driven, planting 2,400 trees, avoiding 80,000 gallons of water used in electricity production, and avoiding 16 tons of burned coal.[145]

Queens Public Library, Rosedale

Economic Benefits

This program would create five full time equivalent jobs[146] (FTEs) for one year. These jobs would be created through the procurement and installation of the backup power supply system. The operations and maintenance of the backup power supply (not funded by this project, to be provided as a match by the selected recipients) would create an additional five FTEs over the span of 25 years.

Backup power at critical facilities would have moderate economic benefits resulting from avoided costs associated with power outages at one or more critical and locally significant facilities that would have otherwise experienced power failure. This project is scalable, meaning that if other funding is identified the $500,000 contribution could be leveraged to provide backup power supplies to additional facilities, resulting in significant economic benefits. Further, if locally significant facilities within the Community had backup power supplies, they could serve as resource and recovery centers, charging stations, or warming/cooling centers, effectively increasing 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.

While a natural gas generator would not offer any direct utility cost savings, a solar backup power system could provide the added benefit of utility savings during non-storm events, offsetting an estimated $0.17 per kWh, totaling approximately $136,500 over the system's useful life.

Table 4.2: 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, cooking, and air circulation*	40 kW	$53,000
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 distribute heating throughout the building

Source: Engineer's Estimate. Louis Berger. 2014.

Table 4.3: Potential emissions from Natural Gas Generator

Potential Emissions	Emission Factors (lbs/MMcf)	Emissions (lbs/hour)	lbs per year (8 hours per day for 7 days)	tons/year
CO	84.0000	0.0843	4.7208	0.0024
VOC	5.5000	0.0055	0.3091	0.0002
NOx	100.0000	0.1004	5.6200	0.0028
PM	7.6000	0.0076	0.4271	0.0002
SO_2	0.6000	0.0006	0.0337	0.0000
CO_2	120000.0000	120.4285	6743.9976	3.3720
N_2O	2.2000	0.0022	0.1236	0.0001
CH_4	2.3000	0.0023	0.1293	0.0001

Source: U.S. EPA: AP 42: Compilation of Air Pollutant Emission Factors. Chapter 1.4, Natural Gas Combustion.

Health and Social Benefits:
Health and social services benefits cannot be readily quantified, but would be significant because the project would allow facilities that serve socially vulnerable populations to operate during power outages. The installation of a backup power supply to a critical facility will ensure access to the functions that it provides, such as emergency medical services or response, during Community-wide power failures caused by extreme weather. As a scalable program, a total of approximately 75 facilities in the Communities could be eligible to participate. Depending on the competitive solicitation response, healthcare patients could have access to a medical facility with a backup power supply, eldercare residents may not need to evacuate their residential facility, or a school could serve as a resource and recovery center.

Cost-Benefit Analysis

Through this project, the Community would gain reliable power at one (or more, depending on the competitive solicitation responses) critical facility that serves socially vulnerable populations. The economic benefits of creating 10 full time equivalent jobs and moderately reduced costs associated with power outages, combined with the moderate health and social benefits gained by reliable operation of one or more facilities that serves socially vulnerable populations outweigh the project's relatively low cost ($500,000).

Considering capital costs, a natural gas generator is more cost effective than solar panels, as $500,000 could power 40,000 sq. ft. with HVAC, while solar panels with backup batteries could power 25,000 sq. ft. without HVAC for the same cost. Likewise, the life cycle costs of a natural gas generator are approximately one third of the cost for the solar backup power system. However, given site conditions and environmental benefits, the solar system may be more appropriate. Further, the solar system would provide a year-round benefit of cost savings on a facility's utility bills, totaling approximately $136,500.

While this cost estimate would fund one average location, 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 (e.g., lighting, heating) to be powered by the supply, existing natural gas connection, and the organization's ability to match funding from other sources. Therefore, the competitive solicitation process would determine the facilities that would directly benefit from this project and could scale the project accordingly. For example, the competitive solicitation could determine that a backup power supply system at one school would cost $300,000 to power gymnasium lighting for three days, while two smaller social services organizations would only require $200,000 each to provide backup power to their entire facilities. 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 power supply system would significantly reduce the vulnerability of one or more critical or locally significant assets outside of the floodplain, reducing its risk to a residual level and allowing for the facility to continue operations during a storm event, as well as serve a dual purpose (i.e., Resource and Recovery Center) after the storm event. This project would reduce risk for populations that rely on the facility or infrastructure powered by the backup supply. These populations cannot be quantified as the exact locations are unknown. The populations would experience a reduced risk of evacuation of their facility and the loss of functions of the facility that they rely on.

Timeframe for Implementation

The timeframe for implementation is immediate and can be completed within two (2) years or less.

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

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

D2: Study to Elevate Brookville Boulevard (Snake Road) between 149th Boulevard and Rockaway Boulevard [Featured Project]

Project Description

Brookville Boulevard between 149th Ave and Rockaway Boulevard—known locally as Snake Road—is a key transportation corridor for the Idlewild Watershed Communities. The roadway services 17,500 cars daily, the Q114 bus route, and provides direct access from Brookville to Rockaway Boulevard, one of the area's main east-west thoroughfares. However, Brookville Boulevard is a dangerous road due to its location, layout, and elevation. The road is only 24 feet wide in most locations and is situated at an elevation of only four feet above sea level as it winds through low-lying wetlands, causing it to flood frequently.[147] Further, it lacks guard rails, shoulders, and other standard roadway safety measures.

The roadway washed out from tidal surge during Superstorm Sandy, limiting transportation access to the Community and limiting the Community's ability to access the area's main retail centers, including the Five Towns Shopping Center. It continues to wash out regularly during spring tides and storm events. The Study to Elevate Brookville Boulevard would:

- Identify the direct causes of flooding at Brookville Boulevard between 149th Avenue and Rockaway Boulevard;
- Study the feasibility of elevating the entire length of roadway between 149th Avenue and Rockaway Boulevard (4,300 feet) to address the identified causes of flooding;
- Determine necessary improvements to roadway geometry to improve safety;
- Assess the use of infrastructure upgrades to elevate the roadway on a trestle to encourage the passage of intertidal waters through the surrounding wetlands. The passage of these waters is important for the protection and nourishment of the wetlands and the function of the wetlands as a water retaining body; and
- Evaluate constructing a wetlands boardwalk adjacent to the elevated roadway for pedestrian and bicycle travel.

The report would evaluate the feasibility of several alternatives and assess the effectiveness of those alternatives for flood mitigation and safety. The scope of work for this project would also include baseline studies such as topographic and geotechnical surveys, environmental site assessments, threatened and endangered species surveys, wetland delineations, and tidal analysis. Ultimately, the report would include development of a preferred alternative that would seek to improve the function and ecological health of the wetlands, as well as the Community's ability to access goods, services, and jobs in the aftermath of major storm events or during typical spring tides (Figure 4.22).

Cost: $450,000

This cost includes baseline studies of the current state of the road, traffic analysis, development of alternatives that mitigate flooding on the road, and a comparative analysis of these alternatives, recommendation of one "preferred alternative," cost estimation of this alternative, and identification of any expected regulatory approvals and permits necessary for project implementation. The baseline studies would include the following:

Flooding of Brookville Boulevard (Snake Road) at Idlewild Park Preserve

Source: New York Daily News

- Existing information review: Review of current projects or studies that impact Brookville Boulevard, review of the context of the project with other planned or ongoing projects, and review of the current problems with flooding on the roadway. This cost also includes field surveys to assess existing conditions.
- Traffic analysis: Analysis of existing traffic conditions, temporary, and permanent traffic impacts that would result from the reconstruction of Brookville Boulevard.

Under Existing Conditions, Snake Road Floods Frequently due to Low Elevation

Source: Google Earth

Figure 4.22: Conceptual Rendering of Snake Road Elevation

- Topographic surveys: A surveyor licensed in the state of New York would perform a baseline topographic survey of the roadway and adjacent area to locate existing structures (e.g., manholes and catch basins). Surveys would be performed using aerial and/or ground based methods to generate one-half (0.5) foot contour intervals.
- Wetland Delineations: The survey prepared above would also delineate adjacent state, federal, and non-jurisdictional wetlands.
- Threatened and Endangered Species surveys: The areas surrounding Brookville Boulevard would be assessed for the presence of threatened or endangered species, critical aquatic and terrestrial habitat, and nesting or breeding areas.
- Tidal Analysis: A tidal analysis would be conducted to evaluate how the alternatives would impact tidal flows and the extent to which each alternative would protect the roadway from tidal surge. It would also consider the potential impacts on tidal flows through the trestle within the Idlewild wetlands.

The Study to Elevate Brookville Boulevard would include a dedicated public outreach effort to engage local community based organizations, residents, and business owners.

Minimal uncertainties are associated with the costs of the study; however, costs for implementation of the preferred alternative recommended in the study are likely to be high but are unknown at this time. The scope of work for the study would determine the costs associated with design and construction. Likewise, no operations and maintenance costs are associated with the study; however, implementation of the project would have bridge and roadway maintenance costs that would be estimated within the cost estimating task performed as part of the study.

The process of performing the study would be part field survey and part desktop survey, which would result in minimal impacts, if any, on Brookville Boulevard. However, the potential implementation of the project resulting from the study may have impacts on traffic and circulation, including potential external costs associated with a temporary closure of part or all of Brookville Boulevard during construction. The potential implementation project may also have environmental consequences to species in the wetlands habitat where construction of footings for the trestle would occur. Construction activities could also have temporary impacts to noise, air, and water quality.

Benefits and Co-Benefits

Environmental Benefits:
While environmental benefits would not result directly from the study, implementation of the study's recommendations would have moderate environmental benefits for the Idlewild wetlands. Increasing the elevation of Brookville Boulevard would allow the passage of water through culverts under the reconstructed road, or the trestle on which the road is elevated. Currently, the flow of water within the Idlewild wetlands is impeded by the wetlands' basin geomorphology (the connectivity of the streams and ponds) and anthropogenic modifications (the changes in wetland structure due to pollution). Increasing water flow in the park would moderately improve the hydrology of the wetlands. The health of the wetlands and their ability to absorb water depend on the hydrology of the wetlands. Elevating Brookville Boulevard would increase the flow of water within the Idlewild Park Preserve, which would significantly improve the water retaining capacity of the wetlands and strengthen their function as a tidal barrier. Increased flow would also improve the health of the wetland ecosystem in the Idlewild Park Preserve. According to the U.S. Environmental Protection Agency, an acre of wetland can typically store about three acre-feet of water, or one million gallons. Therefore, the 196-acre wetlands in the Idlewild Park Preserve surrounding Brookville Boulevard would have the capacity to store 588 acre-feet of water, or 196 million gallons.

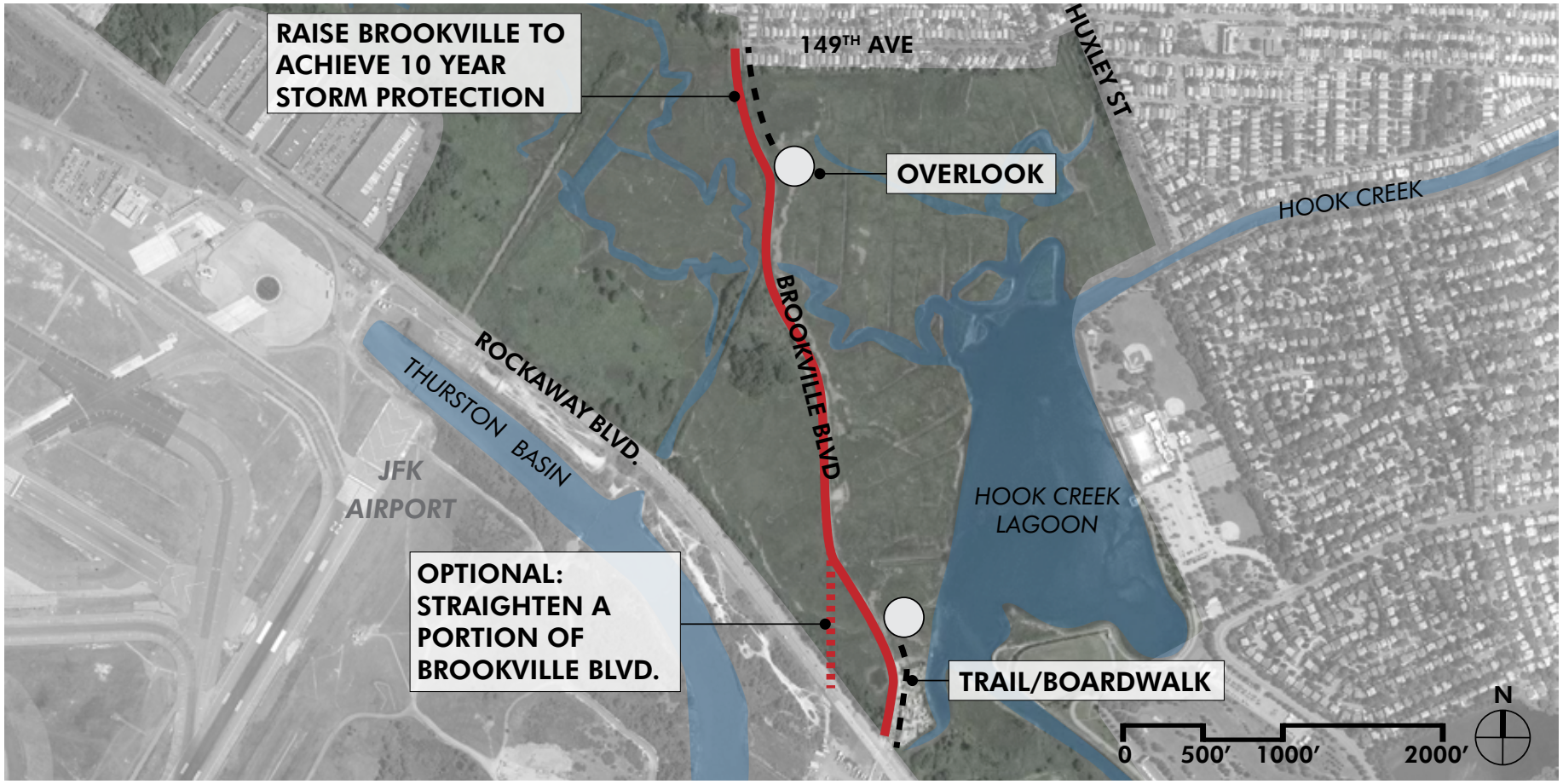
Economic Benefits:
The study would create five full time equivalent jobs (FTEs)[148] for a year, but would have few other direct economic benefits. The design and construction of the elevated roadway, although not included in this project's funding, would generate additional FTEs, income, and additional economic activity in the Community. In addition, ongoing operations and maintenance of the reconstructed Brookville Boulevard would also support jobs and income in the area.

In addition, NYC DOT would save on repair costs for the damages that storms, tidal floods, and spring tides currently cause to the road. Avoided repair costs include fixing sink holes and repaving of the road surface, which could cost up to $1.3 million for the entire boulevard and occur on average every 10 years.

Elevating Brookville Boulevard would decrease—and potentially eliminate—flooding of the roadway, which would lead to a safer and more reliable route through the Community and would connect the Community to key economic assets. Because of Brookville Boulevard's location, this affects commuter traffic, public transit, intra-city trips, and trips between New York City and Nassau County. The importance of Brookville Boulevard is evident in its high traffic volume, designation as a bus route, and connectivity between communities.

The route would also be more reliable in the aftermath of flood events or storms, when emergency responders may need to use the road for quick travel. Since there is no convenient detour around Brookville Boulevard, the increase in its reliability would greatly benefit both local residents and emergency responders. A detour around Brookville Boulevard during flood conditions could increase response times by up to seven minutes. Increased response times have both economic and social impacts. Implementation of this project could reduce the costs of disaster response and potentially provide more services to individuals and

Figure 4.23: Map of Brookville Boulevard from 149th Ave to Rockaway Boulevard (Snake Road)



households, including vulnerable populations. Elevating the roadway would avoid these cost increases, resulting in economic benefits to first responders and to residents and businesses served by the first responders.

Implementation of the project would improve the functioning of wetlands to retain additional stormwater, which could reduce the damage and associated repair costs to nearby homeowners and businesses in a flood or storm event. Ensuring uninterrupted travel on Brookville Boulevard would also support continued and future economic activity and possibly commercial investments in the area.

Additionally, the project could include a wetland boardwalk adjacent to the elevated roadway, which could provide recreational and aesthetic value to nearby property owners, increasing nearby property values. The boardwalk could trigger additional visitor spending and economic activity in the area.

Health and Social Benefits:
The Study to Elevate Brookville Boulevard would not have direct health and social benefits. However, implementation of recommendations of the study could have significant benefits to the health and safety of the motorists who use Brookville Boulevard. It could also provide opportunities for pedestrians or bicyclists to use the roadway, which is presently not available due to unsafe conditions.

Brookville Boulevard's narrow lanes and abundance of curves—in addition to the surrounding tall vegetation that limit visibility—make it a prime location for traffic accidents. In the past five years, several fatalities and injuries have occurred from traffic accidents along the roadway.[149]

Implementation of the study's recommendations would reduce the frequency of traffic accidents from two causes, roadway geometry and routine flooding. Reconstructing the roadway in accordance with current NYS Department of Transportation (DOT) safety guidelines would provide significant benefits to the health and safety of drivers along the roadway by improving sight lines, removing sharp curves, and installing proper safety measures (e.g., retroreflective pavement markings, rumble strips, guard rails). Reconstructing the roadway at an elevation that protects against the 10-year storm event (6.3 ft. NAVD) would reduce the frequency of traffic accidents resulting from flood hazard conditions.

The implementation of anticipated study recommendations may also include a path along the reconstructed Brookville Boulevard for bicyclists and pedestrians. This would increase recreational opportunities within the Community, while providing bikers and pedestrians a direct route from Brookville and Rosedale to Rockaway Boulevard, and offering potential future connections to regional Greenway efforts such as the Jamaica Bay Greenway. Public health benefits resulting from increased accessibility to bicycle travel would include regular exercise (and associated benefits to cardiovascular health and lower obesity rates) and improved air quality from reducing auto trips. The path may also include educational signage, which would provide information about the wetlands and their benefits. Increased awareness about the wetlands would increase public support for the preservation and protection of wetlands.

Cost-Benefit Analysis

There are few direct benefits that would result from the Study to Elevate Brookville Boulevard; the project cost of $450,000 would result in the creation of five full time equivalent jobs for a year. The study is necessary for the potential elevation of Brookville Boulevard to occur, and therefore the benefits of elevating the road can be tied back to this initial study. Significant indirect economic benefits that would result from the study include potential jobs for design and construction, avoided costs for road repaving and repairs resulting from recurring inundation, avoided costs for residences and businesses near the wetlands after a flood or storm event, and cost savings for emergency response. In addition, the wetland boardwalk could also induce visitors spending and provide amenities for residents.

Further, the elevation and realignment of Brookville Boulevard that could be recommended by this study could save lives and benefit the 6,400 people that live in the region immediately north and south of Brookville Boulevard, who are most likely to use the roadway for either evacuation or daily travel, and the 17,500 drivers that use Brookville Boulevard every day. Risk reduction and economic benefits are compounded by the environmental benefits to ecological health and coastal resiliency, as well as a new recreational and multi-modal transportation asset that would benefit quality of life. Although the costs of design and construction of the elevated roadway are likely

to be considerable, the benefits that would result from the elevated roadway, stormwater retention, and the wetland boardwalk, as described above, are also considerable. 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 feasibility study be undertaken at a relatively low cost of $450,000.

Risk Reduction

The study itself would not directly reduce risk, but would assess alternatives for reducing risk and identify the alternative with the highest risk reduction benefit. The potential elevation and realignment of Brookville Boulevard as a result of the study would reduce the risk of flooding along the road, which is a critical element of the transportation infrastructure system. As stated above, the reduction of flood occurrences would greatly decrease the risk of accidents for 17,500 drivers that use Brookville Boulevard every day. Socially vulnerable populations would also experience a reduced health risk since emergency responders would be able to rely on Brookville Boulevard for reduced travel times during flood events.

Elevation of Brookville Boulevard would also improve drainage capacity at the wetlands. Improved drainage would increase the wetlands' function as a tidal barrier, reducing the risk of tidal floods for the Community.

Timeframe for Implementation

The timeframe for implementation of the Study to Elevate Brookville Boulevard is immediate; the study can be completed within two (2) years or less. Implementation of the recommended plan would be long term, as the study would need to be completed, followed by securing funding and permits for implementation.

Regulatory Requirements

Implementation of recommendations of the Study to Elevate Brookville Boulevard would require coordination and input from City, state, and federal agencies. The project would be subject to a regulatory review from the New York City Department of Environmental Protection (NYC DEP), the New York City Department of Transportation (NYC DOT), and the New York City Department of City Planning (NYC DCP). Due to the scale of the project, agencies would also likely be involved in the review and permitting of the project; such agencies are likely to include at a minimum the New York State Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), the National Oceanic and Atmospheric Administration (NOAA), agencies associated with the New York State Coastal Zone Management Program (CZMP) including the New York State Department of State (NYS DOS).

Jurisdiction

As this project is in the Borough of Queens, the City of New York would have jurisdiction over the project.

Strategy D: Additional Resiliency Recommendations

D3: Elevate 147th Avenue Bridge at Brookville Park

The 147th Avenue Bridge crosses over Brookville Park between 232nd Street and Brookville Boulevard. South of the Belt Parkway, this bridge is the only transportation corridor that allows access from Rosedale to Brookville and Springfield Gardens. A traffic report in 2003 estimates the daily traffic count on this bridge to be around 13,000. Despite the importance of the bridge, it possesses several vulnerabilities. The bridge is at a low elevation, making it susceptible to tidal inundation. During Superstorm Sandy, the 147th Avenue Bridge was flooded, posing many risks stemming from the loss of a safe transportation route through the Community.

The bridge features culverts that allow the passage of water from Brookville Park Pond into the Idlewild Park Preserve wetlands. The culverts are low lying, which do not allow an efficient flow of water. This disruption in water flow may cause Brookville Park Pond and the surrounding area to flood during rain events. In addition, due to its lower elevation and flooding issues, the bridge has deteriorated over time. Crash barriers and both the edges of the bridge are deteriorated and substandard.

There is currently a project underway that would reconstruct a segment of Brookville Boulevard and adjoining streets, which make up an area named the Brookville Edgewood Triangle. The scope of this project includes the reconstruction of the 147th Avenue Bridge described above (Figure 4.24). The project is currently in the design phase and funded for construction in 2015. This project would support the elevation of the 147th Avenue Bridge and reconstruct the drainage beneath the bridge.

Elevation of the bridge would reduce the occurrences of flooding, increasing hydraulic capacity under the bridge for flood flows and allowing safer access to the bridge for automobiles, bikes, and pedestrians. Thus, reconstruction of the bridge is important for the following reasons:

- The flood water conveyance and flow would be improved for the underlying creek;
- The bridge services a high traffic road (~13,000 cars daily);
- The bridge services two MTA bus lines (111 and 114);
- Adverse impacts on traffic circulation are avoided; there is a lack of detours if the bridge is flooded; and
- Improved public safety for pedestrian and cyclists.

Figure 4.24: Elevate 147th Avenue Bridge at Brookville Park

D4: Support Rockaway Turnpike/ Nassau Expressway Resilient Corridor Study (NYRCR Plan for the Five Towns)

The Idlewild Watershed Communities Planning Committee supports the Rockaway Turnpike/ Nassau Expressway Resilient Corridor Study which was included as a Proposed Project in the NYRCR Five Towns Plan, with an expanded scope that addresses potential impacts and benefits for the Idlewild Watershed Communities (Figure 4.25).

The scope of the Rockaway Turnpike/Nassau Expressway Resilient Corridor Study was designed to provide regional benefits and extends beyond the Five Towns boundary into the Idlewild Watershed Communities. The study was designed to respond to the extent of Superstorm Sandy inundation and the Five Towns Planning Committee recognized that preventing future tidal flooding would require an elevated levee that reached beyond the length of Thurston Basin, adjacent to JFK Airport. Elevating Rockaway Boulevard, which was the solution described in the Five Towns project description, could protect the Idlewild Watershed Communities from future tidal flooding, but would also cause potential unintended consequences within the Community.

The Idlewild Watershed Communities Planning Committee advocates that the Rockaway Turnpike/Nassau Expressway Resilient Corridor Study explore strategies to mitigate severe tidal flooding while protecting and enhancing the wetlands in Idlewild Park Preserve that help to reduce stormwater flooding in the Community as well as in adjacent NYRCR Communities, including the Five Towns and South Valley Stream. Critically, the Committee advocates that this project cause no negative impacts on the Idlewild Park Preserve wetlands.

Figure 4.25: Rockaway Turnpike/Nassau Expressway Resilient Corridor Study

Section V
Additional Materials

SECTION V. ADDITIONAL MATERIALS

A. Additional Resiliency Recommendations

Table 5.1: Additional Resiliency Recommendations

Strategy	Project #	Project Name	Short Description	Estimated Cost	Regional Project (Y/N)
A: Alleviate Localized Flooding	A1e	Advocate for Construction of Thurston Basin Park	Advocate for NYC DPR to construct the funded park project at the southern end of Thurston Basin. Project is to include wetland restoration along Thurston Basin and construction of comfort stations near the kayak launch.		N
	A1f	City Purchase of Privately Owned Parcels on Edges of Idlewild Park Preserve	Use City funds to acquire 64 vacant privately owned parcels within and directly adjacent to Idlewild Park Preserve. Restore wetlands within the acquired properties, as needed.		N
	A4	Idlewild Park Preserve Culvert Expansion	Reconstruct culvert in Idlewild Park Preserve to install a larger opening. Improved tidal flow would help to restore areas by supporting natural vegetation and wetland functions.		N
C: Environmental Stewardship	C3	Advocate for Idlewild Park Preserve Trail Network and Overlook Restoration	Advocate for improved connectivity of the overlook constructed by NYC DEP and NYC DPR to the network of trails in Idlewild Park Preserve.		N
	C4	Advocate for Municipal Agency Coordination to Prioritize Resilience	Advocate for all City agencies to view resilience to extreme weather and the impacts of climate change as top priorities when planning future program development and capital project planning.		Y
	C5	Support for Creation of Greater JFK Industrial Business Improvement District (IBID)	Advocate for the creation of the Proposed Greater JFK Industrial Improvement District. Advocate that the JFK IBID evaluate strategies to address recurring stormwater flooding within District boundaries and contribute to increased enforcement of illegal dumping.		N

Table 5.1: Additional Resiliency Recommendations (Con't)

Strategy	Project #	Project Name	Short Description	Estimated Cost	Regional Project (Y/N)
D: Access to Critical Goods and Services	D3	Elevate 147th Avenue Bridge at Brookville Park	Advocate for NYC DOT to elevate the 147th Avenue Bridge between 232nd St and 235th St. Elevation of the bridge would reduce the occurrences of flooding, allowing safer access to the bridge.		N
	D4	Support Rockaway Turnpike/Nassau Expressway Resilient Corridor Study (NYRCR Plan for the Five Towns)	Advocate for the Rockaway Turnpike/Nassau Expressway Resilient Corridor Study from the NYRCR Five Towns Plan, with an expanded scope that addresses potential impacts and benefits for the Idlewild Watershed Communities.		Y
	D5	Support for Existing or New Retail/Commercial	Advocate for NYC SBS to establish an information clearinghouse to provide information on flood insurance requirements and resiliency measures.		Y

B. Master Table of Projects

Table 5.2: Master Table of Projects

Strategy	Project #	Project Name	Short Description	Project Category	Estimated Cost	Regional Project (Y/N)
Strategy A: Alleviate Localized Flooding	A1	Green Infrastructure Community Master Plan	Provide funding for locally-specific Green Infrastructure Master Plan as a component of NYC DEP's larger southeast Queens green infrastructure study. In particular, the plan should emphasize interagency coordination, evaluate the potential for stormwater capture on both public and private properties, and identify critical gaps in stormwater management that are not addressed by ongoing and planned infrastructure projects in the area.	Proposed	$750,000	Y
	A1a	Brookville Park Pond Restoration	Dredge Brookville Park Pond to increase stormwater storage capacity. Conduct riparian restoration in a 4' wide planting area around the perimeter of the pond.	Proposed	$1,600,000	N
	A1b	Community Gateway Green Streets	Construct right-of-way (ROW) bioswales at key community gateways to increase stormwater retention and treatment, while improving the streetscape, fostering a sense of place, and supporting local business growth. Project would include construction of bioswales, rain gardens, planting of new street trees, and stormwater tree pits on Francis Lewis Boulevard between 248th Street and Brookville Boulevard, 225th Street between South Conduit Boulevard and 145th Road, and the crossroads of Farmers Boulevard and Guy Brewer Boulevard.	Proposed	$2,900,000	N
	A1c	Green Infrastructure Pilot Project (School Green Roof and Raingarden)	Construct a green infrastructure pilot project at a public building, such as school or library. This pilot project would include a green roof, rain garden, and porous pavement, serving as a demonstration of various green infrastructure best management practices. Educational signage and associated educational curricula would illustrate the benefits of green infrastructure. This project could potentially receive partial funding through NYC DEP's NYC Green Infrastructure grant program.	Proposed	$1,250,000	N
	A1d	Twin Pond Park Bluebelt Enhancement	As a complement to construction of outfalls by NYC DEP, conduct riparian restoration to beautify the park and construct bike path to connect Twin Ponds Park to Brookville Park.	Featured	$850,000	N
	A2	DEP Oyster Restoration in Thurston Basin	Support the proposed NYC DEP Oyster Restoration project in Thurston Basin. Oyster restoration could improve water quality, help reduce wetland fringe erosion, and stabilize the banks of Thurston Basin.	Featured	$250,000	N
	A3	Coastal Management Plan	Study the impacts of coastal defenses to protect the Community from tidal flooding at a regional scale. Recommended projects could include constructing a berm along the Idlewild Park Preserve border to block storm surge, constructing tide gates at Hook Creek, and installation of green infrastructure upland to reduce flow of stormwater into areas with low elevation.	Featured	$465,000	Y

Table 5.2: Master Table of Projects (Con't)

Strategy	Project #	Project Name	Short Description	Project Category	Estimated Cost	Regional Project (Y/N)
Strategy B: Emergency Response Capacity	B1a	Southeast Queens Disaster Recovery Plan	Phase I: Establish Idlewild Watershed COAD. ▪ Develop Southeast Queens Disaster Preparedness and Recovery Plan. ▪ Identify assets and vulnerabilities of local not-for-profit organizations. ▪ Identify potential locations for Resource and Recovery Centers. ▪ Establish communication between CBOs and NYC OEM. ▪ Training and education for CERT, COAD and residents.	Proposed	$230,000	Y
	B1b	Implement Recommendations of the Southeast Queens Disaster Recovery Plan	Phase II: Implement selected Recommendations of the Disaster Response and Preparedness Plan.	Proposed	$500,000	Y
Strategy C: Environmental Stewardship	C1	Phase 1: Green Infrastructure Workforce Training Program	Develop and implement workforce training and volunteer development programs to provide skilled training in green infrastructure installation and maintenance to Community residents while also encouraging environmental stewardship of the Community's natural and manmade stormwater management facilities.	Proposed	$200,000	N
	C1	Phase 2: Idlewild Watershed Communities Open Space Restoration Fund	Establish a recurring fund to provide ongoing maintenance of the Community's parks and wetlands to ensure that they can adequately function as resources for stormwater flooding mitigation. Seed money will establish the fund, which will provide for ongoing maintenance of parks, wetlands, and Bluebelts and bioswales, and serve as an advocate for the Community by identifying additional funding sources and securing City resources to conduct improvements and maintenance.	Featured	$350,000	N
	C2	Home and Business Owner Education and Technical Assistance Program	Provide education and technical assistance to the Communities' homeowners and business owners on how to minimize flood damage, prevent sewer backflows, and on the benefits of permeable surfaces in reducing stormwater damage. Provide technical assistance in the form of counseling and on-site building audits performed by case managers.	Featured	$250,000	Y
Strategy D: Access to Critical Goods and Services	D1	Install Backup Power Supply Systems at Critical Facilities	Install generators and/or solar power at critical facilities to provide a more reliable power source during and after major storm events. Critical facilities could include Schools, Senior Centers, Medical facilities, Resource and Recovery Centers, or Rosedale Pumping Station.	Proposed	$1,000,000	N
	D2	Study to Elevate Brookville Boulevard (Snake Road) between 149th Boulevard and Rockaway Boulevard	Study the feasibility of elevating the entire length of Brookville Blvd (Snake Road) through the Idlewild Park Preserve on a trestle to prevent flooding of the roadway and encourage the passage of intertidal waters through the surrounding wetlands.	Featured	$450,000	Y

C. Public Engagement Process

Goals and Objectives

The Public Engagement Process for the Idlewild Watershed Communities was structured to encourage broad Community participation, including people from all areas and sectors of the Planning Area. The goal was to actively engage the Community in the process of creating a pragmatic program that envisions a resilient and sustainable future for the Idlewild Watershed Communities, which include Springfield Gardens, Brookville, and Rosedale.

The goals of the Public Engagement Process were to:

- Lower barriers to participation and encourage more people and more diverse voices to participate in the NYRCR planning process;
- Engage with a significant number of stakeholders and a broad, representative cross section of the public in an efficient manner, including anyone displaced from their residences or businesses due to Superstorm Sandy and its aftermath;
- Establish ongoing, inclusive, meaningful, and responsive two-way communication with stakeholders;
- Ask the residents, businesses, relevant organizations, and officials of the Idlewild Watershed Communities to provide useful information that can inform the NYRCR Plan; and
- Develop practicable strategic policy and project recommendations built upon a solid base of public support.

In summary, the public outreach component of the plan was effective in informing a wide spectrum of the Community about the NYRCR Program 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, and helped to identify a group of potential project "champions" who can oversee and monitor projects as they proceed in the future.

Public Engagement Strategy

Planning Committee

The ten-member NYRCR Planning Committee (Committee) was comprised of civically engaged residents. The Presidents and Executive Leadership of many local civic associations were engaged as Committee Members, including the Rosedale Civic Association, Springfield Rosedale Community Action Association, the 147th Road Block Association, the 148th Road Block Association, the Springfield Gardens Taxpayers Association, the Springfield Gardens Community Civic Association, and the Eastern Queens Alliance. The Committee played a crucial role in providing input and information to shape the Plan and in assisting with the broader Public Engagement Strategy through their constituent and social networks.

The Committee played a primary role in guiding the outreach process in order to ensure that a broad, representative, and diverse spectrum of the Idlewild Watershed Communities were provided the opportunity to actively participate in, and have input in this process.

The Public Engagement Strategy included regular, monthly 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 the Idlewild Watershed Communities as a result of Superstorm Sandy, Hurricane Irene, and other extreme events.
- The Community's existing assets and the opportunities they might provide for a more resilient future.
- Input regarding the appropriate strategies needed to make the area more resilient.
- Preliminary ideas for projects in the area that can be initiated through the current planning process.
- Discussions regarding the prioritization of recommended actions and projects.
- Input regarding the format and content for Public Engagement Events.
- Major outreach efforts focused on "getting the word out" about the project, the planning process, and the Public Engagement Events.

Meetings accommodated any public members who attended, often including them in the working group sessions. The breakout groups varied throughout the meetings and included topic-oriented working groups (Natural and Cultural Resources, Housing, Economic Development, Infrastructure, Health and Social Services/ Socially Vulnerable Populations, Community Engagement), as well as geographically based, and theme based breakout groups.

Discussions focused on the following:

- Current issues, conditions and needs.
- The elements that comprise the Community's strengths and assets.
- Visions of the future and how these can be translated into achievable opportunities.
- Feedback regarding the technical risk assessment.
- Input regarding the assessment of the Community's economic and housing needs, and guidance to the technical team as it defined opportunities and recommendations for addressing these.
- Guidance and decisions on the various investment, funding, program and policy implementation strategies needed to achieve the Community vision as defined for the area.
- Review of the NYRCR Plan, in order to ensure that it is one that the Community can continue to support and champion over time.

Public Engagement Events

Public meetings were held to offer participation opportunities for individuals in all the communities of the impacted area. Public Meetings were scheduled at key points in the development of the Community Reconstruction Plan to ensure that the public had an opportunity to provide meaningful input and shape the NYRCR Plan.

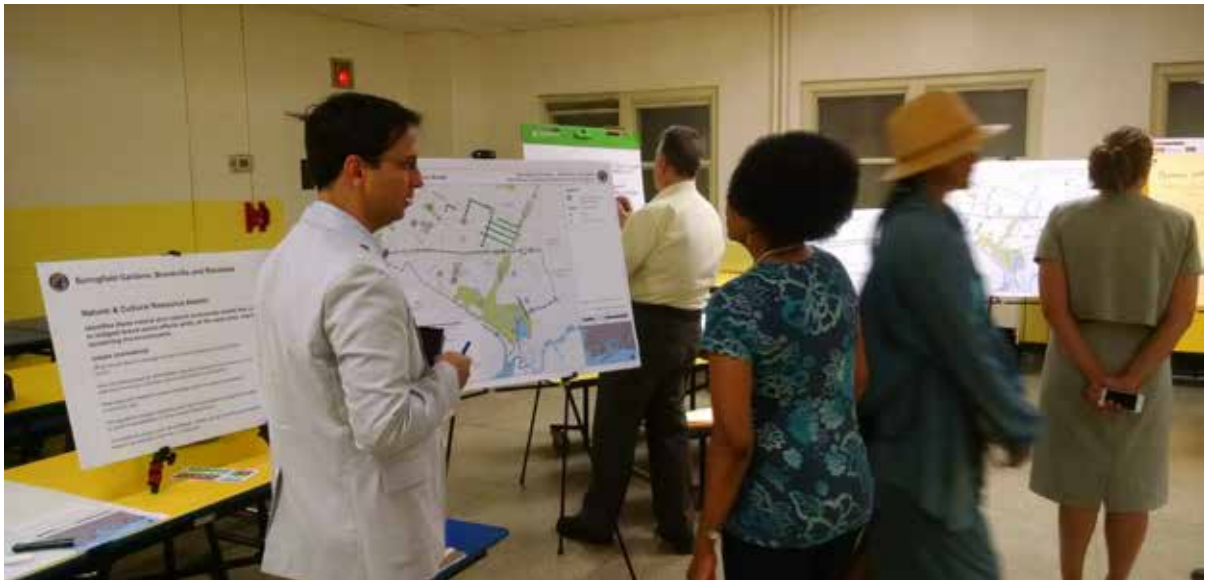
Meetings were held in the evenings to allow those who work during regular business hours the opportunity to attend. A total of 71 members of the public attended public meetings and observed Committee meetings.

Public Meeting #1

Date: July 31, 2014

Location: St. Clare's School, Brookville Blvd., Rosedale, NY

This meeting was held in an Open House format. Attendees signed-in, received informational materials, and assembled for a presentation. Following the presentation, attendees circulated through ordered stations that presented various aspects of the program on display boards. At each station, attendees had the opportunity to talk with a project team member and provide input via comment forms, post-it notes, and/or dots on boards. The meeting was promoted through the Planning Committee members' organizations, at local religious services, and through the distribution of flyers at high traffic public places including the Francis Lewis Boulevard and 243rd Street Economic Corridor. The total attendance of Committee members and the public was 31.



Public Meeting #2

Date: September 16, 2014

Location: Birch Family Center, Springfield Gardens, NY

This meeting was held in an Open House format. Attendees signed-in, received informational materials, and assembled for a presentation. Following the presentation, attendees circulated through ordered stations that presented various aspects of the program on display boards. At each station, attendees had the opportunity to talk with a project team member and provide input via comment forms, post-it notes, and/or dots on boards. The meeting was promoted through the Planning Committee members' organizations, local community calendars, at local religious services, and through the distribution of flyers at high traffic public places the Francis Lewis Boulevard and 243rd Street Economic Corridor. In addition, project personnel attended the Spring-Gar Community Civic Picnic on Saturday, August 16th to discuss the upcoming public meeting with attendees. The total attendance of Committee members and the public was 19.

Public Meeting #3

Date: November 13, 2014

Location: St. Peter's Lutheran Church, Brookville, NY

This meeting was held in an Open House format. Attendees signed-in, received informational materials, and assembled for a presentation. Following the presentation, attendees circulated through ordered stations that presented information on the program and potential projects on display boards. At each station, attendees had the opportunity to talk with a project team member and provide input via comment forms, post-it notes, and/or dots on boards. Attendees provided further information about projects that had been identified and suggested additional projects for the Project Team to investigate. The meeting was promoted through the Planning Committee members' organizations, local community calendars, at local religious services, and through the distribution of flyers. The total attendance of Committee members and the public was 35.

Public Meeting #4

The fourth and final Public Engagement Event will be held in January 2015. During this meeting, the Committee will present the final NYRCR Plan to the Community.

Project Website and Social Media

The Community's website (http://stormrecovery.ny.gov/nyrcr/community/idlewild-watershed-communities) was used to provide information about the development of the plan and to host project documents. Information about the Idlewild Watershed Community Reconstruction effort was available on this website, including:

- News and Announcements, including meeting announcements;
- Project Documents; and
- An Electronic Comment form – for the public to write questions, and share comments with the project team. The Governor's Office of Storm Recovery posted meeting notices and photographs on Facebook, Twitter and Tumblr.

Flyers

Flyers were prepared to advertise each public meeting. The flyers were available in print and electronic formats and were distributed through the Planning Committee Contact lists and well as distributed at high-traffic pedestrian areas including the Francis Lewis Boulevard and 243rd Street Economic Corridor. All flyers included a brief description of the program and explained the opportunity to participate.

News outlets

The public meeting information for the Idlewild Watershed Communities was posted to the following community calendars:

- NY 1 Online;
- Queens Chronicle; and
- Queens Courier.

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 NY Rising Community Reconstruction 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.

Table 5.3: Community Asset Inventory and Risk Assessment

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
KENTRA INTERNATIONAL SERVICES	Moderate	Economic	Yes, FEMA	High	3	2	1	6
SPRINGFIELD GARDENS INDUSTRIAL AREA	Moderate	Economic	No	High	3	2	1	6
SMITH ELECTRONICS	High	Economic	No	Low	3	2	3	18
TIVY TRUCKING INC	High	Economic	No	Low	3	2	3	18
W S JOHN ENTERPRISE	High	Economic	No	Low	3	2	3	18
AT&T STORE	High	Economic	No	Low	3	2.5	3	23
BROOKVILLE BLVD	High	Economic	No	High	3	2.5	3	23
HUXLEY CONSTRUCTION CORP	High	Economic	No	Low	3	2.5	3	23
JARA MARKETING CORP-RECOVERY	High	Economic	No	Low	3	2.5	3	23
ONCE OVER CLEANING SERVICE	High	Economic	No	Low	3	2.5	3	23
ROYAL CLEANING SERVICE	High	Economic	No	Low	3	2.5	3	23
UNIQUE FITNESS SERVICE	High	Economic	No	Low	3	2.5	3	23
A T & SONS TRANSPORTATION CORP	High	Economic	No	Low	3	2	4	24
ATLANTIC FREIGHT	High	Economic	No	Low	3	2.5	4	30
CARGO PARTNER NETWORK INC	High	Economic	No	Low	3	2.5	4	30
IHOP RESTAURANT	High	Economic	No	Low	3	2.5	4	30
KAS CARPET SHOWROOM	High	Economic	No	Low	3	2.5	4	30
PIZZA HUT	High	Economic	No	Low	3	2.5	4	30
APPLEBEE'S NEIGHBORHOOD GRILL	Extreme	Economic	No	Low	3	3.5	4	42
BOOST MOBILE	Extreme	Economic	No	Low	3	3.5	4	42
CHILDREN'S PLACE	Extreme	Economic	No	Low	3	3.5	4	42
CONWAY STORES	Extreme	Economic	No	Low	3	3.5	4	42
D KS HOUSE OF ELEGANCE	Extreme	Economic	No	Low	3	3.5	4	42
GAMESTOP	Extreme	Economic	No	Low	3	3.5	4	42
JIMMY JAZZ	Extreme	Economic	No	Low	3	3.5	4	42

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
KMART	Extreme	Economic	No	Low	3	3.5	4	42
LOWE'S HOME IMPROVEMENT	Extreme	Economic	No	Low	3	3.5	4	42
MODELL'S SPORTING GOODS	Extreme	Economic	No	Low	3	3.5	4	42
ROCKAWAY BLVD ECONOMIC CORRIDOR	Extreme	Economic	No	High	3	3.5	4	42
SOUTH WEST NASSAU OPTOMETRIC	Extreme	Economic	No	Low	3	3.5	4	42
SUBWAY	Extreme	Economic	No	Low	3	3.5	4	42
SUPER DEAL STORES INC	Extreme	Economic	No	Low	3	3.5	4	42
TJ MAXX	Extreme	Economic	No	Low	3	3.5	4	42
T-MOBILE	Extreme	Economic	No	Low	3	3.5	4	42
BAYHOUSE WATERFRONT BAR & GRLL	Extreme	Economic	No	Low	3	4	4	48
REGENCY RECYCLING CORP	Extreme	Economic	No	Low	3	4	4	48
MARTIN DE PORRES SCHOOL		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0
MERRICK ACADEMY		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0
OEM EVACUATION CENTER - BELMONT RACETRACK		Health and Social Services	Yes, FEMA	High	3	FALSE	1	0
OEM EVACUATION CENTER - HILLCREST HS		Health and Social Services	Yes, FEMA	High	3	FALSE	1	0
OEM EVACUATION CENTER - JOHN ADAMS HS		Health and Social Services	Yes, FEMA	High	3	FALSE	1	0
OEM EVACUATION CENTER - PS 268		Health and Social Services	Yes, FEMA	High	3	FALSE	1	0
PS 38		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0
QUEENS HEALTH NET SPRINGFIELD GARDENS		Health and Social Services	Yes, FEMA	High	3	FALSE	3	0
ROSEDALE CHILD DEVELOPMENT CENTER		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0
SAINT CLARE CATHOLIC ACADEMY		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
U.S. POST OFFICE - 21810 MERRICK BLVD.		Health and Social Services	No, Locally Significant Facility	High	3	FALSE	3	0
LINDEN SEVENTH-DAY ADVENTIST ELEMENTARY SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	1	5
AUGUST MARTIN HIGH SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
CATHERINE AND COUNT BASIE MIDDLE SCHOOL 72	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
CATHOLIC GUARDIAN SOCIETY OF NEW YORK	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	1	6
SPRINGFIELD GARDENS COMMUNITY RESIDENCE	Moderate	Health and Social Services	Yes, FEMA	High	3	2	1	6
ROCHDALE ADULT LEARNING CENTER	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	1	8
AMERICAN LEGION - POST 483	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	3	14
FDNY ENG 314	Moderate	Health and Social Services	Yes, FEMA	High	3	1.5	3	14
PROFESSIONAL SERVICES CENTER FOR THE HANDICAPPED AT 148TH AVE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	3	14
PS 156 LAURELTON	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	3	14
PS 181 BROOKFIELD	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	3	14
QUALITY SERVICES FOR THE AUTISTIC COMMUNITY (QSAC), INC.	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	1.5	3	14
A.C.T. COMMUNITY RESIDENCE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
BIRCH FAMILY SERVICE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
CATHOLIC CHARITIES NEIGHBORHOOD SERVICES	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
CHRIST LUTHERAN SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
COLLABORATIVE ARTS MIDDLE SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
COMMUNITY VOICES MIDDLE SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
CYNTHIA JENKINS SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
EXCELSIOR PREPARATORTY HIGH SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
FDNY ENG 311, LAD 158	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18
GEORGE WASHINGTON CARVER HIGH SCHOOL FOR THE SCIENCES	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
KIDWISE SCHOOL-BASED INIT.	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
NYC POLICE DEPT 113TH PRECINCT	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18
NYPD QUEENS SOUTH TASK FORCE	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18
NYS BERNARD M. FINESON DEVELOPMENT DISABLITIES REGIONAL OFFICE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PREPARATORY ACADEMY FOR WRITERS: A COLLEGE BOARD SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PS 251	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PS 30	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PS 354	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PS 52	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
PS/MS 138 SUNRISE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
QS SCHOOL SAFETY DIVISION	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
QUEENS FEDERAL CORRECTIONS FACILITY	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18
QUEENS PREPARATORY ACADEMY	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
QUEENS VILLAGE DAY SCHOOL INC	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
ROCHDALE VILLAGE NURSERY SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
ROCHDALE VILLAGE NURSERY SCHOOL & KINDERGARTEN	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
ROCHDALE VILLAGE SENIOR CENTER	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
ROSEDALE POST OFFICE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
SPRINGFIELD GARDENS HIGH SCHOOL	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
SPRINGFIELD GARDENS HOMELESS SHELTER	Moderate	Health and Social Services	Yes, FEMA	High	3	2	3	18
SPRINGFIELD PUBLIC SCHOOL 37	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
SPRINGFIEND GARDENS DMV OFFICE	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
SUNRISE PUBLIC SCHOOL 138	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
TRI COMMUNITY JUNIOR HIGH 231	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
U.S. POST OFFICE - 14506 243RD ST.	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18
U.S. POST OFFICE - 165100 BAISLEY BLVD.	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2	3	18

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
LIFE'S WORC, INC.	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	3	23
PROFESSIONAL SERVICES CENTER FOR THE HANDICAPPED AT 181ST ST	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	3	23
PROFESSIONAL SERVICES CENTER FOR THE HANDICAPPED AT CRAFT AVE	High	Health and Social Services	Yes, FEMA	High	3	2.5	3	23
PS 195	High	Health and Social Services	No, Locally Significant Facility	High	3	2.5	3	23
PS 80	Moderate	Health and Social Services	No, Locally Significant Facility	High	3	2.5	3	23
ROBERT COUCHE NEIGHBORHOOD SENIOR CENTER	Moderate	Health and Social Services	Yes, FEMA	High	3	2.5	3	23
LIFESPIRE SPRINGFIELD GARDENS		Housing	No, Locally Significant Facility	High	3	FALSE	3	0
NORTHEASTERN CONFERENCE HOUSE	Moderate	Housing	No, Locally Significant Facility	High	3	2	1	6
LAURELTON SOUTH RESIDENTIAL NEIGHBORHOOD	Moderate	Housing	No, Locally Significant Facility	High	3	1.5	3	14
ROSEDALE RESIDENTIAL NEIGHBORHOOD	Moderate	Housing	No, Locally Significant Facility	High	3	1.5	3	14
BROOKVILLE RESIDENTIAL NEIGHBORHOOD	Moderate	Housing	No, Locally Significant Facility	High	3	2	3	18
LOCUST MANOR SENIOR RESIDENCE	Moderate	Housing	No, Locally Significant Facility	High	3	2	3	18
SPRINGFIELD GARDENS RESIDENTIAL NEIGHBORHOOD	Moderate	Housing	No, Locally Significant Facility	High	3	2	3	18
ROCHDALE VILLAGE	Moderate	Housing	No, Locally Significant Facility	High	3	2.5	3	23
MEADOWMERE RESIDENTIAL NEIGHBORHOOD	Extreme	Housing	No, Locally Significant Facility	High	3	3.5	5	53

Table 5.3: Community Asset Inventory and Risk Assessment(Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
ELECTRICITY TOWERS (MULTIPLE ALONG CON EDISON LINE)		Infrastructure	Yes, FEMA	High	3	FALSE	3	0
JFK MTA BUS DEPOT	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
LOGAN GROUP SCHOOL BUS GARAGE	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	1	6
CON EDISON POWER LINE	Moderate	Infrastructure	Yes, FEMA	High	3	1.5	3	14
LIRR STATION LAURELTON	Moderate	Infrastructure	No, Locally Significant Facility	High	3	1.5	3	14
SOUTH CONDUIT AVE	Moderate	Infrastructure	No, Locally Significant Facility	High	3	1.5	3	14
BELT PARKWAY	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
GUY R BREWER BLVD	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	3	18
LIRR LONG BEACH AND FAR ROCKAWAY LINES	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	3	18
LIRR STATION ROSEDALE	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	3	18
SPRINGFIELD BLVD	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2	3	18
STORMWATER OUTFALLS - ID 112658	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 112659	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 112691	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 116957	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 116958	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117149	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117313	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117314	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117315	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117316	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	Risk Area	Asset Class	Critical Facility	Community Value	Hazard Score	Exposure Score	Vulner. Score	Risk Score
STORMWATER OUTFALLS - ID 117317	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117318	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117319	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117320	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
STORMWATER OUTFALLS - ID 117328	Moderate	Infrastructure	Yes, FEMA	High	3	2	3	18
147TH AVE	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	3	23
FARMERS BLVD	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2.5	3	23
FRANCIS LEWIS BLVD	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	3	23
HOOK CREEK BLVD	High	Infrastructure	No, Locally Significant Facility	High	3	2.5	3	23
LIRR STATION LOCUST MANOR	Moderate	Infrastructure	No, Locally Significant Facility	High	3	2.5	3	23
ROSEDALE PUMPING STATION	High	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 116953	High	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 116954	High	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 116955	High	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 116956	Moderate	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 117100	Moderate	Infrastructure	Yes, FEMA	High	3	2.5	3	23
STORMWATER OUTFALLS - ID 117327	Moderate	Infrastructure	Yes, FEMA	High	3	2.5	3	23
BROOKVILLE BLVD	High	Infrastructure	No, Locally Significant Facility	High	3	2	4	24
NYC DEPARTMENT OF ENVIRONMENTAL PROTECTION-JAMAICA WATER SUPPLY WELLS	High	Infrastructure	Yes, FEMA	High	3	2	4	24
ROCKAWAY BLVD	High	Infrastructure	No, Locally Significant Facility	High	3	2	4	24
CSO OUTFALL - ID JAM-005	Extreme	Infrastructure	Yes, FEMA	High	3	3.5	3	32
CSO OUTFALL - ID JAM-007	Extreme	Infrastructure	Yes, FEMA	High	3	3.5	3	32

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
HUNGRY HARBOR RD	Extreme	Infrastructure	No, Locally Significant Facility	High	3	3.5	3	32
STORMWATER OUTFALLS - ID 112690	Extreme	Infrastructure	Yes, FEMA	High	3	3.5	3	32
RUSSO RECYCLING	Extreme	Infrastructure	No	Low	3	3.5	4	42
LAURELTON LIBRARY		Natural and Cultural Resources	No, Locally Significant Facility	High	3	FALSE	1	0
QUEENS BOROUGH PUBLIC LIBRARY - ROCHDALE VILLAGE COMMUNITY LIBRARY	Moderate	Natural and Cultural Resources	Yes, FEMA	High	3	2.5	1	8
IDLEWILD KAYAK LAUNCH	High	Natural and Cultural Resources	No	Low	3	2.5	2	15
IDLEWILD PARK RECREATIONAL FIELD	High	Natural and Cultural Resources	No	Low	3	2	3	18
ROSEDALE LIBRARY	Moderate	Natural and Cultural Resources	No, Locally Significant Facility	High	3	2	3	18
BROOKVILLE POND	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
FRESHWATER EMERGENT WETLANDS	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
GREENSTREET AT HUXLEY ST & 149TH AVE	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
GREENSTREET AT HUXLEY ST & 149TH DR	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
GREENSTREET AT HUXLEY ST & 149TH RD	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
GREENSTREET AT HUXLEY ST & 253RD ST	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
GREENSTREET AT HUXLEY ST & CRAFT AVE	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
HOOK CREEK	High	Natural and Cultural Resources	No	Low	3	2.5	3	23

Table 5.3: Community Asset Inventory and Risk Assessment (Con't)

Asset Information					Risk Assessment			
Asset	**Risk Area**	**Asset Class**	**Critical Facility**	**Community Value**	**Hazard Score**	**Exposure Score**	**Vulner. Score**	**Risk Score**
ROCHDALE VILLAGE LIBRARY	Moderate	Natural and Cultural Resources	No, Locally Significant Facility	High	3	2.5	3	23
ST PIUS X CHURCH	High	Natural and Cultural Resources	No	Low	3	2.5	3	23
ESTUARINE AND MARINE WATER BODIES	High	Natural and Cultural Resources	No	Low	3	2	4	24
HOOK CREEK PARK	High	Natural and Cultural Resources	No	Low	3	2	4	24
SUNRISE PLAYGROUND	High	Natural and Cultural Resources	No	High	3	2.5	4	30
THURSTON BASIN	High	Natural and Cultural Resources	No	Low	3	2.5	4	30

E. Endnotes

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F. Glossary

Base Flood Elevation (BFE)
Water surface elevation corresponding to a flood having a 1% 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 NY Rising Community Reconstruction 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.

Community Based Organization
A non-profit organization that operates within a local community.

CDBG-DR
Community Development Block Grant-Disaster Recovery

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 Outfall

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

DMV
Department of Motor Vehicles

EQA
Eastern Queens Alliance

FEMA
Federal Emergency Management Agency

FDNY
New York City Fire Department

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.

FTE
Full Time Equivalent

Green Infrastructure
General name given to an approach using environmentally friendly techniques to manage stormwater.

Grey Infrastructure
Facilities that are constructued to take storm-water and sewage away from roads and buildings, typically including sewers and storm sewers.

HUD
U.S. Department of Housing and Urban Development

HVAC
Heating, Ventilation, and Air Conditioning

IBID
Industrial Business Improvement District

JFK
John F. Kennedy International Airport

JSPOA
Jamaica Service Program for Older Adults

JWS
Jamaica Water Supply Company

LIRR
Long Island Railroad

LISC
Local Initiatives Support Corporation

MTA
Metropolitan Transportation Authority

NAVD88

NICE
Nassau Inter County Express

NFIP
National Flood Insurance Program

NOAA
National Oceanographic and Atmospheric Administration

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 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

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 Program
NY Rising Community Reconstruction Program

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

PANYNJ
Port Authority of New York and New Jersey

QEDC
Queens Economic Development Corporation

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. 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 U.S. 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 U.S. 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); and
- 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 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).

ROW
Right of Way Bioswale

SCA
School Construction Authority

SPDES
New York State Pollutant Discharge Elimination System

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).

Spring AWPCP
Spring Auxiliary Creek Water Pollution Control Plant

Subwatershed

TPL
Trust for Public Land

Urban heat island effect
Urban heat islands develop in areas with dry, impermeable surfaces such as buildings, roads, and other infrastructure. Heat islands tend to occur in urban areas with a large area of roof coverage and pavement, causing temperatures that are higher than surrounding rural areas.

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

WPCP
Water Pollution Control Plant

WRP
The New York City Waterfront Revitalization Program

WWTP
Wastewater Treatment Plant