NY RISING COMMUNITY RECONSTRUCTION PROGRAM

EAST & SOUTH SHORES STATEN ISLAND
NY RISING COMMUNITY RECONSTRUCTION PLAN

MARCH 2014

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Attributions

This document was developed by the NY Rising Community Reconstruction (NYRCR) Staten Island East & South Shores 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, NYS Department of State, and NYS Department of Transportation. 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, Real Estate Solutions, John V Waters, 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 empowers the State's most impacted communities with the technical expertise 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 $650 million planning and implementation process 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.

One hundred and two storm-affected localities across the State were originally designated to participate in the NYRCR Program. The State has allocated each locality between $3 million and $25 million to implement 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

Forty-five NYRCR Communities, each comprising one or more of the 102 localities, were created and led 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 500 New Yorkers represent their communities by serving on Planning Committees. More than 400 Planning Committee Meetings have been held, during which Planning Committee members worked with the State's NYRCR Program team to develop community reconstruction plans and identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 125-plus Public Engagement Events attracted thousands of community members, who provided feedback on the NYRCR planning process and 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 NYRCR Program's website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on materials in progress.

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

With the January 2014 announcement of the NYRCR Program's expansion to include 22 new localities, the program comprises 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.

1 Five of the 102 localities in the program—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allocated over $650 million of funding to the program for implementing projects identified in the NYRCR Plans. NYRCR Communities are also eligible for additional funds through the program's NY Rising to the Top Competition, which evaluates NYRCR Communities across eight categories, including best use of technology in the planning process, best approach to resilient economic growth, and best use of green infrastructure to bolster resilience. The winning NYRCR Community in each category will be allocated an additional $3 million of implementation funding. The NYRCR Program is also working with both private and public institutions to identify existing funding sources and create new 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 Regional Economic Development Council's State Agency Review Teams (SARTs), comprised of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Communities. 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 NYRCR Planning Committees, passionately committed to realizing brighter, more resilient futures for their communities.

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 NYRCR Community's prioritization of these projects and actions. Proposed Projects are projects proposed for funding through a NYRCR Community's allocation 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 official 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.

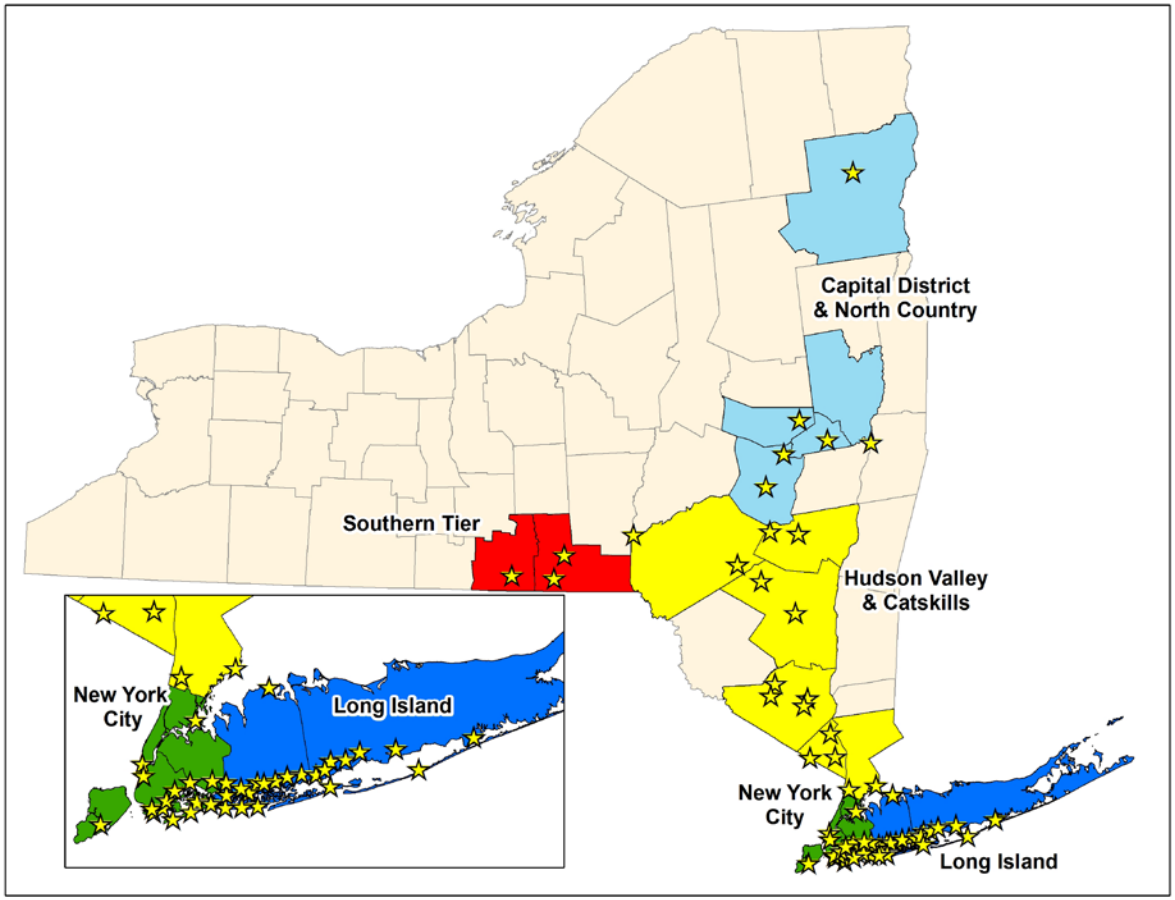
The Staten Island East and South Shores NYRCR Community is eligible for up to $25 million in CDBG-DR implementation funds.

While developing projects for inclusion in this NYRCR Plan, 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 fall into a Federally-designated eligible activity category, fulfill a national objective (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 the Governor's Office of Storm Recovery 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 Community's CDBG-DR allocation 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 (ADA). 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. The Governor's Office of Storm Recovery will actively seek to match projects with funding sources.

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.



Find out more at:

StormRecovery.ny.gov/Community-Reconstruction-Program

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EXECUTIVE SUMMARY

Staten Island is home to nearly a half-million residents and one of the fastest growing counties in New York State. On the East and South Shores of Staten Island, approximately 140,000 residents reside. Prior to the opening of the Verrazano-Narrows Bridge, the East and South Shores of Staten Island were characterized by seasonal bungalows and tourist resorts. In the 1960s, the East Shore experienced more development in wetland areas and former summer homes were winterized to serve as permanent residences with development spreading from upland areas closer to the coastline as time progressed. The housing stock within the Staten Island East & South Shores New York Rising Community Reconstruction Community ("NYRCR Community" or "Community") remains overwhelmingly owner-occupied, with nearly 94% of residents owning their homes.

While most of the waterfront communities on Staten Island were impacted by Superstorm Sandy, some of the most extensive damage occurred in low-lying East Shore and vulnerable South Shore areas. Peak storm tides during Superstorm Sandy reached 16 feet on Staten Island with waves up to six feet reaching the borough's shoreline, causing massive flooding and extensive damage along Staten Island's coastal areas. A total of 121,000 electric customers on Staten Island, or about 70% of Con Edison's customers on the Island, were without power following Superstorm Sandy due to substation damage and downed overhead lines. Electric outages persisted for weeks and, in some cases months, in the areas most impacted by Superstorm Sandy on the Island. The Community's only hospital, with two locations, Staten Island University Hospital (SIUH) North and South campuses, were both incapacitated either due to storm surge or power outages, leaving Richmond University Medical Center (RUMC) on the North Shore as the only fully operational hospital on Staten Island during the storm. Twenty-three individuals lost their lives on Staten Island due to Superstorm Sandy.

In the East Shore, the most extensive inundation occurred in the low-lying residential neighborhoods of South Beach, Oakwood Beach, New Dorp Beach, and in what is commonly referred to as "the bowl" in Midland Beach and Ocean Breeze. While inundation on the East Shore primarily occurred southeast of Hylan Boulevard, flood waters nearly reached the Staten Island Railroad tracks in Dongan Hills—nearly one and a quarter miles from the shoreline—due to the area's low topography and overburdened storm sewers.

On the South Shore, powerful waves eroded the area's protective bluffs, causing significant erosion and damage, especially in the neighborhoods of Crescent Beach, Annadale, Prince's Bay, and Tottenville. Storm surges traveled inland into low-lying areas along creeks and tributaries, including Mill and Lemon Creeks, flooding roads and disrupting businesses.

Sandy also underscored the tenuousness of the East and South Shore's connections to the rest of New York City and the surrounding region as well. Just before and immediately after Superstorm Sandy made landfall on Staten Island, all four of the bridges connecting the Island to Brooklyn and New Jersey, were shut down for safety reasons, isolating the entire borough. The Staten Island Ferry, as well as local rail and bus service temporarily ceased operations. As electrical power was lost across the Island, gas stations were incapacitated and fuel became scarce for a borough dependent on automobiles.

The economy of the East and South Shores is dominated by small businesses, many of which suffered widespread damage that is still being felt today. Before Sandy, the Planning Area contained approximately 3,500 businesses with 25,000 employees, generating revenues of $6.5 billion annually. These businesses are concentrated primarily in the retail and service sectors, with Staten Island University Hospital representing the largest employer in the Community. Sandy's impact on the area's businesses affected an estimated 9,500 jobs and negatively impacted each of the Community's major commercial corridors. Challenges facing businesses impacted by Sandy include building damage, inventory losses, insufficient insurance, and, a reduced customer base.

In September 2013, a committee of Staten Island residents and civic leaders ("NYRCR Committee") convened with the goal of creating a plan to help the East and South Shores rebuild from the damage caused by Superstorm Sandy and prepare the area for a more resilient future. Since that time, the NYRCR Committee has worked

closely with a team of professional consultants, representatives of the Governor's Office of Storm Recovery, and the New York State Department of State to develop this NY Rising Community Reconstruction (NYRCR) Plan.

The NYRCR Plan features a series of projects identified as having the greatest benefit in increasing the East and South Shore's resilience to future climate related events. The State has allocated $25,000,000 in Federal Community Development Block Grant-Disaster Recovery (CDBG-DR) dollars to fund eligible projects identified in the Staten Island NYRCR Plan. The NYRCR Plan is a community-based plan, which is the product of a robust public engagement effort involving consensus-building among both residents and business owners. Finally, the NYRCR Plan is comprehensive, addressing six Recovery Support Functions: Community Planning & Capacity Building; Economic Resilience; Health & Social Services; Housing; Infrastructure; and Natural & Cultural Resources.

With a fundamental focus on implementation, the NYRCR planning process incorporated extensive discussions with the City and State to confirm that relevant agencies have confidence in the project's ability to be implemented. The NYRCR Committee also coordinated with agencies operating at a regional level, including the U.S. Army Corps of Engineers, and conducted an ongoing dialogue with parallel resiliency efforts, especially the U.S. Housing and Urban Development (HUD) Rebuild by Design competition. As a result, the projects featured in the NYRCR Plan are supportive and complimentary of these other efforts, rather than duplicative or counterproductive.

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

The 21 Proposed and six Featured projects included in the NYRCR Plan for the East and South Shores of Staten Island address each of five key strategies that emerged from the public engagement process and technical analysis:

PROPOSED AND FEATURED PROJECTS: Coastal Protection

STRATEGY A: ***Leverage existing coastal protection initiatives, including those by the U.S. Army Corps of Engineers, to more comprehensively limit the exposure of the East and South Shores to storm surge.*** The Coastline is the first and most critical line of defense in protecting the NYRCR Community from inundation associated with Sandy-like storms. While the U.S. Army Corps of Engineers' (USACE) Phase I study will address the protection of the East Shore with a continuous seawall from Fort Wadsworth to Great Kills, local matching funds have not been committed, and implementation of the seawall will likely take many years. As such, the Plan includes three projects that address shorter term coastal protection needs in both the East and South Shores:

The ***Interim East Shore Coastal Protection Measures (A1)*** project would provide interim coastal protections for the area that is the subject of the USACE Phase I Study (i.e., between Fort Wadsworth to Great Kills). The project includes two phases; the first phase is planting and stabilizing existing temporary dunes for added erosion protection. The second phase involves "filling the gaps" between the existing New York City Department of Parks and Recreation (DPR) dunes and the National Park Service Dune adjacent to Miller Field.

Construction of the ***Tottenville and Great Kills Dunes and Coastline Dune Plantings (A2)*** project, will construct a permanent dune system

in phases to protect the Tottenville shoreline against storm surge, replacing temporary dunes that were constructed by NYC DPR.

The ***Integrated South Shore Protection Plan (A3)*** which will build upon the USACE's Feasibility Study for Staten Island's South Shore, by preparing supplemental studies beyond the scope of the USACE study. Tasks within this larger plan include a feasibility study for flood protection alternatives at Mill Creek and in the vicinity of the Tottenville Staten Island Railroad (SIR) Station along Ellis Street, to prevent flooding of local businesses and private homes.

Stormwater Management

STRATEGY B: ***Leverage existing stormwater management measures, especially the Staten Island Bluebelt, to better protect East and South Shore communities from frequent flooding caused by heavy rains and high tides.*** While coastal protection figures prominently in protecting the East and South Shores from future Sandy-like events, the NYRCR Community is also affected by the frequent and dangerous flooding that occurs during smaller rain events like tropical storms, nor'easters, and even light rains accompanied by everyday high tides.

The Plan includes two Proposed Projects and two Featured Projects that work within existing programs to address short- to medium-term issues:

The ***New Creek Bluebelt Implementation (B1)*** project will install detention ponds and other selected best management practices (BMPs) at Last Chance Pond, Boundary Avenue, Joyce Street and Meadow Place to alleviate flooding downstream.

The ***Hylan Boulevard Green Streets and Streetscape Improvements (B2)*** project will install "green street" measures, such as vegetated bioswales and bioretention tree pits to capture stormwater, reduce the volume of stormwater entering the storm sewer system and improve water quality along Hylan Boulevard, Staten Island's primary commercial corridor. This project will have multiple benefits, creating a unique opportunity to educate the community about the importance of the Staten Island Bluebelt in managing stormwater; a location for people to interact with nature by bringing them closer to the Bluebelt; and a model for upgrading the visual quality of Hylan Boulevard and attracting increased private investment.

The ***McLaughlin Street Residential Conversion (B3)*** to Bluebelt project would fund the voluntary buyout of four homes in South Beach that are surrounded by the Staten Island Bluebelt, and replace them with Bluebelt BMPs.

The ***Stormwater Outfall Assessment Study (B4)*** would provide further investigation of stormwater outfalls identified by New York City Department of Environmental Protection (NYC DEP).

Key Connections

STRATEGY C: ***Strengthen key connections and physical infrastructure that link communities in the East and South Shores to each other and with the rest of Staten Island by improving upon transportation infrastructure and the power grid.*** The closure of all four of Staten Island's bridges, as well as the Staten Island ferry and the Staten Island Railway, the loss of electrical power, and the gas shortages that affected the NYRCR Community during and immediately after Sandy emphasized the need to create back up options and redundancies for the area's transportation and electrical distribution infrastructure. The Plan includes six Proposed and Featured Projects to address both the short, and long-term issues related to the NYRCR's Community's ability to stay connected, and the area's critical facilities to stay operational:

A ***study to identify key locations for microgrids and renewable energy sources (C1)*** will evaluate incremental implementation of microgrids at strategic locations to supply reliable electrical power and communication during emergencies.

The components of the ***Go to High Ground (C2)*** initiative encompass production of a Staten Island Severe Storm Survival Guide; Transportation Guide; and Go to High Ground: Vulnerable Population Emergency Preparedness and Evacuation brochures to inform all residents of pre-storm preparedness, post-disaster recovery and resource information. As a borough dependent upon automobile transportation, vehicle protection is critical to maintain the economic viability of the community's workforce. The College of Staten Island's storm surge analysis provided information regarding evacuation routes and strategies to mitigate future inundation of low-lying areas during storm surges.Go to High Ground' is a proposed study to explore the creation of a system of wayfinding signage and development of a program encouraging residents to 'go to high ground' during a storm surge event

and provide designated areas for automobile evacuation.

The ***East Shore Microgrid Network Pilot Project (C3)*** will create a microgrid network centered on the Staten Island University Hospital – North campus and construct above-ground utility lines among critical and community facilities, including those that serve socially vulnerable populations. It potentially links to other community facilities, including: the NYC DEP Mason Avenue and South Beach Pump Stations, Public Schools 52 and 11, the South Beach Psychiatric Center, the NYC DPR's Elevated Track and Field Facility, the New York City Housing Authority's (NYCHA) South Beach and Berry Houses/Senior Centers, FDNY Engine Company 159, the Hylan Boulevard Retail Corridor and the traffic signals along this key evacuation route, as well as the Jefferson Avenue Station of the Staten Island Railroad.

The ***South Shore Microgrid Network Pilot Project*** (C4) will create a microgrid network centered around the Staten Island University Hospital – South Campus and construct above-ground utility lines to connect facilities including the Prince's Bay and Huguenot stations of the Staten Island Railway, NYC DPR's Blue Heron Nature Center, and District 3 facility, as well as Public School 5 and Intermediate School 7.

The ***South Shore Resilient Dock Feasibility Study (C5)*** will identify the most appropriate location for a multipurpose resilient dock in the South Shore. The resilient dock would be accessed by emergency vessels (including regular ferry boats) in the event that other forms of transportation access to the South Shore were compromised. The resilient dock could also be utilized to support regular commuter ferry service and recreational use.

The ***St. George/Tompkinsville Promenade Master Plan/Engineering Study*** (C6) is the first phase in the implementation of the St. George/Tompkinsville Promenade, a vital link to the East and South Shores of Staten Island due to its proximity to the St. George Ferry Terminal. The overall vision is to repair, re-design, and rebuild the promenade in order to increase resiliency, improve connectivity, and enhance economic opportunity and natural resources. Conceptual design and detailed project engineering are included in later phases of the project and are included in the NYRCR Plan as a Featured Project.

Emergency Response Capacity

Strategy D: ***Build the emergency response capacity of existing municipal agencies, non-profit relief organizations, and civic networks to increase the ability of local organizations to help vulnerable populations recover from major storms.*** Capacity, communication, and coordination among Staten Island's emergency response groups and non-profit organizations has been crucial in helping the East and South Shores recover from Superstorm Sandy. Three projects are included in the NYRCR Plan to strengthen those organizations and to increase the East and South Shore's ability to assist the area's vulnerable populations from major storms:

The ***Staten Island 'Central Command Center' Location and Feasibility Study (D1)*** will determine the feasibility of and potential locations for a year-round resource center for Staten Island residents and for disaster response and recovery organizations, including Federal Emergency Management Agency (FEMA). During a disaster, the resource center would function as a 'central command center,' enabling resident access to a reliable power supply, phone charging stations, food and supplies.

Providing support for the ***Staten Island Community Organizations Active in Disaster (COAD) (D2)*** coalition will draw together the organizations that will be charged with responding to future crises in the NYRCR Community to create a plan for community response and to train these responding organizations for the roles that they will play in a post-crisis period. This group is based on a FEMA model that has been implemented throughout the nation.

The Port Richmond CERT Reconnaissance, Radio Augmentation, and Training (D3) project will expand the emergency operations capacity of the Port Richmond CERT (Community Emergency Response Team) & Rescue, Inc. through training and establishment of a new frequency and repeater site.

Neighborhood Integrity

Strategy E: ***Rebuild residential communities in the East and South Shores in a way that increases resilience to future storms while maintaining neighborhood integrity.*** Sandy exposed a broad set of needs beyond infrastructure and coastal protection. Through the NYRCR Process specific needs for creating new strategic visions, assistance and incentive programs, and organizations emerged. These were addressed through five Proposed Projects:

The ***East Shore Waterfront Vision Plan (E1)*** will focus on the "seam" between the New York City DPR's ongoing work with the USACE on the proposed seawall along the East Shore. The plan will develop urban design and economic development strategies to leverage the potential created by the USACE seawall along the Father Capadanno corridor and key east-west commercial corridors, such as Seaview and Midland Avenues, Sand Lane, and Ebbitts Street.

The ***Home Elevation and Resiliency Assistance Program (E2)*** is a program to provide gap funding for low to moderate-income homeowners who do not qualify for existing City and State programs, but need grant and/or subsidized loan assistance in order to make their homes more resilient and to avoid exorbitant increase in flood insurance rates. Since this program identifies a need that is common across multiple New York City NYRCR Communities, this proposal presumes that a centralized non-profit housing assistance organization, NYC agency or NYS agency will administer a broad program that covers areas beyond Staten Island. This central non-profit or agency would aggregate funds from individual NYRCR Communities (to be earmarked for the area that allocates them) and leverage additional public and private funds to expand the influence of this program. This program would serve as a pilot on Staten Island.

Establishment of a Local Development Corporation (LDC) for the East Shore. (E3) The proposed LDC will enhance commercial districts on the Island's East Shore by providing marketing for local businesses, providing a cohesive retail strategy for the area, acquiring properties to be redeveloped, and assisting in obtaining financing. By advocating for resiliency-oriented infrastructure improvements and strengthening local businesses through promotional activities, the LDC would have multiple benefits that would help increase the overall resilience of the East Shore's commercial districts.

'Race for Space' Grant Program to Fill Vacant Storefronts, (E4) a Proposed Project which will replicate the New York City Economic Development Corporation's Staten Island Storefronts Race for Space Program in particularly hard-hit communities such as Midland Beach, would provide awards on a competitive basis ranging from $25,000 to $75,000 for businesses opening new storefronts.

Creation of Common Application for Disaster Relief Grant Funding for Local Businesses, (E5) a Featured Project, which would develop a single simplified application process to help these small businesses obtain post-disaster relief funds. This would eliminate the need for applicants to complete the multiple and sometimes confusing applications needed to access these programs.

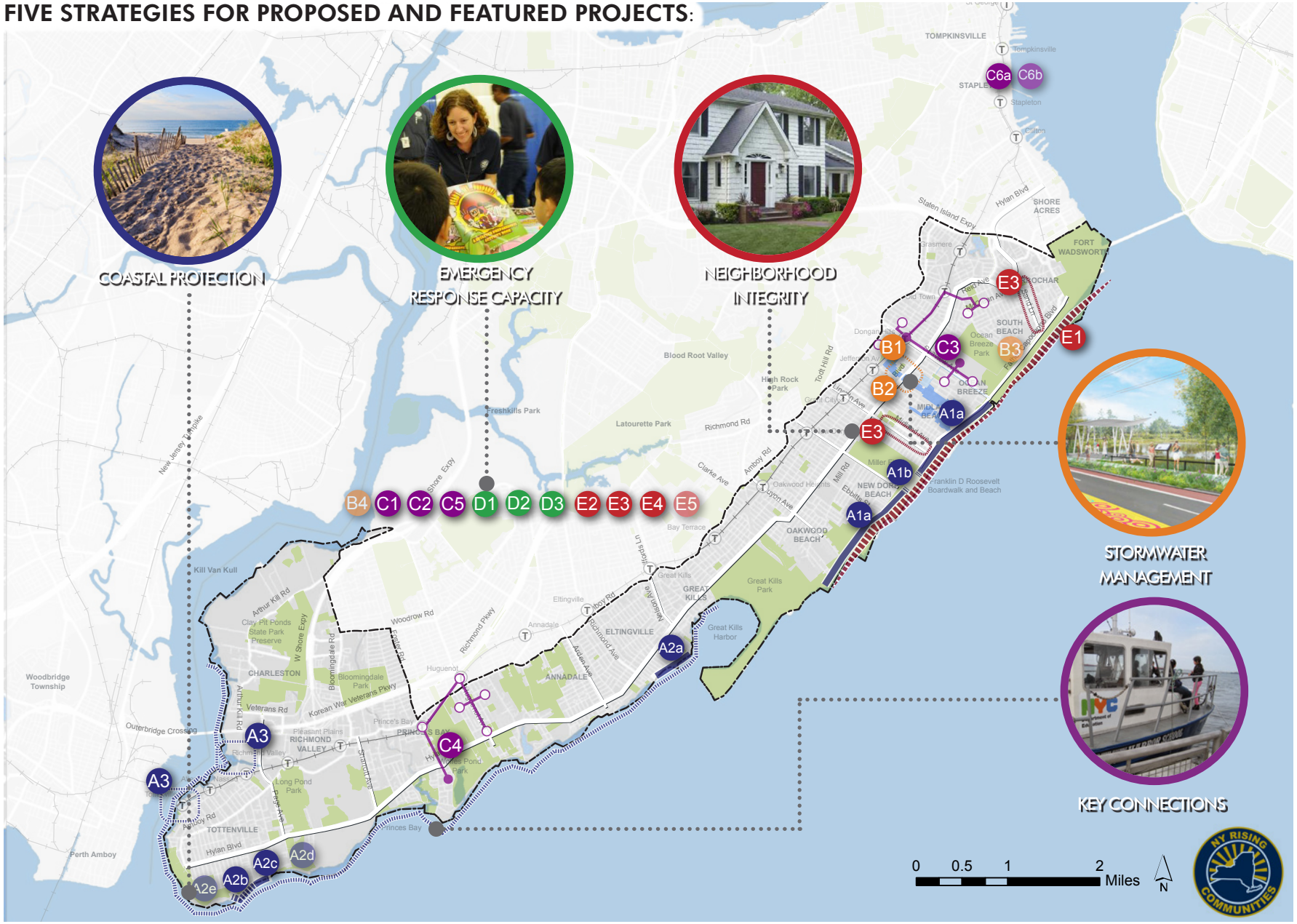
These projects, if implemented, would provide employment of over six hundred individuals, reduce flooding risk, improve the health and social issues of the Community, and lead to a more resilient Staten Island helping residents and businesses recover, build back better and be better prepared for future extreme weather events.

Staten Island East & South Shores

A Coastal Protection	B Stormwater Management	C Key Connections	D Emergency Response Capacity	E Neighborhood Integrity
A1a Interim East Shore Coastal Protection Measures Phase I	B1 New Creek Bluebelt Implementation	C1 Identify Key Locations For Microgrids And Renewable Energy	D1 Staten Island 'Community Emergency Resource Center' Location and Feasibility Study	E1 East Shore Waterfront Vision Plan
A1b Interim East Shore Coastal Protection Measures Phase II	B2 Gateway to the Bluebelt: Hylan Blvd Green Streets and Streetscape Improvements	C2 'Go To High Ground'	D2 Provide support for the Staten Island COAD	E2 Home Elevation and Resiliency Assistance Program
A2a Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase I: Plant of existing dunes in Great Kills	B3 McLaughlin Street Residential conversion to Bluebelt *Featured Project	C3 East Shore Microgrid Network Pilot Project	D3 Port Richmond CERT Reconnaissance, Radio Augmentation, and Training	E3 Establish East Shore LDC
A2b Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase II: Reconstruction/planting of existing dunes from Brighton St to Sprague Ave	B4 Assess Stormwater Outfalls *Featured Project	C4 South Shore Microgrid Network Pilot Project		E4 Implement 'Race for Space' Grant Program
A2c Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase III: Construction/planting of dunes from Sprague Ave to Joline Ave		C5 South Shore Resilient Dock Feasibility Study		E5 Create Common Application for Disaster Relief Grant Funding for Local Businesses *Featured Project
A2d Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase IV: Construction/planting of dunes from Joline Ave to Page Ave and at Goodall St *Featured Project		C6a St. George/Tompkinsville Promenade Master Plan / Engineering Study Phase 1A		
A2e Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase V: Construction/planting of dunes from Conference House Park to Brighton St *Featured Project		C6b St. George/Tompkinsville Promenade Planning, Architecture / Landscape Design Phases 1B-1D *Featured Project		
A3 Integrated South Shore Protection Plan				

Proposed and Featured Projects

FIVE STRATEGIES FOR PROPOSED AND FEATURED PROJECTS:



21 Proposed and six Featured Projects included in the NYRCR Plan for the East and South Shores of Staten Island

Section I: Community Overview

A. Geographic Scope of Plan

Staten Island sits at the southernmost part of New York State. The Island is bordered to the west and north by New Jersey. To the south, Staten Island's shores meet Raritan Bay and to the east, the coastline of Staten Island extends into Lower New York Bay.

The geographic scope of the Staten Island East and South Shores NY Rising Community Reconstruction (NYRCR) Planning Area extends from Fort Wadsworth and the Verrazano-Narrows Bridge in the north to the neighborhoods of Tottenville and Charleston in the south (Figure 1). Census tract boundaries were used to draw the Planning Area boundary (which will also be referred to as the "Community") in order to include inundated areas within the East and South Shores and for ease of data collection and analysis. Amboy Road generally forms the western boundary of the Planning Area, while Foster, Woodrow, and Bloomingdale Roads enclose the inland portions of the Planning Area at the southern end of the Island.

The East Shore of Staten Island extends approximately three miles from Fort Wadsworth in the north to Great Kills Park in the south. The East Shore consists primarily of low-lying areas boarded by open water to the southeast and hills inland that slope upwards to the northwest. The coastline within this area includes sandy beaches along Father Capodanno Boulevard in South and Midland Beaches, including vast expanses of marshes in these neighborhoods, as well as Ocean Breeze, New Dorp Beach, and Oakwood Beach. These low-lying wetlands include residential neighborhoods developed adjacent to portions of Staten Island's Bluebelt system— a long-term stormwater management plan by the New York City Department of Environmental Protection to develop a series of connecting streams, ponds, and wetlands that provide or will provide stormwater management, open spaces, and wildlife habitats.

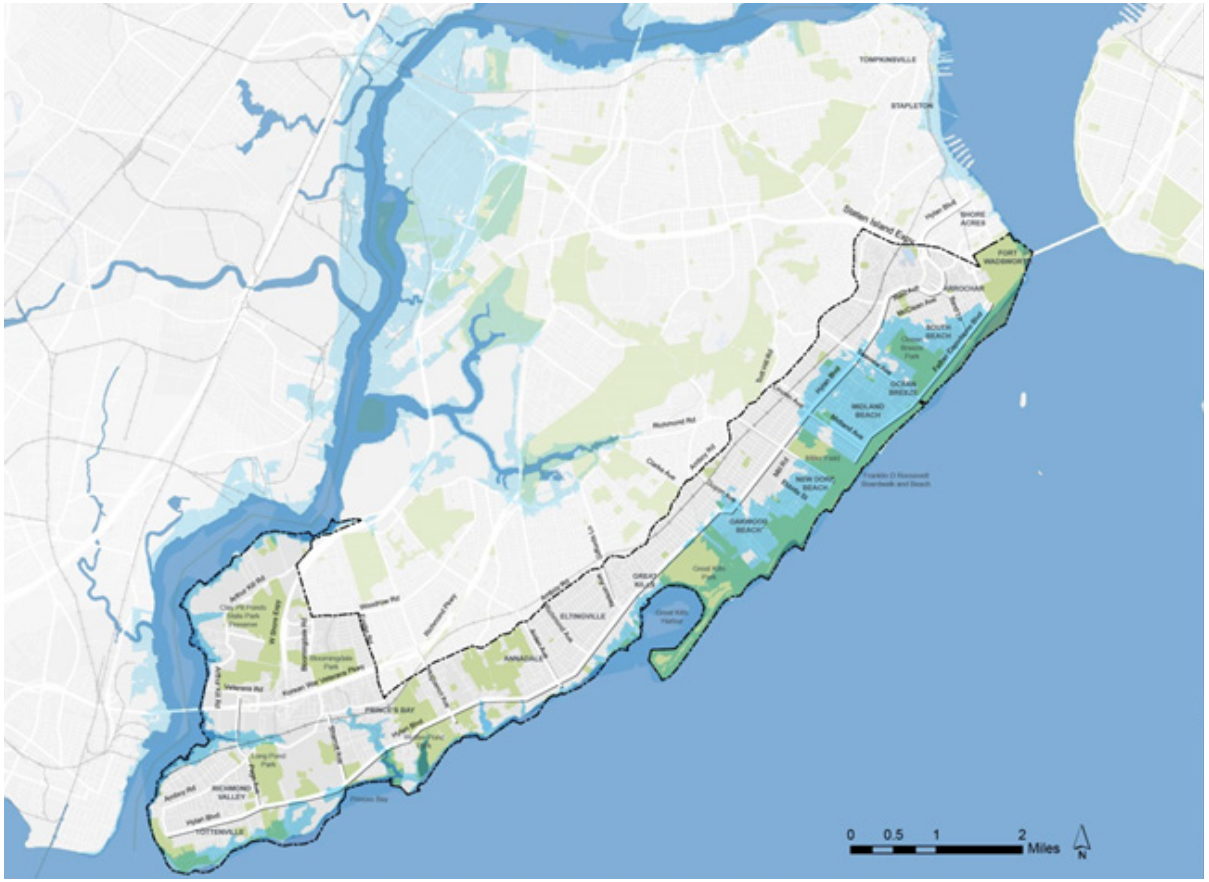


Figure 1: Staten Island East and South Shores Community

The South Shore extends from Great Kills Park to Conference House Park in Tottenville at the southernmost point of the Island. The topography within the South Shore includes low-lying areas with small coastal cliffs, including the neighborhoods of Great Kills, Eltingville, Annadale, Huguenot, Prince's Bay,

and Tottenville. Development extends to the waterfront on the South Shore, with portions of the shoreline hardened with rock or bulkhead.

The neighborhoods along the shoreline, facing Raritan Bay and Lower New York Bay, are especially vulnerable in the event of large storms such as Superstorm Sandy, as the coastlines of Long Island and New Jersey funnel water into Lower New York Bay, which has a tendency to exacerbate storm surges. While most of the waterfront communities on Staten Island were impacted by Superstorm Sandy, some of the most extensive damage occurred in low-lying East Shore and vulnerable South Shore areas.

Staten Island is home to nearly a half-million residents. On the East and South Shores of Staten Island, approximately 140,000 residents reside and the population is growing. Until the Verrazano-Narrows Bridge opened in 1964, the East and South Shores of Staten Island were characterized by small coastal towns. Along the East Shore, seasonal bungalows and tourist resorts were scattered along the beach. Development expanded southward in the 1960s, and the East Shore experienced increased development in wetland areas and former summer homes were winterized to serve as permanent residences. Over the past thirty years, development has continued to spread from upland areas towards the coastline and development pressure on the Island continue today. Between 2000 and 2010, Staten Island was the fastest growing borough in New York City and Richmond County one of the top ten fastest growing counties in New York State, a trend which is projected to continue in the coming years.[1] Rapid development and lack of planning during a period of extreme growth led to overdevelopment across Staten Island. While new homes were constructed, infrastructure did not—and in most cases has not—kept up with pace of new development. Over the past decade, there has been a response by government and the community to curb overdevelopment and respond to the need for more infrastructure investments across Staten Island. Attention to planning and capital investment (i.e. roads, sewer, power, etc.) continue to be top priorities of the Community.

Both the East and South Shores of Staten Island have long been exposed to various forms of flooding. Low-lying wetlands on the East Shore are subject to storm surge, as occurred during Superstorm Sandy, but these areas also see increased water levels and flooding from stormwater runoff during heavy rains, tropical storms, and nor'easters. The coastline along parts of the South Shore is steeper than on the East Shore; however, wave action and rising sea levels have eroded natural coastal defenses over time, making waterfront neighborhoods in the South Shore more prone to flooding.

Public transportation in the Community is not as extensive as in other communities in New York City, and is limited to only a few main corridors. These include Metropolitan Transportation Authority (MTA)-operated local and express buses along Hylan Boulevard, the Staten Island Railway—Staten Island's only rail line—and the Staten Island Ferry Terminal in St. George. As such, access in the East and South Shores is heavily reliant on the automobile. Eighty-four percent of households in Staten Island own at least one car[2]. This is by far the highest rate of

Historic Postcards of Staten Island

car ownership in New York City. In the event of a mandatory evacuation, if the Island's connecting bridges and ferry service are shut down, transportation options are limited.

The housing stock within the Community is primarily owner-occupied, with nearly 94% of residents owning their homes.

Prior to Superstorm Sandy, the East and South Shores contained approximately 2,800 businesses employing 17,100 people. These businesses were concentrated primarily in the retail and service sectors, with Staten Island University Hospital (SIUH) representing one of the largest employers in the Community. Most of the businesses in the Community are very small in scale, with over 80% having fewer than five employees. While the prevalence of small businesses contributes to the vibrancy and diversity of the local economy, this may also represent an additional economic challenge in recovering from Sandy and future weather events, since small businesses often have limited resources for recovery.[3]

"The Planning Committee recognized that Staten Island is a community of neighborhoods and the assets and strengths of the Island as a whole are key to a more resilient future."

At the outset of the NYRCR Planning Process, the Planning Committee reviewed several additional options for the geographic scope of the plan, including an expansion of the area to the north. After significant discussion of various options, the Planning Committee reached consensus on keeping the initial Planning Area in order to focus and leverage the allocated Community Development Block Grant Disaster Recovery (CDBG-DR) funds in the areas that were most heavily impacted by Superstorm Sandy on Staten Island. However, it is important to note that the Planning Committee voiced a strong concern for their neighbors on the North Shore as well as on the remainder of the Island.

B. Description of Storm Damage

Just before and immediately after Superstorm Sandy made landfall on Staten Island, the Outerbridge Crossing, Goethals Bridge, and Bayonne Bridge connecting the borough to New Jersey as well as the Verrazano-Narrows Bridge connecting the Island to Brooklyn, were shut down for safety reasons, isolating the entire borough. The Staten Island Ferry, one of the most utilized mass transit options to Manhattan from Staten Island, ceased operations and local rail and bus service temporarily stopped functioning. As electrical power was lost across the Island, gas stations were out of service and fuel became scarce for a borough dependent on automobiles. The risk to health and safety became evident as one of the Community's hospitals with two locations in the Planning Area, Staten Island University Hospital (SIUH) North and South campuses, were incapacitated either due to storm surge or power outages leaving Richmond University Medical Center (RUMC) on the North Shore as the only fully operational hospital on Staten Island during the storm. The storm's impacts on Staten Island residents and businesses included damage or destruction to housing units and interruption of an estimated 9,500 jobs. Twenty-three individuals lost their lives on Staten Island due to Superstorm Sandy.

Superstorm Sandy Damage on the East Shore, Staten Island

Although Superstorm Sandy was no longer categorized as a hurricane when it made landfall, it was still a large and dangerous storm. Three unique circumstances exacerbated the severity of Superstorm Sandy's impact:

- 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 that led to a direct impact on the New York City Metropolitan Area.

Peak storm tides during Superstorm Sandy reached 16 feet on Staten Island. Data indicated that waves up to six feet crashed along the borough's shoreline, causing massive flooding and extensive damage along Staten Island's coastal areas. Many homes in the highest risk locations on the East and South Shores were not only flooded, but also severely damaged, shifted from foundations, or completely destroyed. Staten Island's position in the New York Bight—a right angled funnel of land on either side of Lower New York Bay—increased the extent of the storm surge. As storm surge came ashore, the narrowing of land compressed the rising water from the sides, leading to even greater storm surge in force and height. As a result, peak storm tides in the waterways off

Staten Island were roughly five feet higher than the Lower Manhattan Battery.

Within the Community, flooding associated with Superstorm Sandy is attributable to four primary factors:

- Development of wetlands and low lying areas: Development in wetlands and areas that would have served as natural drainage reduced the ability for the landscape to absorb storm and flood waters, increasing the vulnerability of homes and infrastructure;
- Inadequate stormwater management: Storm drain systems are inadequate or nonexistent in many areas. Flooding from stormwater, either through surge or backwater inundation, was exacerbated at high-tide when tide gates in existing outfalls were closed to prevent tidal water from flowing back into the system;
- Inadequate coastal flood protection: Discontinuous natural and manmade coastal protection systems along the shoreline of the Community exposed coastal areas to storm surges;
- The confluence of unique circumstances described above: a large storm making landfall during a spring tide on a northwesterly path through the New York Bight; and
- Sea Level Rise: Storm surge and stormwater impacts were amplified by the approximate 1.5-foot (0.5 m) rise in sea level that has occurred since 1821.[4]

The most extensive inundation occurred in the low-lying residential neighborhoods of South Beach, Oakwood Beach, New Dorp Beach, Annadale Beach, Tottenville, and in what is commonly referred to as "the bowl" in Midland Beach and Ocean Breeze—an area formed north of Father Capodanno Boulevard (Figure 2). These neighborhoods, which were primarily wetlands before development expanded in Staten Island, are known for their older bungalow homes, which were historically built as vacation homes with lower building standards than primary residences. While inundation on the East Shore primarily occurred southeast of Hylan Boulevard, flood waters nearly reached the Staten Island Railroad tracks in Dongan Hills—nearly one and a quarter miles from the shoreline—due to the area's low topography and overburdened storm sewers.

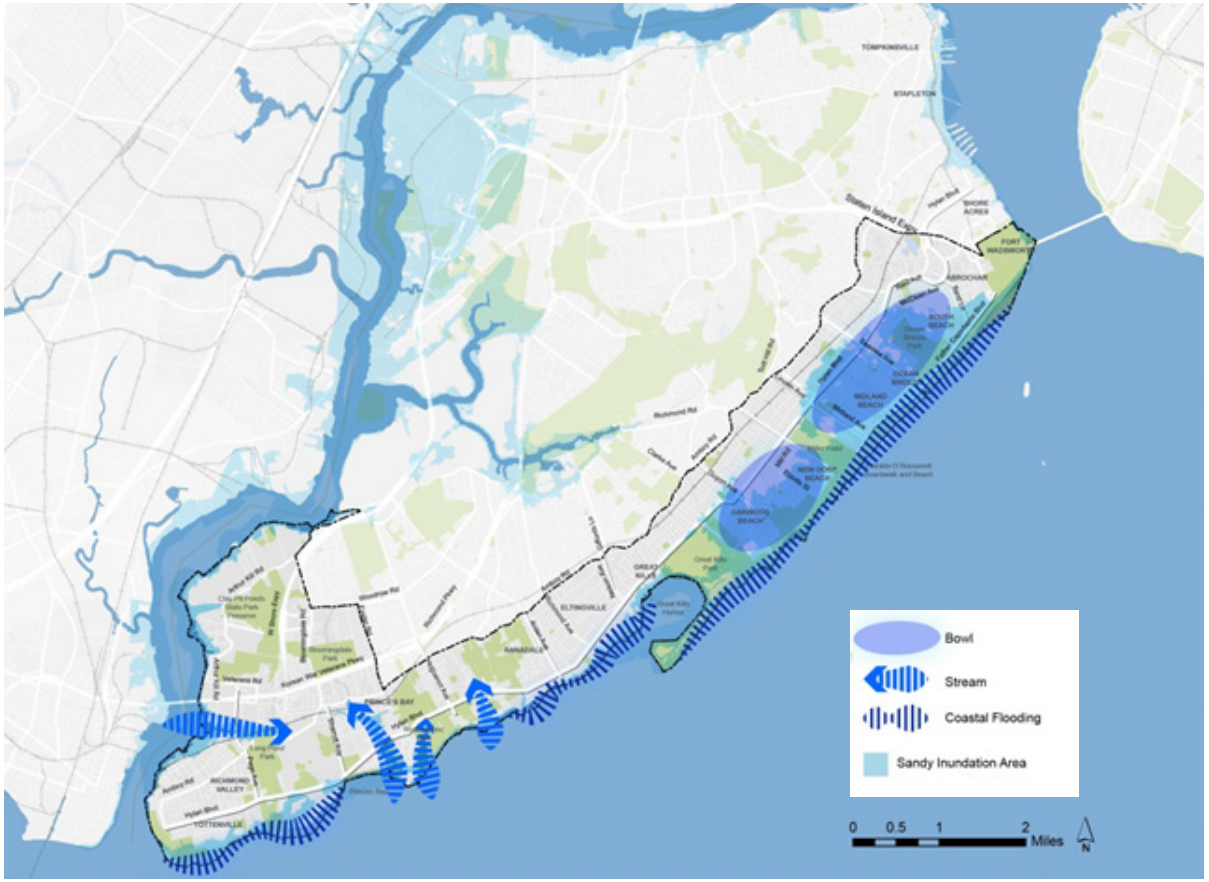


Figure 2: Key Causes of Damage from Superstorm Sandy

The Midland Avenue retail corridor experienced significant flooding and many businesses struggled in the aftermath to reopen or still have

Superstorm Sandy Damage on Staten Island

not reopened today. Retail concentrations along Father Capodanno Boulevard, Hylan Boulevard, and Sand Lane were also negatively impacted. Challenges facing businesses impacted by Superstorm Sandy include building damage, inventory losses, insufficient insurance, and a reduced customer base. Similarly, businesses in Great Kills Harbor along Mansion Avenue suffered significant damage during Superstorm Sandy, either by flooding, storm surge, or property damage caused by boats in the area. The marinas within Great Kills Harbor were also damaged and some have not been repaired.

On the South Shore, powerful waves eroded the area's protective bluffs, causing significant erosion and damage, especially in the neighborhoods of Crescent Beach in Great Kills, Annadale, Prince's Bay, and Tottenville. Storm surges traveled inland into low-lying areas along creeks and tributaries—also known as "backwater inundation"—including Mill and Lemon Creeks, flooding roads and disrupting businesses.

A total of 121,000 electric customers on Staten Island, or about 70% of Con Edison's customers on the Island, were without power following Superstorm Sandy due to substation damage and downed overhead lines, affecting residential customers, businesses and the two hospitals on the East and South shores.[5] Electric outages persisted for weeks and, in some cases months, in the areas most impacted by Superstorm Sandy on the Island. The Oakwood Beach Wastewater Treatment Plant, serving nearly 250,000 residents on Staten Island[6], was completely inundated, damaging many of the facility's pumps.

Although the impact of Hurricane Irene was less devastating on Staten Island than Superstorm Sandy, it brought tropical storm-force winds, heavy rains, and storm surge that caused significant damage on the East and South Shores. By the time Hurricane Irene made landfall in the New York City area on August 28, 2011, the City had issued a mandatory evacuation order for low-lying areas and the Metropolitan Transit Authority had suspended subway and bus routes. Staten Island University Hospital also evacuated in advance of the storm. Peak storm tide of more than eight feet on Staten Island caused damage in low-lying areas, while heavy winds caused downed trees and power lines. In contrast with Superstorm Sandy, much of the impacts of Hurricane Irene resulted from heavy precipitation, with localized rainfall totals nearing 10 inches in New York City. While Superstorm Sandy caused a greater amount of damage on Staten Island than Hurricane Irene, both storms provide a view of the types of risk that the East and South Shores could face in the future, including severe storm surge, hurricane force winds, and heavy rains, contributing to dangerous flooding, power outages, and stormwater backups.

C. Critical Issues

Superstorm Sandy exposed several critical issues within the Community that this NYRCR Plan addresses. These critical issues were identified throughout the NYRCR process during Planning Committee meetings, Public Engagement Events, and meetings with State and city agencies. These issues helped to guide the development of the NYRCR Plan and identification of Proposed and Featured Projects to address needs and opportunities faced by the Community. The following six Recovery Support Functions (RSFs), which were established by President Barack Obama in 2011 through the National Disaster Recovery Framework, provide a context for addressing these critical issues. Critical issues facing the East and South Shores of Staten Island are addressed in greater detail in Section II: .

Community Planning and Capacity Building

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

The Planning Committee considered the impact of land use within extreme risk zones, especially with regard to the City of New York's *Build It Back* program and the State of New York's *NY Rising Buyout Program*. The Committee emphasized the importance of land use controls that allow for expansion of the Staten Island Bluebelt. The Committee also prioritized the creation and support of programs that increase communication and coordination among disaster recovery organizations and local non-profits that played a critical role on the ground providing assistance after Superstorm Sandy.

Critical Issues for Community Planning and Capacity Building

- Greater coordination among community-based organizations that provide critical resources in educating residents in preparation of disasters and helping people recover.
- Greater public education and preparedness efforts, especially outreach efforts targeted towards socially vulnerable populations.

Midland Beach

- Adoption by New York City of recommendations put forth by various regional plans to increase Staten Island's resilience to extreme weather and climate change.

Economic Development

The Planning Committee recognized that increasing the Community's economic resilience is about improving the ability of the area's key retail and commercial corridors to recover after major disasters. Economic resilience is important to Staten Island for three key reasons:

- Businesses that are able to recover quickly after disasters are more likely to keep their doors open in the future;
- If businesses are closed for extended periods of time, employees will suffer from lost wages, compounding the difficulty of their recovery efforts at home; and
- Businesses on Staten Island provide important goods and services that residents need to quickly recover.

The Planning Committee recognized that Staten Island businesses require additional resources to increase resilience, including undertaking proactive strategic planning to leverage the U.S. Army Corps of Engineers (USACE) proposed seawall along the East Shore; augmenting the Community's organizational infrastructure; and incentivizing private investment. The Planning Committee also determined that businesses need more streamlined recovery processes after disasters to better access recovery assistance.

Critical Issues for Economic Development

- User-friendly loan and grant programs that provide assistance to businesses that have been impacted by severe storms.
- Infrastructure improvements to mitigate stormwater flooding and traffic congestion to improve the quality of and access to the area's business districts.
- Solutions to address retail vacancies that persist since Superstorm Sandy.

Superstorm Sandy Damage in Midland Beach

Health and Social Services

Health and Social Services organizations provide critical resources to the Staten Island Community, especially socially vulnerable populations. Organizations such as hospitals, senior centers, religious institutions, and non-profits provide resources for all Staten Islanders, 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, and the elderly.

The Planning Committee considered the impact on vulnerable populations of all projects, from infrastructure projects that protect critical assets to the capacity and resilience of individual Health and Social Services Assets. The Planning Committee identified maintaining electrical power and communications during disasters as an important need. This was addressed by projects that improve upon the existing electrical grid and increase the capacity of existing organizations to respond to disasters.

Critical Issues for Health and Social Services

- Reliable backup power sources for both Staten Island University Hospital campuses.
- Integrated networks of non-profit organizations that can provide training, information, and resources that assist the Staten Island non-profit community in expanding capacity for disaster response.
- Temporary housing dedicated to skilled volunteers who can provide disaster recovery services and reconstruction.

Housing

The Housing RSF refers to individual assets such as senior homes, multifamily housing, and affordable housing facilities, but also refers to residential neighborhoods that are at high or extreme risk of catastrophic flooding in the event of future storms like Superstorm Sandy. Homes in these neighborhoods are also facing very significant increases in flood insurance rates, which pose a threat to neighborhood stabilization. President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 into law in March 2014, amending the Biggert-Waters Flood Insurance Reform Act of 2012 and easing insurance premium increases for many ratepayers. There is, however, enduring concern about longer-term rate hikes and the measures homeowner must take to avoid them. The Planning Committee considered the myriad housing programs that were established in the wake of Superstorm Sandy. The Planning Committee determined that there were gaps in the existing housing programs and still significant need for homeowner assistance. Issues facing these communities require a comprehensive response, such as infrastructure projects that protect the community from storm surge as well as filling the gaps in existing housing assistance programs. Although programs have been implemented since Superstorm Sandy to provide assistance to homeowners, the Planning Committee recognized additional unmet needs for financing tools to assist homeowners who need to modify their homes to mitigate flood risks and rising insurance rates.

Critical Issues for Housing:

- Housing recovery and repair strategy that addresses gaps in New York City reconstruction assistance programs.
- Partnerships between local non-profit organizations and city-wide housing assistance organizations to provide additional resources and guidance to Staten Island homeowners in applying for various relief programs.

Infrastructure

Infrastructure refers to the strategies that the Planning Committee identified for restoration, repair, and management of essential services,

Superstorm Sandy Damage in Tottenville

such as stormwater systems, transportation networks, and coastal defenses.

The Planning Committee recognized that while some infrastructure projects could be implemented within the CDBG-DR allocation for the Community, other projects would require additional study, significant regional coordination, and greater capital investment. Therefore, the Infrastructure strategies proposed by the Planning Committee contain a combination of short- and medium-term projects for implementation, along with long-term studies that will ultimately provide the framework for a comprehensive approach to more resilient infrastructure on Staten Island.

Critical Issues for Infrastructure

- Coordination between the U.S. Army Corps of Engineers (USACE) and local neighborhoods to incorporate short-term protections in coastal areas while USACE coastal protection projects are in the planning phase.
- Creation of microgrids that generate power in low-risk locations and form networks of critical facilities that can provide important relief and recovery services after a major storm.
- Enhance existing and proposed coastal dunes along the East and South Shores.

Con Edison Conducting Repairs after Superstorm Sandy in Saten Island

Natural and Cultural Resources

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

The Planning Committee placed a great deal of emphasis on the role that green infrastructure can play in reducing stormwater flooding. In particular, the Planning Committee supported expansion of the Staten Island Bluebelt as one of the best, and most environmentally sensitive, methods of addressing stormwater issues on the Island.

Critical Issues for Natural and Cultural Resources:

- Restoration of parks and wetlands that were damaged by Superstorm Sandy to increase their capacity in absorbing flood and rainwater.
- Expansion of the Staten Island Bluebelt to provide greater stormwater capacity.
- Evaluation of changes in land use and stormwater regulations to further enhance and protect current and future locations of tidal and freshwater wetlands and natural infrastructure.

D. Community Vision

The Planning Committee developed a Vision Statement to guide the East and South Shores in addressing damage caused by Superstorm Sandy, capitalize on social and economic assets to improve the lives of residents, employees and business owners, and rebuild a more resilient community to expand the economy and reduce future risk. This statement was tested and refined, based on input received at two Public Engagement Events.

Vision Statement

The East and South Shores of Staten Island are a diverse, yet unified, community with significant natural, cultural, and economic assets, and a long tradition of engaged citizens with a strong and unique sense of identity. Building on these strengths, the East and South Shores will come back stronger and build back better after Superstorm Sandy.

Sandy tested the strength of all Staten Islanders, but the devastation experienced on the East and South Shores was particularly acute. While this Plan prioritizes rebuilding the East and South Shores, the vision recognizes that the East and South Shores are inextricably linked with assets and strengths in the rest of the Island and that these key assets are critical to a more resilient future.

Purpose and Goals

This NYRCR Plan aims to prepare the East and South Shores to better handle the impacts of severe storms and sea-level rise. The NYRCR Plan also aims to build capacity within upland areas to ensure that all Staten Islanders are protected prior to, during, and following extreme weather events, and to strengthen the physical and social connections between the two. A thoughtful, cohesive plan identifying short, medium and long-term strategies must be developed now in order to reduce future risk. Specifically, the goals of this Plan are to:

- Strengthen local business corridors and improve connections to key economic assets in the North Shore to increase the East and South Shore's economic resilience to better withstand severe weather events.
- Improve coordination between health and social services organizations to effectively communicate services to all populations. Resilience is just as much about social programs and education as it is physical infrastructure.
- Provide residents in low-lying and coastal areas with a range of housing options that are resilient in design and location.
- Rebuild in a way that enhances the area's grey and green infrastructure systems to withstand future extreme weather events. Reinforce connections to the Island's key regional infrastructure assets.
- Enhance the area's natural and cultural resources to better withstand storm surges and high winds, and to help control other forms of flooding from heavy rains. Look for additional opportunities to implement green infrastructure for stormwater management (i.e. expansion of the Bluebelt), erosion prevention, and restoration of wetlands will also help to better protect the Island from storm damage.
- Bolster the support infrastructure for the East and South Shore's most vulnerable populations, including low-income populations, the elderly, people with disabilities, children, and the homeless, to help prepare and evacuate these groups in advance of a storm, track and protect them during the immediate aftermath, and return the community back to normal soon after.

The Planning Committee has determined that city, state, and federal efforts to rebuild the East and South Shores–as well as the efforts by the public and private sectors–must be coordinated and Staten Islanders must be engaged throughout process.

Figure 3: Vision

E. Relationship to Regional Plans

Regional Perspective

As a Borough of the City of New York (NYC) that shares water bodies with the State of New Jersey and Long Island, regional plans and projects in neighboring jurisdictions will have a strong impact on Staten Island.

Members of the Planning Committee shared this regional perspective and had an understanding of the regional issues, and ongoing regional planning and resiliency efforts. Further, the public nature of Planning Committee meetings encouraged collaboration with other local and regional initiatives.

The most significant current and proposed projects, such as the sewer upgrades by NYC Department of Design and Construction (DDC), the expansion of the New Creek Bluebelt by NYC Department of Environmental Protection (DEP), and the coastal protection systems proposed by the U.S. Army Corps of Engineers (USACE) Phase I Draft Feasibility Study anticipated to be released in summer 2014, will impact the proposed reconstruction strategies developed through the NYRCR planning process.

Noted regional initiatives and organizations reviewed or engaged through this process include:

- City of New York, State of New York, and Federal agencies, including local Staten Island offices
- NYC Special Initiative for Rebuilding and Resiliency (SIRR)
- U.S. Army Corps of Engineers, Hurricane and Storm Damage Reduction Project on the South Shore of Staten Island, NY; North Atlantic Coast Comprehensive Study
- Sandy Rebuilding Task Force, Hurricane Sandy Rebuilding Strategy
- U.S. National Park Service, plans for Gateway National Recreation Area
- NYC Local Waterfront Revitalization Program
- SImagines: Planning for Recovery Program
- Vision for Staten Island
- Staten Island American Institute of Architects Regional/Urban Design Assistance Team

Some challenges identified are beyond the jurisdictional control of communities within Staten Island, such as city zoning ordinances, which are governed by the City of New York, and shoreline stabilization, which is the responsibility of the USACE. Therefore, it was critical that the NYRCR planning process be inclusive of community, City, State, and Federal agencies who share jurisdictional control and responsibility on Staten Island and along its shorelines and waterways.

Reconstruction strategies were evaluated by the Planning Committee on a regional basis, rather than in a vacuum, considering current or proposed projects, as well as parallel planning efforts such as U.S. Housing and Urban Development's (HUD) Rebuild By Design competition and projects and studies to be conducted by the USACE and the City.

There are a significant number of plans, policies, procedures, and resources that address the existing conditions, regulatory frameworks, community goals, and resiliency opportunities on the East and South Shores of Staten Island. These resources have been produced by public agencies at all levels of government, regional planning groups, business and non-profit organizations, and academic institutions. Reconstruction projects and resiliency programs included in the NYRCR Plan recognize the planning work completed to date.

A comparison of community and municipal planning efforts before and after Superstorm Sandy provides insight into how the perceptions of needs and opportunities by local residents and New York City changed due to the impacts of the storm. Although some resilience themes related to climate change appear in plans developed before Superstorm Sandy, the overarching focus of these plans tended to focus on issues such as quality of life, recreation, community involvement, and education. Superstorm Sandy resulted in a far more specific focus on the sustainability of communities in low-lying areas of Staten Island.

Pre-Sandy

Vision for Staten Island: Staten Islanders Building Their Future

The *Vision for Staten Island* was developed during 2009 and 2010 to encourage Staten Islanders to take an active and collaborative role in the future of the Island. The report compiled input from local residents and workers on issue areas including arts and culture, education, the environment, social services, and economic development, among others. The findings of the report were summarized in seven central themes:

- Defining and Defending Staten Island's Unitary Interest
- Deepening Community Engagement
- Youth/Young Adults a Particular Concern
- The Transformative Possibilities of Education
- Reaffirming and Building on Core Commitments
- Recognizing and Supporting the Island's "Umbrella Community-Based Organizations"
- Two Huge Issues: Transportation and Governance

The New York City Comprehensive Waterfront Plan—Vision 2020

The New York City Comprehensive Waterfront Plan—Vision 2020 (CWP) is a comprehensive analysis and overall vision for New York City's 520 miles of shoreline. It includes a strategic framework for the City's waterfront, short- and long-term strategies, and is used to guide land and water use decisions. Priorities in the plan focus on expanding public access, supporting the working waterfront, improving water quality, restoring the ecology of the waterfront, enhancing the Blue Network (the waterways between the five boroughs), and increasing the resiliency of the City in respect to climate change and sea-level rise.

The 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.

Post-Sandy

SImagines: Planning for Recovery Program

SImagines was established by Staten Island-based architects to generate a unified vision on the future of coastal communities in Staten Island. The program identified that Staten Islanders' perception of the shoreline was changed dramatically by Superstorm Sandy. The goal of this program was to bring residents, business owners, and community leaders together in a workshop setting to create a plan for neighborhood recovery that would address the fears and concerns that Sandy unleashed. Recommendations from these workshops are organized into six categories:

- Protection
- Infrastructure
- Site/House
- Communication
- Quality of Life
- Waterfront

PlaNYC: A Stronger, More Resilient New York

The report produced by Mayor Bloomberg's Special Initiative for Rebuilding and Resiliency (SIRR) is a nearly $20 billion plan that provides a framework for providing greater coastal protections, more resilient infrastructure systems, and more responsive municipal services. The goal of the report is to provide strategies that will help New York City adapt to the impacts of climate change and ensure that the city is better prepared to recover from disasters such as Superstorm Sandy. The report provides a list of 45 initiatives for increasing resiliency in the

East and South Shores of Staten Island in the following categories:

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

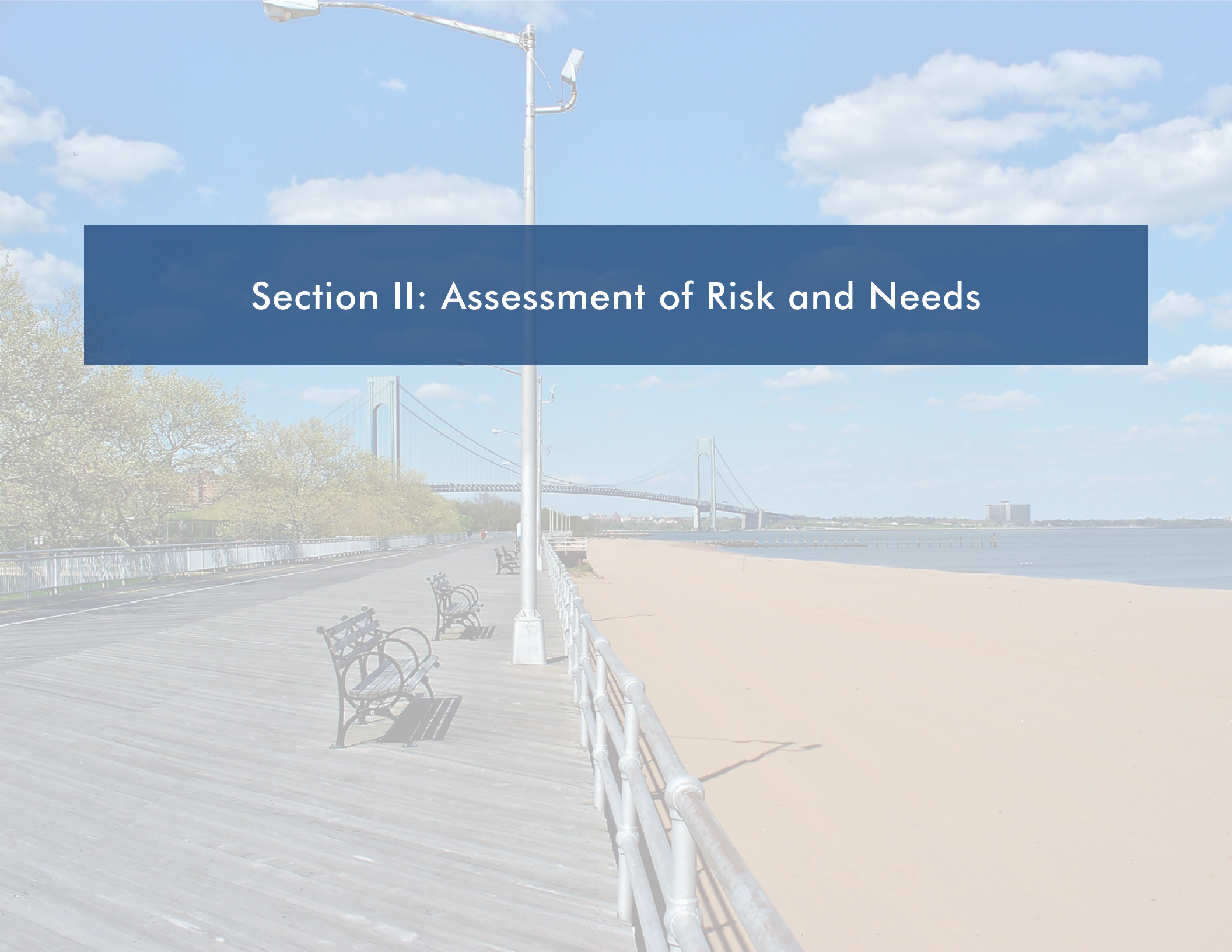
A comprehensive list of the relevant regulatory and advisory documents that the Planning Committee reviewed as part of the NYRCR Process are listed in Section V: Additional Materials.

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 Department of City Planning's Flood Resilience Zoning text amendment adopted by City Council in 2013.



Section II: Assessment of Risk and Needs

A. Description of Community Assets and Assessment of Risk

Creating an Asset Inventory and Risk Assessment

The process of completing the NY Rising Community Reconstruction (NYRCR) Plan for the East and South Shores of Staten Island was largely framed in terms of community assets and the risks that they face. Assets are a critical component of the NYRCR Plan because they include facilities, institutions, or networks that are essential to day to day life, long-term resilience, and rapid disaster recovery in Staten Island. The Planning Committee prioritized assets that are critical or locally significant and which provide services for vulnerable populations, such as people with disabilities, low-income populations, the elderly, young children, and homeless populations.

In order to create a plan that protects critical assets, the Planning Committee also considered the relative risk that these community assets face. The purpose of developing this asset inventory and risk assessment was to enable the community to identify those assets at highest risk for negative impacts from future storm events. Knowing the assets at highest risk helped the Planning Committee to understand the needs and opportunities within their community and empowered the Planning Committee to prioritize projects that reduce the risk to these assets. The Asset Inventory and Risk Assessment Process is illustrated in Figure 4.

The Asset Inventory and Risk Assessment was compiled to measure the current levels of risk to assets on Staten Island. The goal of the risk assessment was to determine those assets at highest risk; the Asset Inventory and Risk Assessment was limited to all assets within extreme and high risk areas, as well as critical or locally significant assets within the entire NYRCR Community. This risk assessment served as a baseline for determining the risk-reduction benefits of potential NYRCR Proposed and Featured Projects.

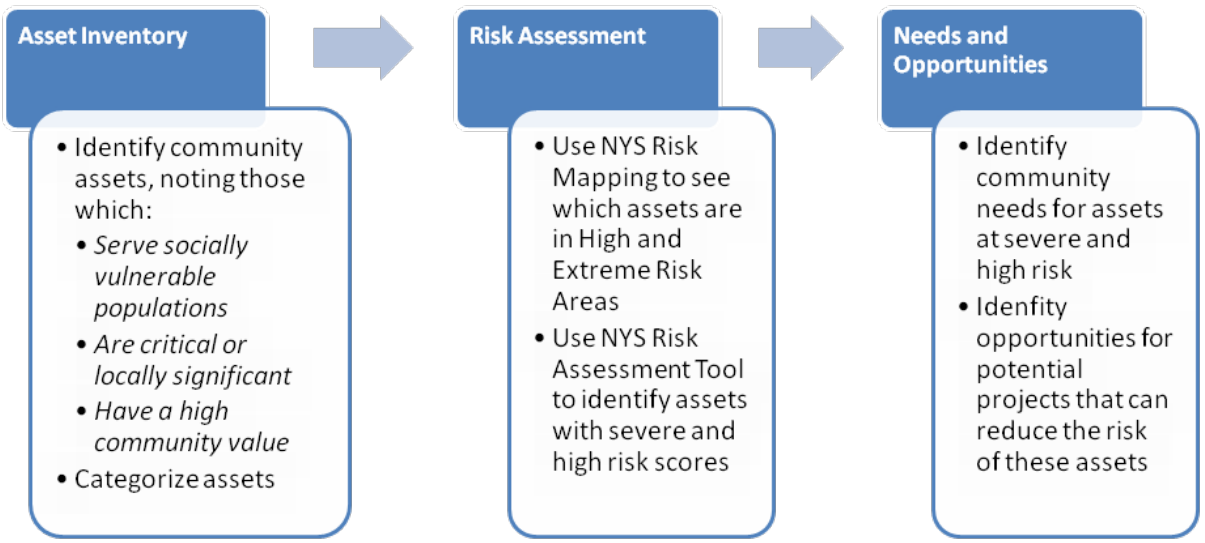


Figure 4: Asset Inventory and Risk Assessment Process

i. Description of Community Assets

To be a more resilient community, Staten Island must identify ways to strengthen and protect its social, economic, and natural resources that have been, or will be, affected by coastal hazards. These assets are places or facilities where economic, environmental, and social functions of the community occur or are critical infrastructure required to support those functions. These are features which the community values, ranging from commercial areas, neighborhoods, schools, and healthcare facilities, to infrastructure, natural habitats, and cultural resources. The NYRCR Plan seeks to ensure that reconstructed assets and new

assets are built to withstand the impacts of future storms, while programs and policies are designed to increase the community's resilience.

The Planning Committee has identified numerous assets that were either impacted by Superstorm Sandy, 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:

- Economic;
- Health and Social Services;
- Housing;
- Infrastructure Systems;
- Natural and Cultural Resources; and
- Socially Vulnerable Populations.

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

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

The following is a summary of the assets at risk within the East and South Shores of Staten Island NYRCR Community identified through the above assessment process. The detailed Community Asset Inventory can be found in Section V: Additional Materials.

New York State Risk Maps

New York State Department of State (NYS DOS) has developed risk assessment area mapping, which defines areas at risk from coastal hazards 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. The NYS Risk Assessment Maps were utilized for the NYRCR Plan to show the corresponding risk (extreme, high, and moderate) for each of the asset categories (Figure 5).

The risk assessment map in Figure 5 indicates that the entire coastline of the Community is in the Extreme Risk Zone, with extreme risk areas extending inland at Oakwood Beach, Lemon Creek and Mill Creek. High risk areas extend far inland throughout the East Shore neighborhoods of South Beach, Ocean Breeze, Midland Beach and New Dorp Beach. High risk areas along the South Shore include Great Kills, Eltingville, and Tottenville.

Great Kills Harbor

South Shore, Staten Island Coastline

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.

- FEMA V zone.
- Shallow Coastal Flooding per NOAA NWS's advisory threshold.
- Natural protective feature areas susceptible to erosion.
- Sea level rise - Added 3 feet to the 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 SLOSH category 3 hurricane inundation zone.

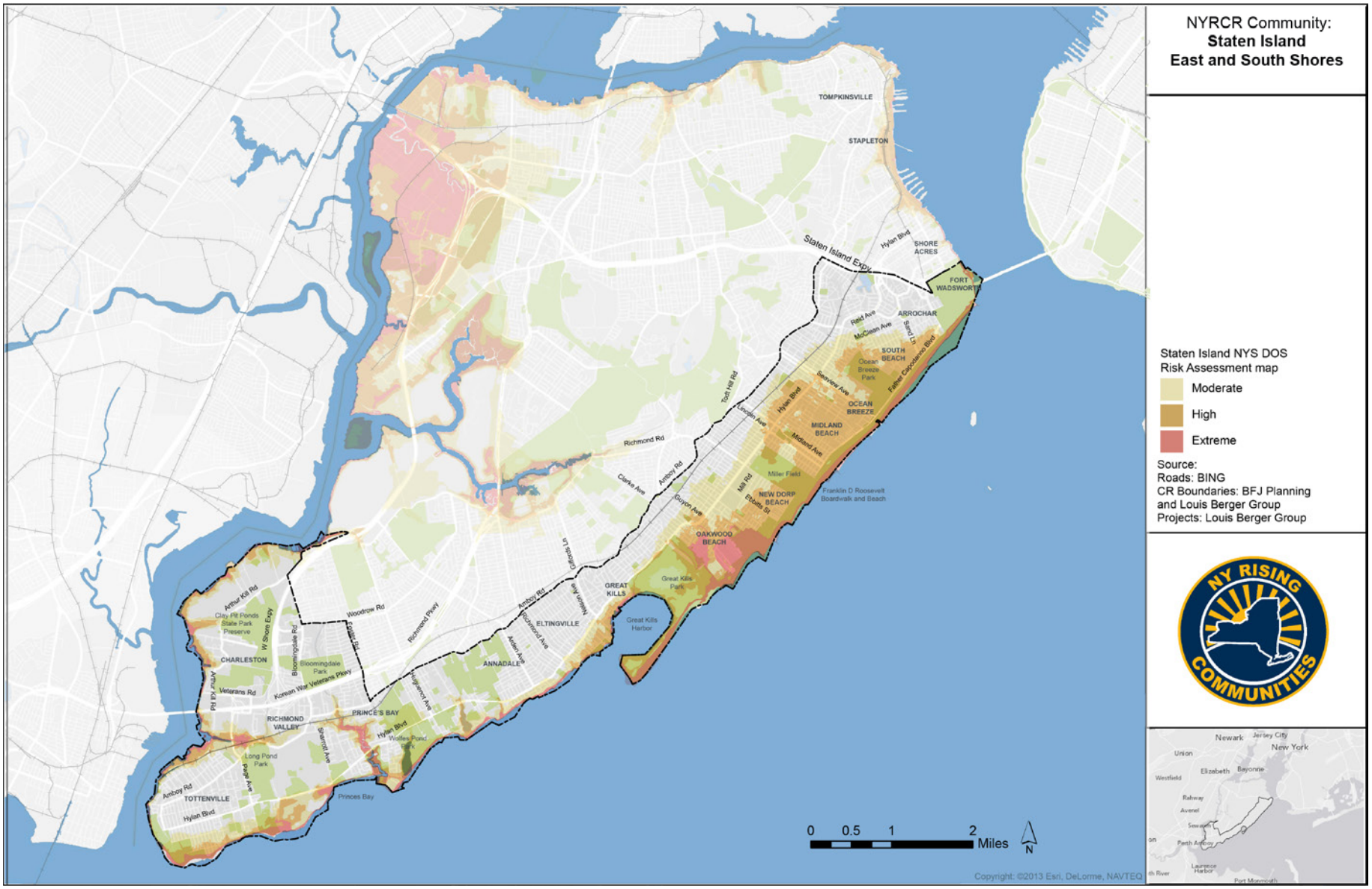


Figure 5: DOS Risk Map

Economic Assets

Economic assets that are at extreme or high risk of damage in future storms include large employers, key commercial areas, and tourism destinations (Figure 6). Staten Island University Hospital (SIUH) is the largest employer within the Community and one of the largest on Staten Island. Commercial corridors along Father Capodanno Boulevard, Midland Avenue, Sand Lane, and Hylan Boulevard on the East Shore and Amboy Road, Hylan Boulevard, Ellis Street, and Mansion Avenue on the South Shore experienced significant inundation during Sandy and many businesses have not yet reopened, especially in Midland Beach. In addition, Great Kills Marina is an important seasonal destination that was severely damaged by Sandy's inundation. Critical economic assets outside of the Community, which impact the economic resilience of the East and South Shores include the Staten Island Ferry and Bay Street Commercial Corridor.

Superstorm Sandy Damage to Hylan Boulevard Businesses, East Shore of Staten Island

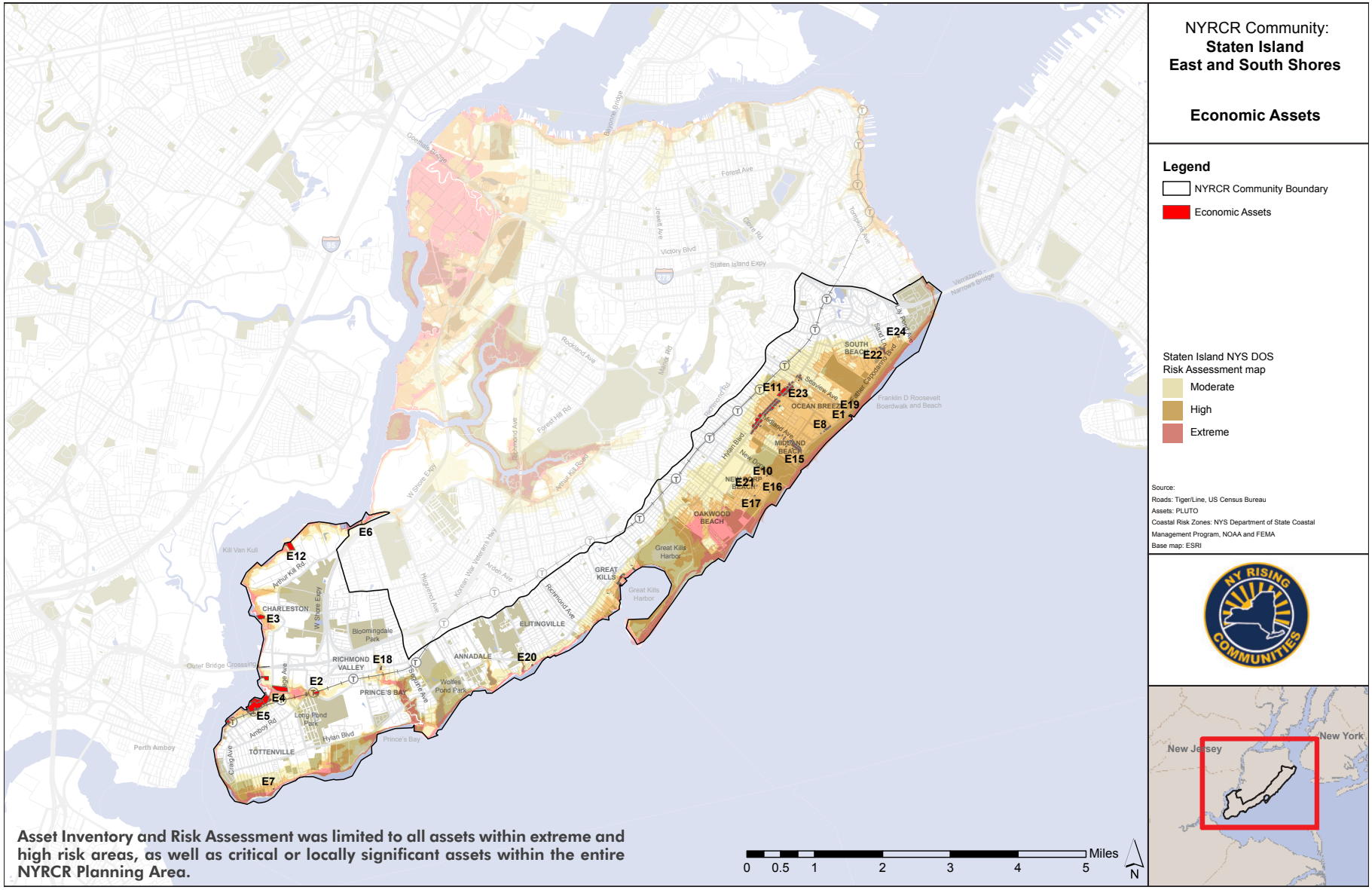


Figure 6: Economic Assets

Health and Social Services Assets

Staten Island is served by three private hospitals: SIUH North and South and Richmond University Medical Center (RUMC). SIUH has two locations (Figure 7); its East Shore location was severely damaged by Superstorm Sandy, causing risk to patients and job loss for employees, while its South Shore location was only moderately damaged, due to its higher elevation and shoreline defenses, but did suffer the loss of power. When SIUH closed and service was interrupted due to the impacts of Superstorm Sandy, residents did not have access to sufficient medical services in coastal neighborhoods. RUMC served as the only fully-operational hospital on Staten Island during and just after the storm, operating with one emergency room and limited bed capacity. RUMC is considered a critical asset despite its location outside of the Community and the Planning Committee underscores the importance – as well as the two other hospitals – as Staten Island is not served by any public hospital. Likewise, the Jewish Community Center (JCC) served as an important shelter and source of services during the storm, and is, therefore, a critical asset outside of the Community. Senior Centers were also identified as important assets, including the South Beach Senior Center, New Dorp Beach Friendship Club and the Mt. Loretto Friendship Club. The New Dorp Beach Friendship club, in particular, was a critical resource for senior citizens on the East Shore prior to the storm, but was destroyed during Superstorm Sandy and is still closed today.

SIUH Electrical Generators

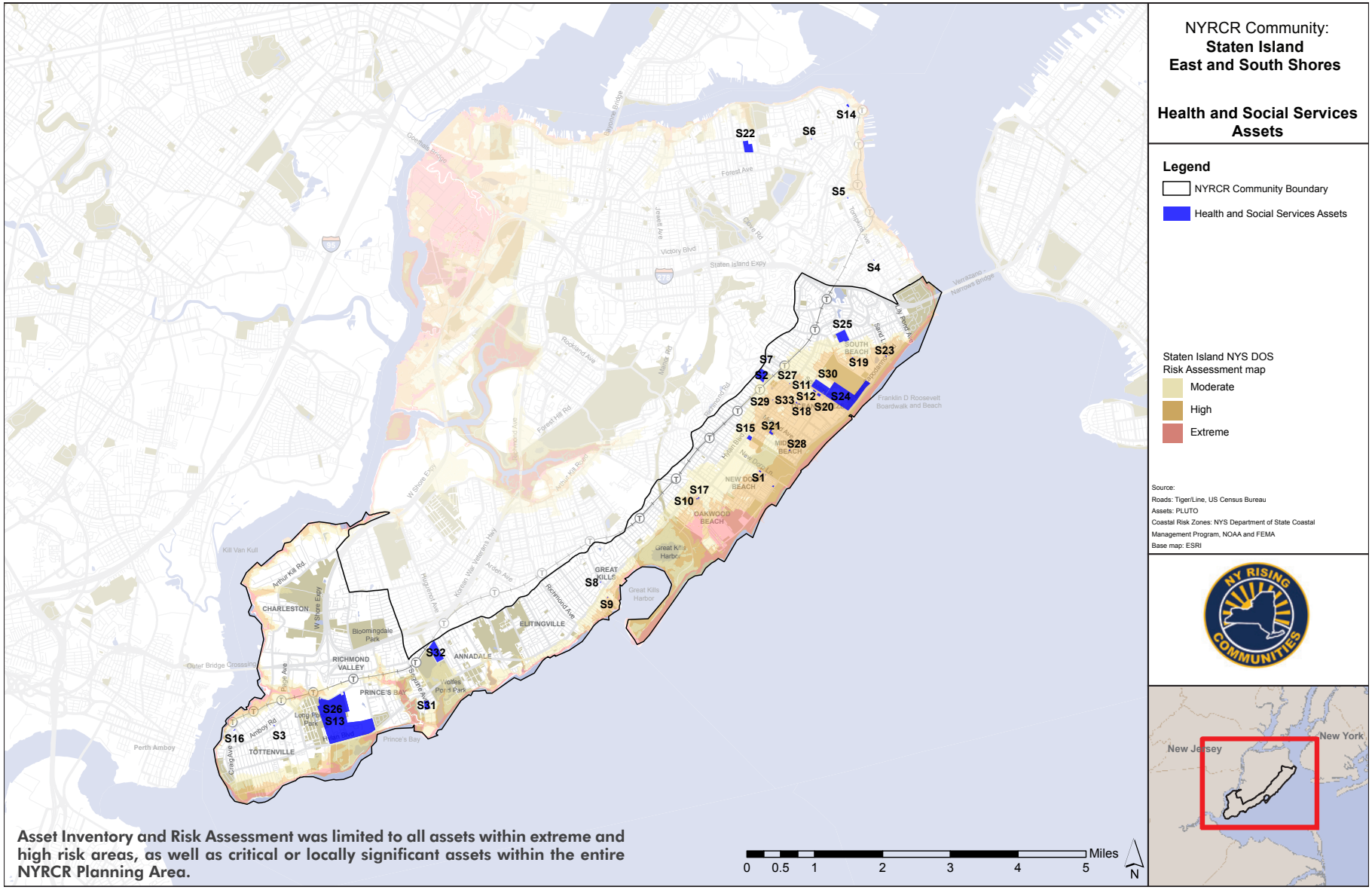


Figure 7: Health and Social Services Assets

Housing Assets

The Community is primarily characterized by single-family residential neighborhoods. Many of these neighborhoods are located in low-lying areas and former wetlands. The greatest extent of storm surge flooding during Superstorm Sandy occurred in the East Shore neighborhoods of South Beach, Ocean Breeze, Midland Beach, New Dorp Beach, and Oakwood Beach. Although flooding did not extend as far inland in South Shore neighborhoods due to coastal topography, Great Kills, Eltingville, Annadale, Prince's Bay, and Tottenville all experienced significant damage (Figure 8).

Residential neighborhoods that experienced the most damage tended to be areas that have historically been low-lying wetlands. These areas, like many East Shore coastal communities, are characterized by bungalow homes with little stormwater drainage, frequent flooding, and coastal inundation.

East Shore, Staten Island

South Beach

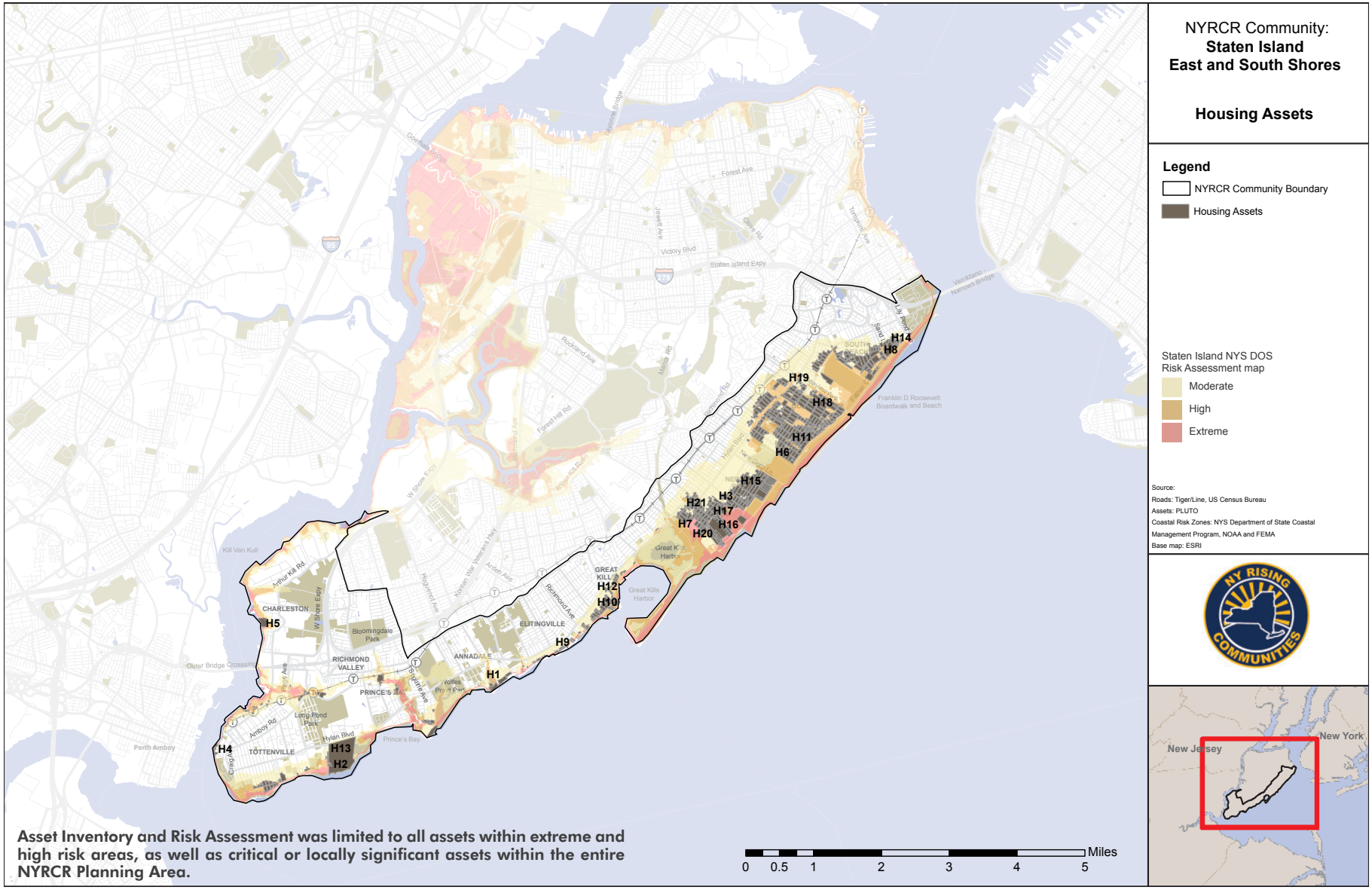


Figure 8: Housing Assets

Infrastructure Assets

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 in the event of a storm for two reasons. First, inundated roads increase the difficulty of reaching designated evacuation routes; and second, tidal flooding or persistent stormwater flooding can damage roads and exacerbate traffic congestion during both evacuations and normal conditions. Parts of Hylan Boulevard and Amboy Road on the South Shore were subject to Sandy inundation, as was the Richmond Valley station of the Staten Island Railway (Figure 9). The Richmond Valley Train Station sits on top of tidal wetlands with streams running behind both platforms, eastbound and westbound. As part of the Mill Creek Watershed Bluebelt work currently underway, both streams will be removed from behind the platforms and directed under the tracks to NYC Department of Environmental Protection (DEP) Bluebelt Best Management Practices (BMPs).

There are also several critical transportation infrastructure assets located outside of the Community that, after Superstorm Sandy, impacted the ability of residents and businesses within the East and South Shores of Staten Island to recover. These include the Korean War Veterans Parkway, (formerly known as the Richmond Parkway), the Staten Island Expressway, Pearl-Harbor Memorial Expressway, and bridges such as the Verrazano-Narrows Bridge and Outerbridge Crossing. The Clifton Rail Yard, which is part of the Staten Island Railway (SIR) system, also suffered extensive damage during the storm, putting rail service at risk for all of Staten Island.

Stormwater and sewer networks are also critical infrastructure assets that present risks in the event of major storms. Another key asset impacted by Superstorm Sandy was the Island's electrical power system. The Planning Committee determined that the power grid must include greater protections and redundancies to limit outages and provide back-up electricity, especially to critical assets.

Nassau SIR Station

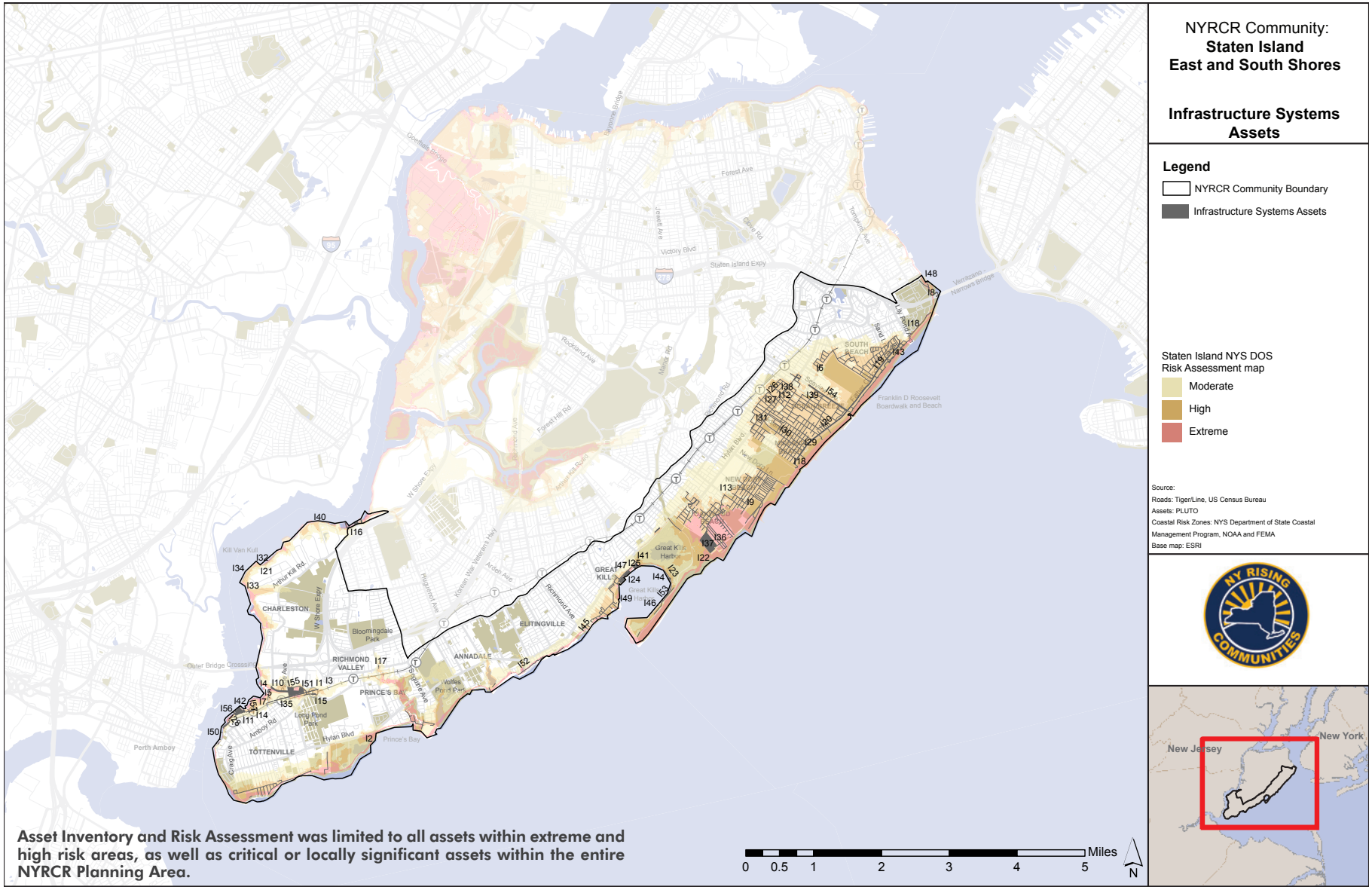


Figure 9: Infrastructure Assets

Natural and Cultural Resources Assets

Superstorm Sandy impacted beaches, parks, wetlands, natural stormwater systems, and cultural institutions (Figure 10). In South and Midland Beaches, the Franklin D. Roosevelt (FDR) Boardwalk suffered extensive damage, as well as beach erosion. In Great Kills Park – part of the Gateway National Recreation Area (Gateway) – extensive beach erosion occurred, as well as the loss of a bathhouse and marina. Miller Field, also park of Gateway, is a key asset, which served as a distribution site during recovery efforts. On November 15, 2012, President Barack Obama visited survivors of Superstorm Sandy at Miller Field, thanked volunteers for their recovery efforts, and toured the neighboring New Dorp Beach community.[7]

Wetlands, streams, and ponds all contribute to the natural system of managing stormwater in Staten Island. The New Creek Bluebelt in Midland Beach is in the High Risk zone. There are several streams and ponds along the South Shore, including Cunningham Pond, Mill Creek, Lemon Creek, Bunker Pond, and Wolfe's Pond. Wolfe's Pond, part of Wolfe's Pond Park, is highly susceptible to damaging storm surge. The dam that protects the pond from connecting with Raritan Bay was breached in 1992 and again in 2011 during Hurricane Irene, emptying out the pond and creating a brackish water condition killing marine life.[8] Cultural resources such as museums, religious institutions, and libraries were also impacted by Superstorm Sandy, and many are also located in areas that are at risk.

While the Planning Committee recognizes the risks associated with these assets, they also recognize the unique opportunity to leverage these resources to help protect the community, as a first line of defense from future storm surge events.

Mill Creek

Lemon Creek

New Creek Bluebelt

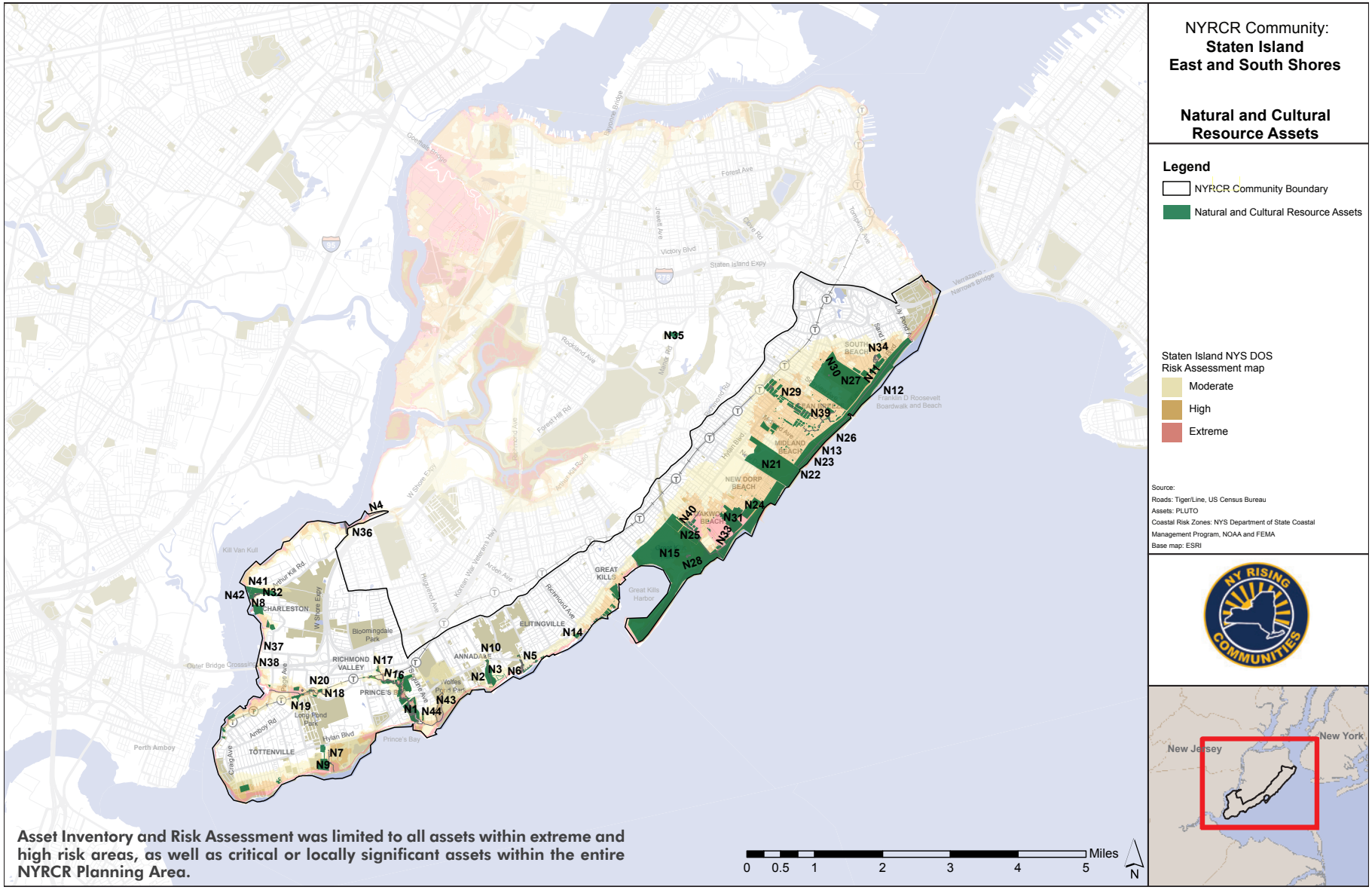


Figure 10: Natural & Cultural Resources Assets

Assets that Serve Socially Vulnerable Populations

Assets that serve Socially Vulnerable Populations include facilities that provide services for people with disabilities, low-income populations, the elderly, young children, limited-English proficient speakers, and homeless populations. Superstorm Sandy had devastating impacts on socially vulnerable populations within the East and South Shores with approximately 67% of the 23 storm-related fatalities on Staten Island comprised of residents over the age of 55 and more than 33% over the age of 65. Socially vulnerable populations identified within the high risk zone include the elderly population in Midland Beach, including the residents of the Island Shores Assisted Living facility, and other neighborhoods throughout the Community, as well as patients of the South Beach Psychiatric Center.

Low-income households are dispersed throughout the Planning Area, exhibiting no particular pattern. Although no real trend is evident, the northern portion of the area – including the Grasmere, Dongan Hills and South Beach communities—contains the greatest number of U.S. Census Block Groups where over one-third of households earn less than $35,000 annually. Low-income households are generally defined as those with an annual salary of less than $35,000.[9] The area with the lowest share of low-income households is the southwestern tip of the Community, in the vicinity of the Tottenville and Prince's Bay neighborhoods.

The northern part of the Community has both the greatest concentrations of households without any access to a vehicle, and households with limited-English proficient speakers. With respect to non-English speaking households, virtually the entire Community has less than 1% of households that speak no English, while 15% to 29% of households in two block groups north of Sand Lane speak no English.[10] Households without access to a car are scattered throughout the area, but there are only two block groups where more than one-quarter of households lack access to a vehicle and both lie at the northern end of the Community.

Elderly (persons over the age of 65) and very young (children under the age of 9) populations are also scattered throughout the Community.[11] There are three areas where more than 30% of the population is over the age of 65—one toward the north, one in the central portion of the Community, and one toward the south in the vicinity of the Mt. Loretto Friendship Club Senior Center and the Prince's Bay neighborhood. In general, these same three areas also contain the greatest share of children under the age of 9. There are several block groups in the southern, central and northern portions of the Community where more than one-quarter of the population is very young, which are proximate to the elderly population concentrations.

Critical and Locally Significant Assets

Special consideration was given to identifying critical or locally-significant assets, whose loss or impairment would compromise essential services for Staten Island's communities. According to the Federal Emergency Management Agency (FEMA), critical facilities are essential to the health and welfare of the whole population and are especially important following hazard events.[12] Examples of Critical Facilities include emergency service facilities such as hospitals and other medical facilities, police and fire stations, emergency operations centers, public works facilities, generating plants and other principal point of utility lines, evacuation shelters, schools, and other uses that house special needs populations.

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

Assets with High Community Value

The preparation of this NYRCR Plan was a participatory planning process which gained input from the NYRCR Planning Committee and the public. Therefore, community value weighed highly in determining which assets the NYRCR Plan seeks to protect. "Community Value" equated to the value of the asset to the community and is expressed as high, medium, or low. The following assets have a high community value:

- Assets noted as important to protect by the NYRCR Planning Committee and public;
- Critical facilities and locally significant facilities;
- Facilities that serve socially vulnerable populations;
- Key elements of infrastructure systems (e.g., gas stations and certain roadways);
- Emergency Operations and Response Facilities;
- Schools and Community Facilities; and
- Significant Economic assets.

ii.Assessment of Risk to Assets

Understanding Risks: Coastal Hazard and Risk Assessment Tool

Risk is the chance that an asset will be damaged or destroyed by future storm events. Assessing the risk to the East and South Shores enables prioritization of projects and reconstruction strategies that can protect specific assets by reducing their risk.

The risk to each asset or group of assets, as identified above, has been quantified using a tool developed by NYS DOS. This risk assessment provides a baseline risk score for each asset or group of assets. Identifying the assets at highest risk will help to prioritize projects and reconstruction strategies that can protect vulnerable assets. The reduction in risk score caused by implementing a potential project will be a key determinant of the risk-reduction benefit generated by that project.

For the purposes of the Risk Assessment tool, the ***Asset Inventory and Risk Assessment was limited to critical or locally significant assets within the entire NYRCR Community,*** and all assets within extreme and high risk areas, according to NYS DOS Risk Mapping. Assets within the Tool are grouped by:

- Asset Category
- Systems, noting key elements of each system (e.g., "Roadway Network" and "Peninsula Blvd.")
- Location (i.e., municipality, close proximity)
- Similar Exposure and Risk Characteristics (e.g., NYS Risk Area)

Unless otherwise stated, "assets" within subsequent text and figures refer to assets included in the Asset Inventory tool, limited and grouped as described above.

Risk is an expression of *hazard*, the likelihood and magnitude of a future storm; *exposure*, or the moderating effect of topographic and shoreline features; and *vulnerability*, the ability of an asset to resist damage from a future storm event for each group of assets.

Risk Scores

The Risk Score for each group of assets is determined by multiplying its hazard, exposure and vulnerability. The Coastal Hazard and Risk Assessment Tool automatically generates this risk score, which represents the relative risk of the assets in the community. Risk scores include some subjective analysis and should not be compared from one NYRCR Community to another.

Risk = Hazard x Exposure x Vulnerability

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 helped to identify assets with increased potential for storm damage and serve as one of many factors in determining the Proposed and Featured Projects the Planning Committee included in the NYRCR Plan (see Section IV: Implementation—Project Profiles) . 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.

See Section V: Additional Materials for the complete Coastal Hazard and Risk Assessment Tool for the Community.

Economic Assets

Most Economic Assets inventoried (88 % of asset inventory) are at high risk of future inundation. Commercial districts along Midland Avenue and Hylan Boulevard on the East Shore and Amboy Road on the South Shore all lie in the High Risk zone, while Great Kills Marina is at the highest risk for future inundation, due to its location in an Extreme Risk zone (Figure 12).

The Economic Assets at highest risk include Great Kills Marina and Puglia by the Sea Restaurant, which was destroyed during Superstorm Sandy. Additional Economic Assets at high risk include the segments of the Mansion Avenue, Arthur Kill Road, and Ellis Street commercial corridors, which all lie within extreme risk areas. Economic corridors along include Amboy Road, Androvette Street, Father Capodanno Boulevard, Hylan Boulevard, Midland Avenue and Sand Lane are also at high risk. These high risk assets include several individual or 'ungrouped' assets that do not fall within groups, given their geographic distance away from economic corridors, such as the Amazing Deli, Coral Bay Café in Tottenville, which was completely destroyed during Sandy, and Nino's Salumeria, among others.

Table 1: Economic Assets: Risk Level

Asset ID	Asset Name	Risk Score
E20	Puglia by The Sea	
E9	Great Kills Marinas	
E4	Arthur Kill Rd/Ellist St/Main St - Extreme	
E13	Mansion Avenue - Extreme	
E3	Androvette Street - High	
E6	C G Feeds	
E7	Coral Bay	
E8	Father Capodanno Blvd - High	
E12	King's Material Co Inc	
E1	Amazing Deli	
E2	Amboy Road - High	
E5	Arthur Kill Rd/Ellist St/Main St - High	
E11	Hylan Boulevard - High	
E15	Midland Ave - High	
E16	New Dorp Beach Deli	
E17	Nino's Salumeria	
E18	Nothing New	
E19	Oceanside Ave Plumbing & Heating	
E21	Risas World of Chocolate	
E22	Sand Lane - High	
E23	Slater Convenience	
E24	Tippy Realty Co.	
E14	Mansion Avenue - High	
E10	Griff's Place	

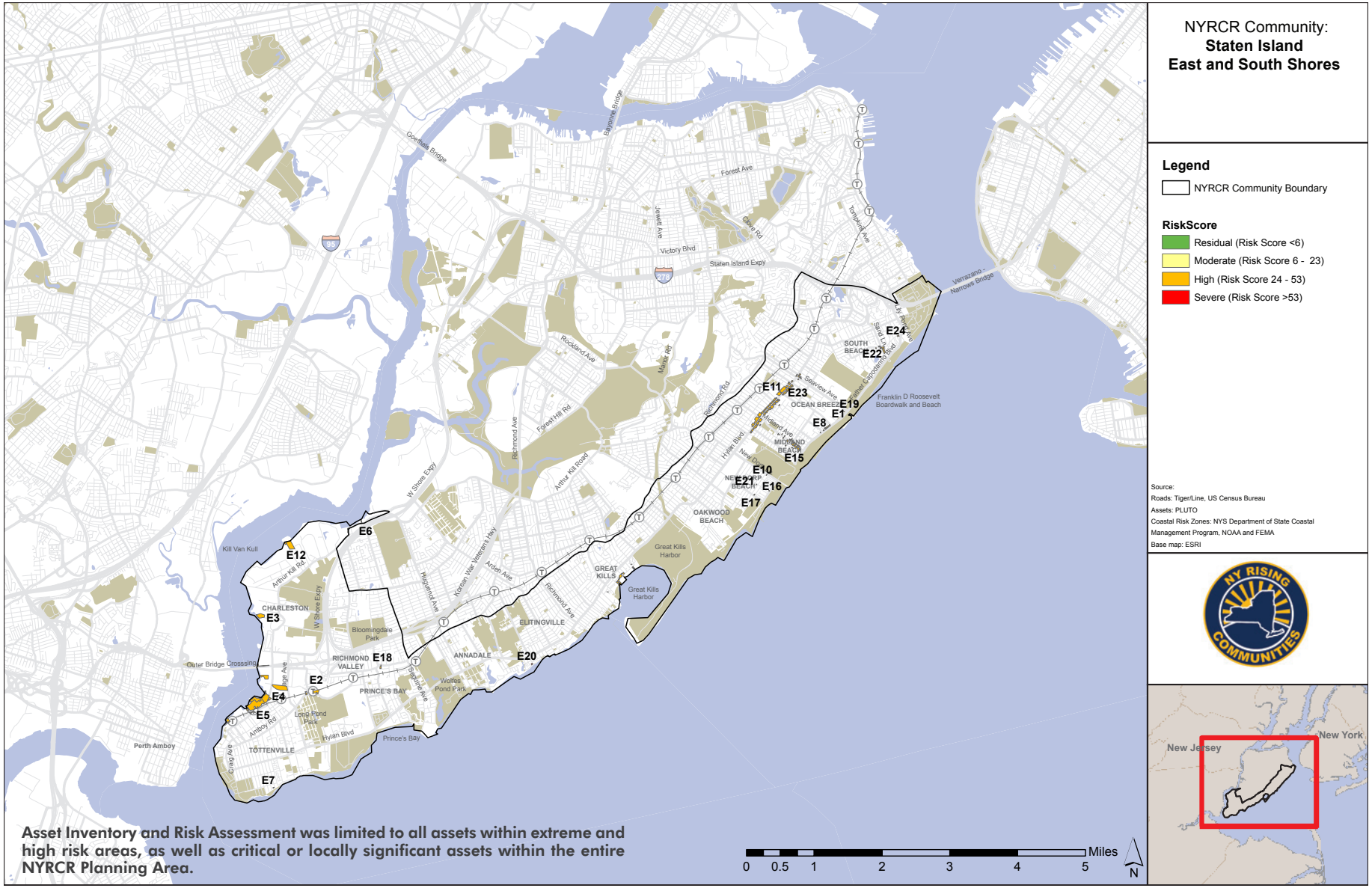


Figure 11: Risk Assessment of Economic Assets

Health and Social Services Assets

Risk levels for Health and Social Services Assets on the East and South Shores vary from high to residual, and no assets in this category are at severe risk for impacts from future storm events. For example, Staten Island University Hospital, the largest employer within the Community and the largest healthcare provider on the Island, sits in the High Risk zone. Figure 13 illustrates the risk to Health and Social Services Assets included in the Asset Inventory and Risk Assessment.

Approximately one quarter of the health and social services assets (24% of asset inventory) are at high risk of future flooding. Among these are groups of health and social services assets in the neighborhoods of Great Kills, Old Town, Dongan Hills and South Beach. Individual 'ungrouped' assets are also at high risk, including schools such as St. Margaret Mary's School and PS 38, as well as the Staten Island Community Center. These assets are noted as locally significant with a high community value.

Health and Social Services Assets at moderate risk include several healthcare facilities within the Community, such as Hylan Communicare Health Center, Island Medical Specialists, Island Rehabilitative Specialists, the South Beach Psychiatric Center. The north campus of Staten Island University Hospital is also at moderate risk, but this risk level could be exacerbated because SIUH was inaccessible due to flood waters on access roads leading to the Hospital. South Richmond High School is also considered at moderate risk, as are a group of health and social services assets in Oakwood Beach. Several senior centers are also at moderate risk, including the Berry House Friendship Club Senior Center, the Mt. Loretto Friendship Club Senior Center, and the South Beach Senior Center.

The South Campus of SIUH received a residual risk score. Although it is beyond the Community, Richmond University Medical Center was included in the Risk Assessment because it was identified by the Planning Committee as locally significant for providing emergency care during flood events when SIUH is unable to provide critical care services. Tottenville High School, which played a key role as a point of distribution and shelter during the recovery from Superstorm Sandy, is also noted at residual risk. .

Table 2: Health and Social Services Assets: Risk Level

Asset ID	Asset Name	Risk Score
S1	A Very Special Place, Inc.	
S18	Old Town-Dongan Hills-South Beach HSS Assets - High	
S21	PS 38 George Cromwell	
S23	Smiles Around US 2	
S28	St. Margaret Mary's School	
S29	Staten Island Community Center	
S33	Wonder Years Preschool	
S9	Great Kills HSS Assets - High	
S10	Hylan Communicare Health Center	
S11	Island Medical Specialists	
S12	Island Rehabilitative Services	
S17	Oakwood Beach HSS Assets - High	
S19	Our Place School	
S20	Primary Care Clinic	
S24	South Beach Psychiatric Center	
S27	Special Tees	
S30	Staten Island University Hospital - North Campus	
S15	NYPD Police Station 122 PRECINCT, P.B.S.I./S.S. #5	
S2	Berry House Friendship Club Senior Center	
S13	Mt. Loretto Friendship Club Senior Center	
S25	South Beach Senior Center	
S26	South Richmond High School	
S31	Staten Island University Hospital - South Campus	
S3	FDNY Fire House ENG 151, LAD 76	
S4	FDNY Fire House ENG 152, BN 21	
S5	FDNY Fire House ENG 153, LAD 77	
S6	FDNY Fire House ENG 155, LAD 78	
S7	FDNY Fire House ENG 159	
S8	FDNY Fire House ENG 162, LAD 82, BN 23	
S14	NYPD Police Station 120 PRECINCT	
S16	NYPD Police Station 123 PRECINCT	
S22	Richmond University Medical Center (RUMC)	
S32	Tottenville High School	

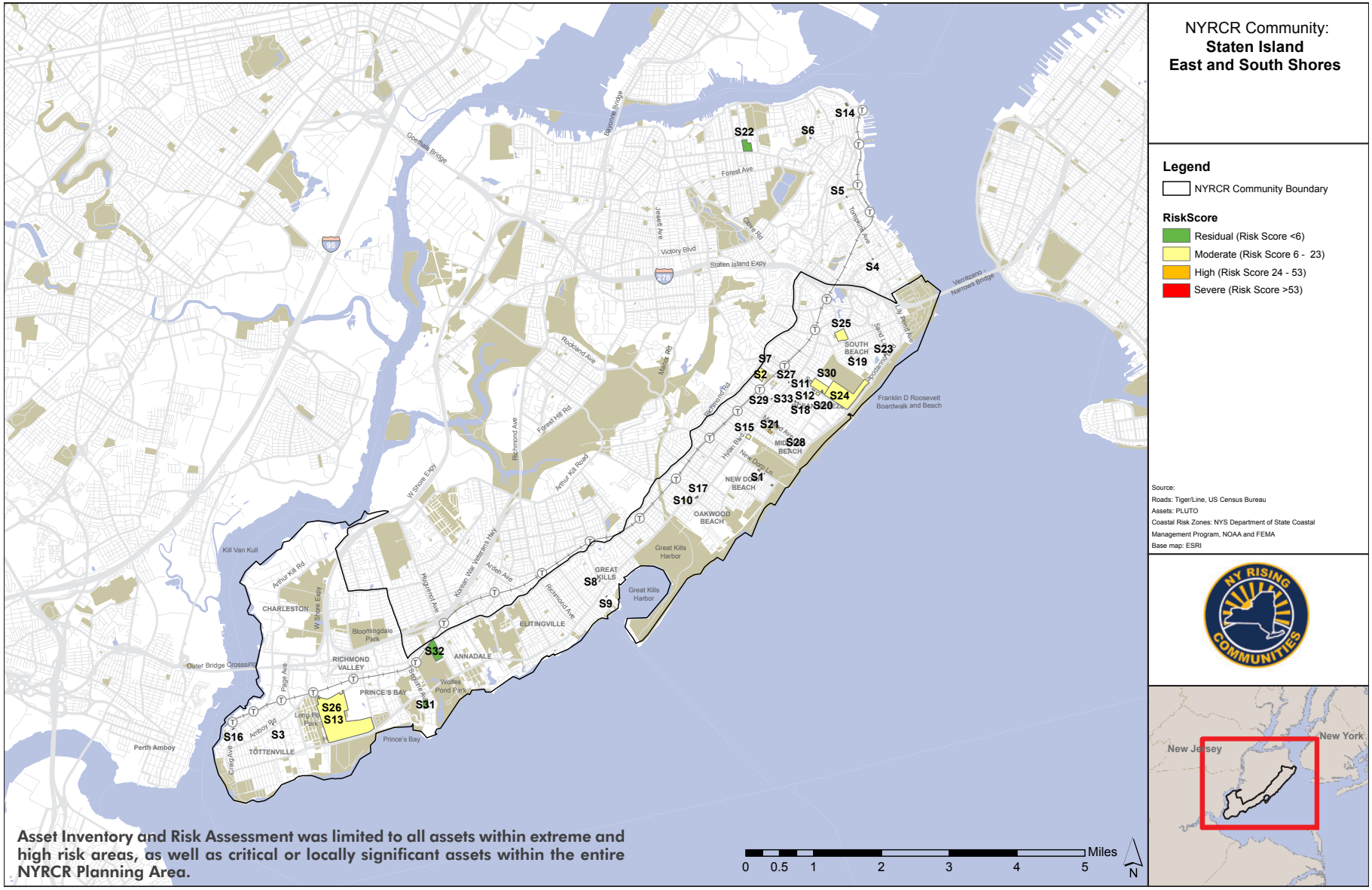


Figure 12: Risk Assessment of Health & Social Services Assets

Housing Assets

Areas which suffered severe inundation during Superstorm Sandy include the East Shore neighborhoods of Oakwood Beach, which is in an Extreme Risk zone, as well as South Beach, Ocean Breeze, Midland Beach, and New Dorp Beach, which are all in High Risk zones (Figure 14). Residential neighborhoods in High Risk zones on the South Shore include sections of Great Kills, Eltingville, Annadale, Prince's Bay, and Tottenville.

Several groups of housing assets on the East and South Shores lie within extreme and high risk areas according to NYS DOS Risk Maps, but only one receives a severe risk score in the Coastal Hazard and Risk Assessment Tool: A portion of Charleston, Richmond Valley, and Tottenville that lies in an extreme risk area.

Housing Assets at high risk include neighborhoods in Annadale, Huguenot, Prince's Bay, Eltingville, and Oakwood Beach, and Great Kills. Other Housing Assets at high risk include those in the vicinity of Grasmere, Arrochar, Fort Wadsworth, New Dorp Beach, Midland Beach, and Old Town, Dongan Hills, and South Beach.

Individual or 'ungrouped' Housing Assets include senior and affordable housing assets, as well as those serving disabled populations. The highest risk among these is Staten Island Developmental Disabilities Services Office. Additional Housing Assets at high risk that serve socially vulnerable populations include Island Shores Assisted Living, Jesuit Home for Indigent, Aged and Homeless, and Mission of the Immaculate Virgin.

Table 3: Housing Assets: Risk Level

Asset ID	Asset Name	Risk Score
H4	Charleston-Richmond Valley-Tottenville - Extreme	
H1	Annadale-Huguenot-Prince's Bay-Eltingville - Extreme	
H16	Oakwood Beach - Extreme	
H20	Staten Island Developmental Disabilities Services Office	
H9	Great Kills - Extreme	
H11	Island Shores Assisted Living	
H13	Mission of the Immaculate Virgin	
H2	Annadale-Huguenot-Prince's Bay-Eltingville - High	
H3	Assc for Help of Retarded Children	
H6	Community Resources for Developmentally Disabled	
H8	Grasmere-Arrochar-Ft. Wadsworth - High	
H15	New Dorp-Midland Beach - High	
H17	Oakwood Beach - High	
H18	Old Town-Dongan Hills-South Beach - High	
H7	Eden II School for Autisitc Children	
H5	Charleston-Richmond Valley-Tottenville - High	
H10	Great Kills - High	
H12	Jesuit Home for Indigent Children, Aged, Homeless	
H14	New Broadview Manor Home for Adults	
H19	On Your Mark, Inc.	
H21	United Cerebal Palsy	

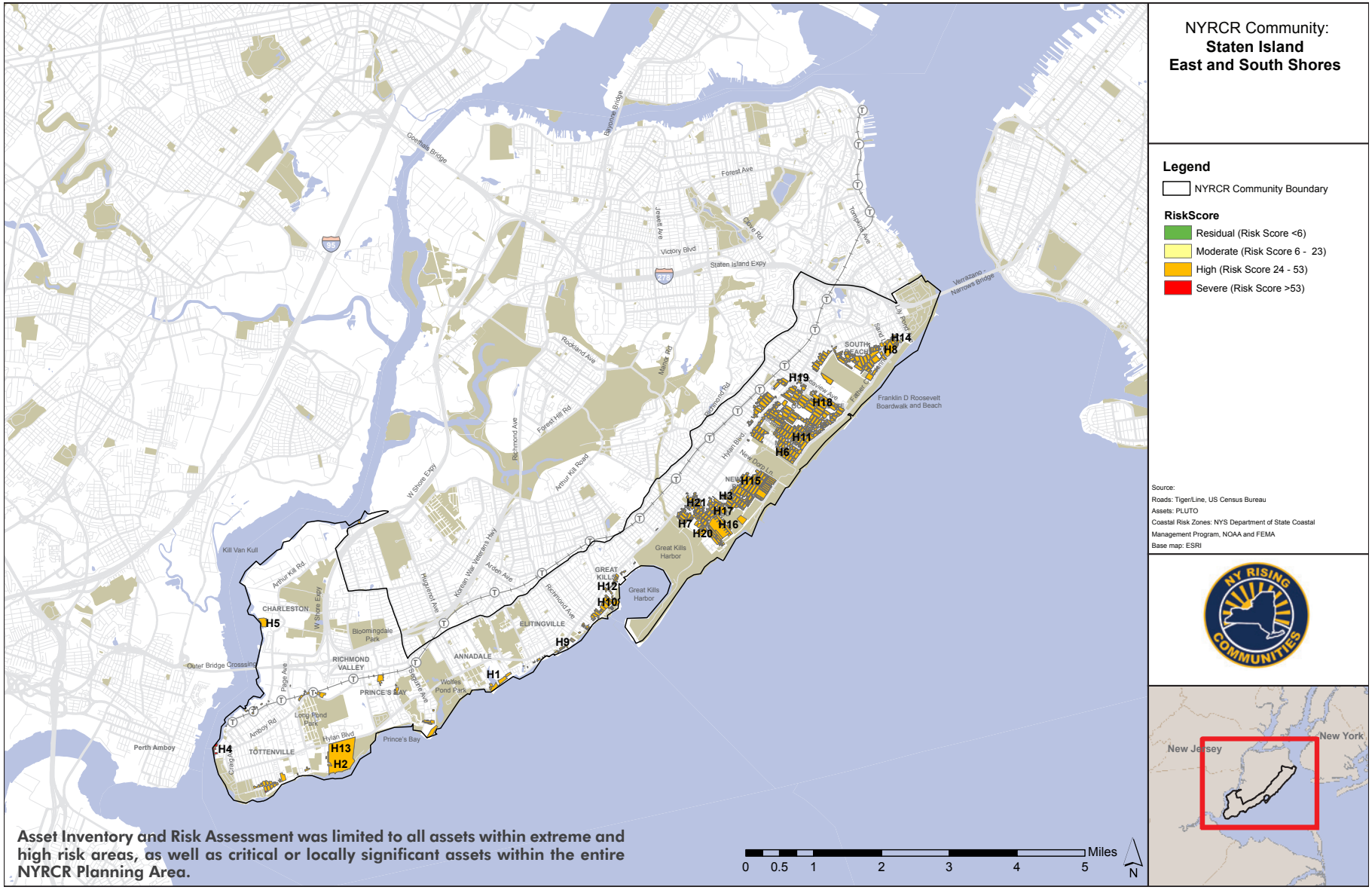


Figure 13: Risk Assessment of Housing Assets

Infrastructure Systems Assets

Each Infrastructure System Asset was analyzed as a group within the Asset Inventory and Risk Assessment Tool and key segments of these Infrastructure Systems that were noted as locally significant by the Planning Committee were analyzed separately (e.g., Hylan Boulevard and Father Capodanno Boulevard). Figure 15 illustrates the risk scores of Infrastructure Systems Assets included in the Asset Inventory and Risk Assessment.

Few Infrastructure Systems Assets (12% of asset inventory) are at severe risk for future inundation, but this small percentage includes the roadway network that lies in extreme risk areas–one of the most critical assets to Staten Islanders. Risk levels in Staten Island are compounded by flooded roadways, which impede emergency access and evacuation routes along key corridors. Also at high risk is the group of infrastructure systems assets in Charleston, Richmond Valley, and Tottenville that lie in the extreme risk areas, including transportation assets such as segments of the Staten Island Railroad, as well as gas stations and communications assets. Other high risk assets include five piers along the east shore, including at Great Kills, and segments of the bike path along the FDR Boardwalk that lie in extreme risk areas.

The majority of Infrastructure Systems Assets (65% of asset inventory) are at high risk for impacts from future storm events, including the roadway system in high risk areas and several key roadways such as: Amboy Road, Father Capodanno Boulevard, Hylan Boulevard, Midland Avenue, and Seaview Avenue. Four Staten Island Railway stations are also at high risk: the Richmond Valley and Tottenville stations are at high risk and the Atlantic and Nassau Stations are at moderate risk, though these two stations are being replaced with one station by the Metropolitan Transportation Authority (MTA).[13] Several pedestrian bridges and segments of bikeways within the high risk areas receive high risk scores, as did six piers along the East and South shores.

Tottenville Temporary Dunes

The Con Edison power supply system, considered critical by FEMA and locally significant by the Planning Committee, has two assets at risk: the substation at Manila Place, which is at high risk and the substation at Arthur Kill Road. The power supply station on Atlantic Avenue is also at moderate risk. Various features of the communications infrastructure are also at high risk, including cell phone towers, microwave towers and antennas.

Fuel shortages were highly detrimental to Staten Island after Superstorm Sandy, with major disruptions in the upstream supply chain. The Port Mobil facilities are at high risk, lying partially in high and moderate risk areas. Several gas stations receive high risk scores, while the fuel storage tanks at Mill Road and Ellis Road receive moderate risk scores. Finally, the Oakwood Beach Wastewater Treatment Plant also received a high risk score.

Natural and Cultural Resources Assets

As with many other asset categories, the largest percentage of Natural and Cultural Resources Assets are at high risk (63 % of asset inventory). Figure 16 illustrates the risk scores of Natural and Cultural Resources Assets included in the Asset Inventory and Risk Assessment.

Assets at severe risk of damage from future storms include those groups of Natural and Cultural Resources that lie in Extreme Risk Zones in the neighborhoods of New Dorp Beach, Midland Beach, Old Town, Dongan Hills, and South Beach. Individual assets at severe risk include the FDR Boardwalk and Gateway National Recreation Area. Other assets at severe risk include wetlands in South Beach and water bodies in Oakwood Beach.

Natural and Cultural Resources at high risk include those groups, such as Conference House Park and Lemon Creek Park, within the neighborhoods of Annadale , Huguenot, Prince's Bay, Eltingville, Charleston, Richmond Valley, Tottenville, and Great Kills. Miller Field in New Dorp Beach is at high risk for future storm events, despite its location as a distribution point for federal agencies following Superstorm Sandy. Several water bodies are also at high risk, including Arthur Kill, Mill Creek, Lemon Creek, and Wolfe's Pond.

Socially Vulnerable Populations

Assets serving Socially Vulnerable Populations are primarily categorized within one of the other five asset categories above, with most falling within Health and Social Services or Housing.

No assets that serve socially vulnerable populations received a severe risk score; however, several of the community identified assets are at high risk for future storm impacts. Facilities at high risk that serve children include schools and preschools, such as PS 38, Eden II School for Autistic Children, St. Margaret Mary's School, Smiles Around Us, and Wonder Years Preschool; while those at moderate risk include Our Place School and South Richmond High School.

Dedicated facilities at high risk that serve the elderly include Island Shores Assisted Living,

New Creek Bluebelt

while those at moderate risk include the Mt. Loretto Friendship Club Senior Center, New Broadview Manor Home for Adults, and the Berry House Friendship Club. Facilities that serve disabled populations are at high risk as well, including the ARC of Staten Island, the Staten Island Developmental Disabilities Services Office, and the United Cerebral Palsy.

Housing Assets in the extreme risk areas in Annadale, Huguenot, Prince's Bay, and Eltingville have the highest risk score among assets that serve socially vulnerable populations. Other neighborhoods with significant populations of socially vulnerable residents at high risk include Charleston, Richmond Valley, Tottenville, Grasmere, Arrochar, Fort Wadsworth, Great Kills, Oakwood Beach, Old Town, Dongan Hills, and South Beach. Several Health and Social Service Assets, including both campuses of the SIUH, and other healthcare facilities are noted as having high or moderate risk for socially vulnerable populations, as they may have limited mobility during a disaster event.

Table 4: Infrastructure Assets: Risk Level

Asset ID	Asset Name	Risk Score
I52	Roads_Extreme	
I10	Charleston-Richmond Valley-Tottenville Infrastructure Systems Assets_Extreme	
I18	FDR Boardwalk Bike Path_Extreme	
I41	Pier - E Mansion Ave	
I43	Pier - FDR Boardwalk	
I44	Pier - Great Kills Park	
I46	Pier - S Buffalo St	
I48	Pier - Ft Wadsworth	
I2	Antenna - Mount Loretto Service Road	
I8	Barrier for Column of Verrazano-Narrows Bridge	
I9	Cell Tower - Roma Avemie	
I19	FDR Boardwalk Bike Path_High	
I24	Great Kills Infrastructure Systems Assets_Extreme	
I40	Pier - Chemical Ln	
I47	Pier - W Mansion Ave	
I49	Pier - Harbour Ct	
I16	Donjon Recycling	
I20	Fr Capodanno Blvd_High	
I29	Microwave Tower - Midland Avenue	
I4	Arthur Kill Road_Extreme	
I1	Amboy Road_High	
I15	Cozzens Blvd Footbridge_High	
I23	Gravel Road Esplanade	
I25	Great Kills Infrastructure Systems Assets_High	
I26	Hylan Blvd_High	
I30	Midland Avenue_High	
I42	Pier - Ellis St	
I45	Pier - Oceanic Ave	
I50	Pier - Hopping Ave	
I53	Roads_High	
I54	Seaview Avenue_High	
I55	Staten Island Railway Line_High	
I5	Arthur Kill Road_High	
I12	Citgo at Slater Boulevard	
I13	ConEd Power Substation (Manila Place)	
I17	DOT Right of Way	
I27	Jefferson Ave Commercial Waste Carter Garage	
I31	Mobil at Midland Ave	
I32	Mobil Oil Corp., Port Mobil Barge Berths Nos. 5, 6, 7, and 8.	
I33	Mobil Oil Corp., Port Mobil Tanker Wharf Berth No. 1A.	
I34	Mobil Oil Corp., Port Mobil Tanker Wharf Berths Nos. 1, 2, 3, and 4.	
I38	Old Town-Dongan Hills-South Beach Infrastructure Systems Assets_High	
I36	Oakwood Beach Sewage Treatment Plant	
I51	Richmond Valley SIR Station	
I56	Tottenville SIR Station	
I3	Antenna - Richmond Valley Road	
I6	Atlantic Ave Power Supply	
I28	Main Street Footbridge_High	
I39	Perciballi Container Services Inc	
I57	Tracy Avenue Footbridge	
I37	Oakwood Beach Water Pollution Control Plant	
I11	Charleston-Richmond Valley-Tottenville Infrastructure Systems Assets_High	
I14	ConEdison Substation (Arthur Kill Rd)	
I22	Fuel Tanks - Mill Road	
I7	Atlantic SIR Station	
I21	Fuel Tanks - Ellis Road	
I35	Nassau SIR Station	

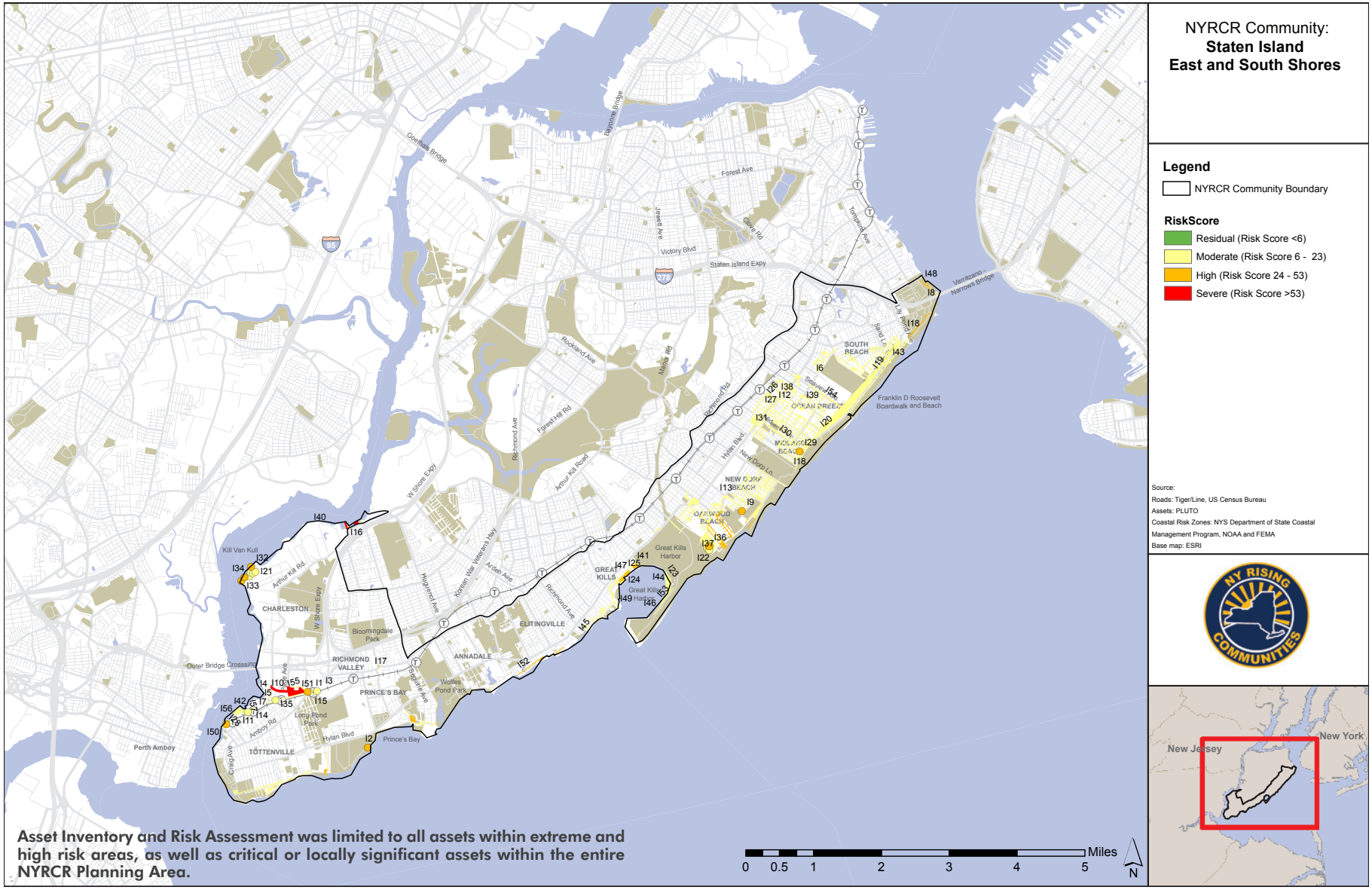


Figure 14: Risk Assessment of Infrastructure Assets

Table 5: Natural and Cultural Resource Assets: Risk Level

Asset ID	Asset Name	Risk Score
N11	FDR Boardwalk_Extreme	
N12	Franklin D. Roosevelt Boardwalk and Beach	
N13	Gateway Nat'l Rec Area (Fort Wads-Great Kills)	
N22	New Dorp-Midland Beach Natural and Cultural Resources Assets_Extreme	
N26	Old Town-Dongan Hills-South Beach Natural and Cultural Resources Assets_Extreme	
N31	Pond near Oakwood Beach	
N33	River near Oakwood Beach	
N40	Stream near Great Kills Park	
N1	Annadale-Huguenot-Prince_s Bay-Eltingville Natural and Cultural Resources Assets_Extreme	
N8	Charleston-Richmond Valley-Tottenville Natural and Cultural Resources Assets_Extreme	
N14	Gerat Kills Natural and Cultural Resources Assets_Extreme	
N16	Lemon Creek_Extreme	
N19	Mill Creek_Extreme	
N24	Oakwood Beach Natural and Cultural Resources Assets_Extreme	
N4	Arthur Kill	
N5	Blue Heron Main Branch_Extreme	
N21	Miller Field/ Gateway Nat'l Rec Area	
N43	Wolfe's Pond_Extreme	
N7	Butler Manor	
N15	Gerat Kills Natural and Cultural Resources Assets_High	
N20	Mill Creek_High	
N25	Oakwood Beach Natural and Cultural Resources Assets_High	
N29	Pond in Last Chance Pond Park	
N34	South Beach Wetlands	
N39	Stream in Last Chance Pond Park	
N28	Pond in Great Kills Park	
N30	Pond in Ocean Breeze Park	
N44	Wolfe's Pond_High	
N2	Annadale-Huguenot-Prince_s Bay-Eltingville Natural and Cultural Resources Assets_High	
N3	Arbutus Creek	
N6	Blue Heron Main Branch_High	
N18	Mill Creek Tributary_High	
N23	New Dorp-Midland Beach Natural and Cultural Resources Assets_High	
N27	Old Town-Dongan Hills-South Beach Natural and Cultural Resources Assets_High	
N41	Stream near Sharrott's Shoreline _High	
N10	Denise Tributary	
N9	Charleston-Richmond Valley-Tottenville Natural and Cultural Resources Assets_High	
N17	Lemon Creek_High	
N32	Pond near Sharrott's Shoreline	
N38	Stream from Arthur Kill 2_High	
N35	Staten Island Jewish Community Center	
N36	Stream from Arthur Kill 1	
N37	Stream from Arthur Kill 2_Extreme	
N42	Stream near Sharrott's Shoreline_ Extreme	

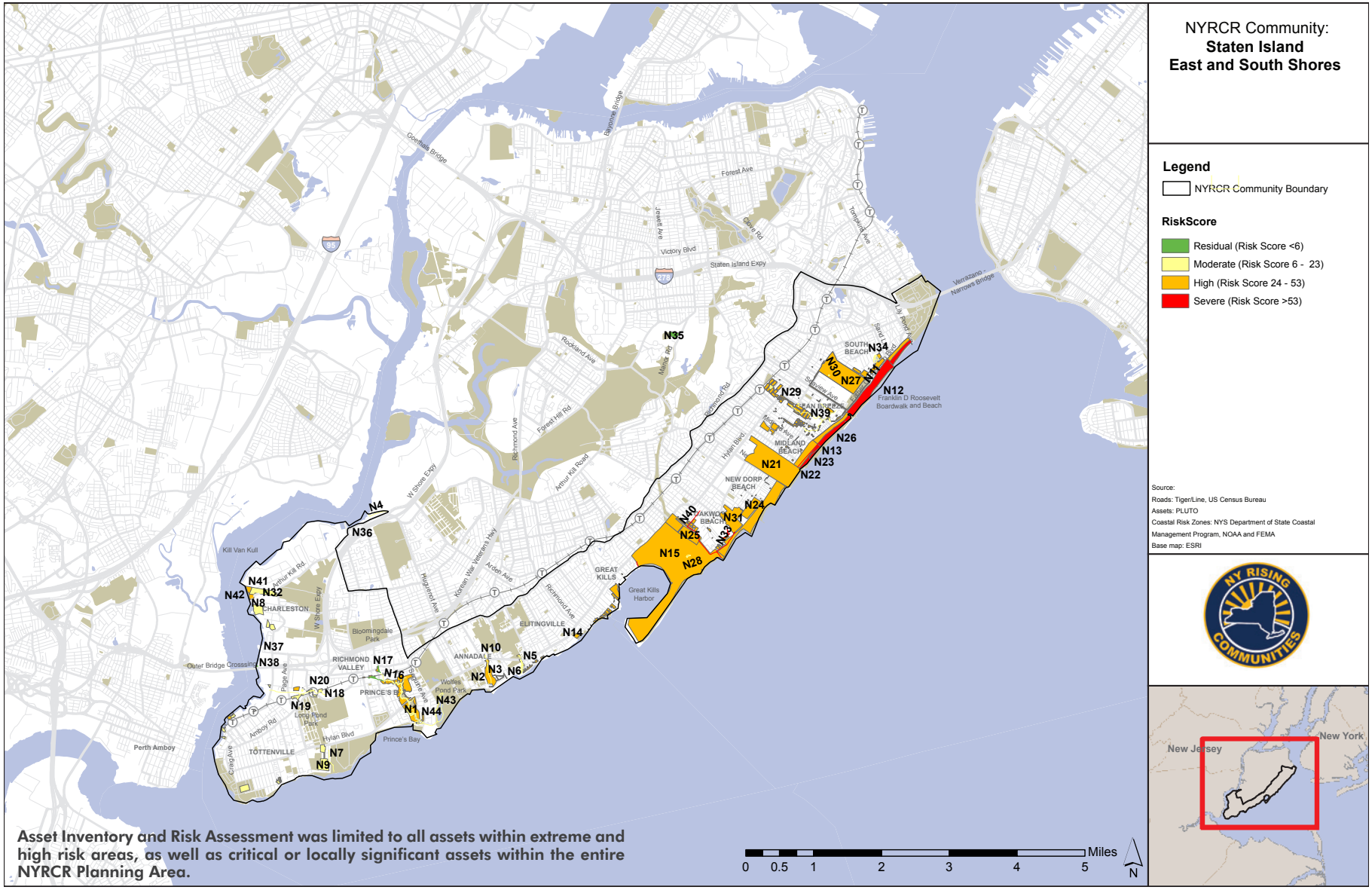


Figure 15: Risk Assessment of Natural & Cultural Resource Assets

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 on the East and South Shores of Staten Island. 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 through input from the Planning Committee and the public.

Though Superstorm Sandy was an unprecedented event, the sources and causes of flooding observed on a greater scale during Sandy are regularly reflected on a smaller scale during high tides, rain storms, and nor'easters. **Sandy has effectively exposed the greater system-wide inadequacy of Staten Island's flood mitigation and protection system, as well as the need for more robust comprehensive planning.**

For each of the six Recovery Support Functions (RSFs) described in Section I.C. above, the following Assessment of Needs and Opportunities has identified areas in which Staten Island's East and South Shores could improve its resilience to major storms and other disasters. This analysis supplements input that the Planning Committee has received at committee meetings and Public Engagement Events, and has helped to guide the Committee in identifying strategies and projects that will contribute to resilience on the East and South Shores.

Community Planning and Capacity Building

In order to assess needs for Community Planning and Capacity Building, the Community was assessed on its ability to:

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

Public education and awareness as it relates to emergency preparedness emerged as a critical need within the Community due to: 1) the presence within the Community of several vulnerable populations, including limited-English proficient speakers, the elderly, and children; and, 2) the fact that so many residents did not evacuate prior to Superstorm Sandy making landfall. Special Purpose Plans which focus on the East and South Shores of Staten Island were studied for their specific focus on resilience to major storms. In particular, these plans indicate a shift in focus after Superstorm Sandy. Finally, this Needs Assessment reviews New York City programs and land use policy that impact resilience on the East and South Shores.

Community Planning and Capacity Buildings Needs

Public Education and Preparedness

According to the 2011 five-year American Community Survey, more than 70% of residents within the Community speak only English. However, there are also several notable concentrations of residents who speak other languages or who speak no English.[14]

Community-wide, Russian speakers account for 8% of all residents, with particular concentrations located in the East Shore communities of Arrochar, South Beach, Midland Beach, New Dorp Beach, and Oakwood Beach. In these areas, 15% of the population speaks Russian and nearly half of these residents do not speak English proficiently.

The second-largest share of non-native English speakers is the Spanish-speaking population, which accounts for 6% of residents in the Community. Although there are Spanish speakers throughout the Community, this population tends to be concentrated in the East Shore communities of Arrochar, South Beach, Ocean Breeze, and Midland Beach. In these areas, 9% of the population speaks Spanish with nearly 40% of whom do not speak English proficiently.

The Community also includes smaller populations of residents who speak Italian (4%), Polish (1%), Urdu (1%), Other Indo-European Languages (2%), Chinese (2%), Tagalog (1%), and Arabic (2%).

Among these smaller populations of speakers of languages other than English, a majority of both the Chinese and Polish populations speak English poorly, indicating a potential language barrier at the community scale, which makes multi-lingual disaster preparedness education more critical.

These concentrations of residents who speak languages other than English are opportunities for a multilingual public education campaign. In many of these diverse communities, residents and business owners are less likely to consume mainstream, English-language media. These communities therefore require additional municipal and community-based efforts to ensure that residents are prepared for approaching storms and know where to go to seek out resources.

Guidelines Outlined in Existing Plans

As described in the Relationship to Regional Plans, several previous planning documents call attention to Critical Issues that need to be addressed in order to make the East and South Shores more resilient to climate related events. Regional plans that include all of Staten Island and New York City focus on stormwater management, hazard mitigation, economic development, sustainability, and housing affordability. All of these issues impact resilience in the Community and were considered by the NYRCR Committee. In particular, Staten Island and New York City plans that could impact the Community include:

- *Vision for Staten Island: Staten Islanders Building Their Future*
- *Vision 2020 - New York City Comprehensive Waterfront Plan*
- *SImagines: Planning for Recovery Program*
- *PlaNYC: A Stronger, More Resilient New York*

In order to assure that these regional plans provide sufficient benefit to residents and businesses in the East and South Shores, there is a need within the Community to advocate for the implementation of regional best practices at the local level.

Community Planning and Capacity Building Opportunities

New York City Policy and Programs

Although the New York City Office of Emergency Management (NYC OEM) operates programs to improve disaster preparedness and establish emergency response plans for vulnerable populations, the need remains to increase the capacity of local Staten Island organizations to respond during times of emergency. **Local organizations have a deeper reach in the community and are more prepared to identify residents in need.** In January 2014, NYC OEM released a Draft update to the City's Hazard Mitigation Plan.[15] In addition to the Hazard Mitigation Plan, NYC OEM produces educational materials to help New Yorkers prepare for disaster situations. These "Ready New York" guides cover a wide range of risks, including hurricanes, flooding, extreme heat, and risk to certain populations such as businesses, special needs, and children. Although the Ready New York guides are available in multiple languages, educational campaigns targeted towards vulnerable populations may be more likely to reach their targets if initiated by locally-based organizations.

Land Use Policy

Development patterns changed in Staten Island during the post-war development boom and after the Verrazano-Narrows Bridge was completed in 1964. Staten Island's population grew by 33% during the decade from 1960 through 1970.[16] One result of the Island's growing population is that many summer homes along the East and South Shores were converted into full-time residences. Many of these homes existed in low-lying neighborhoods and wetlands. These residential uses in former wetlands has exacerbated the risk of coastal storm surge as was observed during Superstorm Sandy and local flooding during a rain event.

Two programs at the City and the State level have identified this incongruity of coastal risk and residential land use: the State of New York's NY Rising Buyout Program has established two different buyout zones with the objective of returning extreme risk areas back to a natural wetland state. New York State has announced that parts of the neighborhoods of Oakwood Beach and Ocean Breeze are eligible for the program. In addition, New York City's Build It Back program offers subsidies for homeowners to rebuild based on income levels and damage assessments. The program also includes an acquisition component but, in contrast to New York State's program, the City program allows for redevelopment at the city's discretion.

Economic Development

Large portions of the business community were severely impacted by Superstorm Sandy, causing physical damage, closure or impacting operations and revenues. To ensure that the existing businesses can recover and that new businesses can grow, it is critical to have a plan to address economic resilience to future storms and environmental threats. Local businesses both support and depend upon the close-knit character of the largely residential communities of the East and South Shores. These enterprises supply food and health care services, perform essential personal services, provide employment, and can also act as a meeting place and focal point for a community trying to recover. However, these businesses require reliable infrastructure, including utilities, roads and sewer, and access for employees, customers and suppliers, including transportation, in order to function.

Economic Development Needs

Economics Development needs were assessed by conducting a survey of local business owners, interviewing representatives of the Staten Island Chamber of Commerce (Chamber) and Staten Island Economic Development Corporation (SIEDC), and analyzing economic data from Claritas, Primary Land Use Tax Lot Output data sets (PLUTO), and the U.S. Census.

Survey of Business Owners

Local business owners were surveyed to get direct feedback on the public sector's response to Sandy. The Chamber and the College of Staten Island Small Business Development Center (CSI-SBDC) helped administer the survey. Outreach efforts included direct calls to businesses, email blasts, articles in the local newspaper[17], and social media, including Twitter and Facebook, led by the Governor's Office of Storm Recovery. These outreach efforts directed businesses to an online survey. Although the sample size did not allow for a formal statistical analysis, the responses do provide a context and reinforce data collected in the interviews with the Chamber, CSI-SBDC, and SIEDC.

Nearly 100 survey responses were obtained as of the date of this analysis (the survey will continue to be administered by the Chamber and CSI-SBDC as part of their on-going outreach and research efforts). A copy of the survey appears in Section V: Additional Materials.

The majority of the respondents were businesses located on the East Shore of Staten Island, reflecting the higher commercial densities in this area compared with the South Shore. More than two-thirds of respondents leased their space, with one-third owning the space where their building was located. According to the survey, approximately three out of four responding businesses were in business for over five years on Staten Island, illustrating the pre-storm stability of these businesses and their long relationship with the residential community.

Retail businesses were the most common, followed by Accommodations and Food Service companies. The Healthcare, Professional and Other Services sectors were also represented. Respondents were from small scale enterprises, with nearly 60% having five or fewer employees (including the owner).

According to the survey, Superstorm Sandy had a negative impact on the number of jobs retained by these businesses, with over 10% reporting a decline in employment. Almost 90% of the businesses responding suffered some type of physical damage from the storm, with flooding and damage to equipment, furnishings and inventory occurring most frequently. One-third of these businesses had damages ranging from $50,000 to $100,000, but nearly half experienced damages of over $100,000. Three out of four businesses experienced a decline in revenue from the storm, with two out of three of these businesses reporting a decline of 50% or more in the past year.

Other common impacts from Superstorm Sandy included:

- utility interruptions;
- impeded access to short- and long-term capital;
- reduction in customers;
- impeded access to businesses; and
- gasoline rationing.

According to the survey, approximately half of impacted businesses were able to reopen partially within one month, but required longer than one month to fully reopen. Less than 10% of businesses have yet to reopen even partially, and only two noted that they have decided not to reopen at all. One in four businesses impacted by Superstorm Sandy were forced to change locations, with the bulk of businesses able to remain in their pre-storm location.

The majority of survey respondents stated that they still needed to purchase new equipment

or furnishings after Superstorm Sandy and that they also needed to purchase new inventory. Approximately 40% still need to make building or structural repairs. Assistance is still needed by local businesses, with a majority needing additional working capital and/or loans for physical improvements, according to the survey.

More than half of the responding businesses worked with the Chamber, with large portions also using NYC Business Solutions or their Certified Public Accountant (CPA) for technical assistance. According to the survey, the National Grid Hurricane Sandy Emergency Economic and Community Redevelopment Program was the most popular source of recovery funds and was utilized by nearly half of respondents. Personal credit cards and loans from family members and friends were the second- and third-most popular source of recovery funding. While NYC Business Solutions Loans and Grants were utilized by one in four respondents, less than 20% of businesses received any property insurance proceeds. Business interruption and flood insurance proceeds were received by only three respondents. Finally, according to respondents, U.S. Small Business Administration (SBA) loan and grant programs were not heavily utilized due to onerous application requirements and delays in obtaining funds.

Businesses in the High and Extreme Flood Risk Area

To determine economic conditions in the East and South Shores of Staten Island, businesses were profiled through two geographic lenses: the larger Community and the High and Extreme Flood Risk Area. Analyzing the businesses in the larger Community provides an understanding of the overall business community, its largest sectors and most significant employers. Focusing on the businesses located in the smaller High and Extreme Flood Risk Areas provides an understanding of the types of companies, the number of employees and the potential tax revenues at risk in these locations.

The High and Extreme Flood Risk Areas are primarily areas that encompass residential neighborhoods. However, within these high and extreme risk areas, there are approximately 500 businesses employing 3,500 workers[18], which represent approximately 14% of the total businesses and workers in the Community. Businesses in the High and Extreme Flood Risk Areas tend to be small-scale, with a median of three workers per firm and only four businesses having more than 50 employees, a slightly lower ratio than in the Community overall. The median annual revenue for businesses in the higher risk areas was similar to those for the entire Community.

According to PLUTO data, there are approximately 3.2 million square feet of commercial space in extreme and high flood risk areas, or an average of 908 square feet per business.[19] The total assessment for these properties is roughly $330 million and, applying the 2013/2014 commercial tax rate of 10.323% results in total commercial property taxes of over $34 million at risk. Sales tax revenues are also at risk if these businesses are forced to close, or experience reduced revenues as a result of future extreme weather, with over $20 million in sales taxes generated annually by businesses in these flood prone areas.[20]

Summary of Economic Needs

The business survey, interviews with local business groups like the Chamber and CSI-SBDC, and analysis of economic data all indicate that Staten Island businesses—especially those in the extreme and high risk areas—are at risk for future disruptions due to extreme weather. Many businesses in the Community are small in scale and have a long-standing history with local residents, but the physical damage suffered during Superstorm Sandy has posed a challenge to small businesses that lack significant financial resources. Obtaining insurance proceeds and assistance from government sources was difficult, with most businesses resorting to personal debt to fund their rebuilding efforts. Businesses in the Community still require assistance, as many report revenue declines of over 50% in the past year, and work to replace equipment, furnishings and inventory is outstanding.

Economic Development Opportunities

Local economic development officials and business representatives were interviewed to better understand the challenges businesses faced in the aftermath of Superstorm Sandy; what issues these businesses continue to face; and how to improve the public sector response to advance economic resilience in future storms. These interviews were supplemented by the Business Survey results which sought business owners' feedback on which assistance programs were most and least helpful to them over the past year.

Local business authorities, including the Chamber, indicate that during summer months

beach goers could represent a potential source of new demand for businesses. Attracting these users could be a good source of demand for businesses located within walking distance of the beach and boardwalk, such as those on Father Capodanno Boulevard, Midland Avenue or Sand Lane. In November 2013, New York City Economic Development Corporation and NYC Department of Parks and Recreation released a Request for Expressions of Interest (RFEI)[21] to seek proposals for seasonal or permanent projects for the reactivation of the public beach front and public spaces that could increase tourism and would support existing businesses and encourage the creation of new business activity. This RFEI recognizes the unique opportunities for businesses along the waterfront and could potentially increase economic activity for existing businesses along the shoreline.

Organizational Infrastructure

There are many organizations that have been working with the business community within the Community, and each brings various constituencies and tools for assistance. Two organizations that have worked closely in the Community are the Chamber and CSI-SBDC.

The Chamber is the largest business organization on the Island and represents over 700 businesses that employ 20,000 individuals. The Chamber focuses on four main areas of community involvement: networking, education, help desk and advocacy. The Chamber performed extensive community outreach after Superstorm Sandy and provided essential technical assistance to approximately 200 member and non-member businesses recovering after the storm. Due to local conditions immediately after Superstorm Sandy and the lack of electricity, telephone and internet service, information on these 200 businesses was gathered through field visits by Chamber staff to businesses impacted in high risk areas such as Midland Beach and New Dorp. As conditions within the areas stabilized, additional meetings of business owners were combined with other outreach efforts, such as telephone and email. Due to its longstanding involvement with the business community on Staten Island, the Planning Committee worked closely with the Chamber in developing the economic resiliency strategy for the NYRCR Plan.

The CSI-SBDC also performed significant outreach to the business community in the Community. Since its inception in 1993, CSI-SBDC has worked with nearly 6,500 businesses, creating or saving over 4,400 jobs. They work with entrepreneurs to help with business and marketing plans, identifying funding sources, understanding e-commerce, and complying with licensing and other regulations. After Superstorm Sandy, the CSI-SBDC established a Business Recovery Center at the College of Staten Island, working closely with the SBA. Over the past year, the CSI-SBDC has handled an estimated 1,300 inquiries from over 300 businesses and assisted over 240 businesses in obtaining business disaster loans.

Assistance Sources

Businesses in the area applied for loans and grants from a variety of sources which include, but are not limited to, the SBA, NYC Business Solutions (NYC Emergency Loan Fund and NYC Matching Grant), National Grid, and alternative lenders, such as the West Brighton Local Development Corporation (LDC). According to the Business Survey, there was much frustration with the application process when applying for loans and grants, however, business owners reported that the National Grid funding source was an exception. For most business owners, paperwork to obtain funds was overwhelming, requiring information that small businesses did not have or had lost in the storm. Business owners also reported that many grant applications asked for redundant information that was time-consuming. SBA's programs had many stipulations and required a level of oversight that most business owners found overly-burdensome, especially after the devastation of Superstorm Sandy, including forensic audits. Further, if a business owner was successful in obtaining funds from the SBA, these funds were not provided in a timely manner and were not available until up to eight months after the storm. NYC Business Solutions programs, which provided loans of up to $25,000 and grants up to $10,000, were better received, but also had restrictions that were cumbersome.

National Grid's Hurricane Sandy Emergency Economic and Community Redevelopment Program[22] was viewed as highly user-friendly, providing up to $200,000 per qualified business, with a total of $30 million available for businesses impacted by Superstorm Sandy. The program was restricted to its gas customers and required owners to invest a minimum 50% of the structural improvements. The program considered a business's total number of employees and required an endorsement from the Chamber to ensure that businesses were legitimate. The simplicity of the application and

requirements—and the rapid availability of monies—resulted in popularity for this program.

Insurance proceeds from property, flood, and business interruption to businesses were minimal, as a number of factors contributed to damages (flooding from ocean, flooding from sewers, wind damage, areas outside of Flood Zones being flooded, etc.) often giving insurers a way to avoid or minimize payouts.

According to the Chamber, business owners' credit cards, families, friends, small local lenders, retirement and savings accounts were the prevalent source of funds to rebuild their business and replace inventory after the storm. If another storm were to hit the area in the near term, it is unlikely that many of these businesses would be able to recover again unless, assistance programs were significantly improved, including a reduction in paperwork required for grant and loan programs following a disaster.

Health and Social Services

Staten Island is home to a vast network of civic and non-profit organizations who enrich the Community and who contributed greatly to the Community's recovery from Superstorm Sandy. These organizations provide resources for seniors, help to organize and serve businesses, and create coalitions of non-profit organizations. In the aftermath of Superstorm Sandy, neighbors helped neighbors. In particular, the Staten Island Not-for Profit Association (SINFPA), JCC of Staten Island, the Staten Island Community and Interfaith Long-Term Disaster Recovery Organization (LTRO), the Stephen Siller Tunnel to Towers Foundation and others worked closely after the storm to reach communities in need. In addition to existing organizations, new groups emerged to help Staten Island communities recover, including Guyon Rescue Mission and Yellow Boots Longterm Recovery Group. These organizations have also banded together to produce numerous surveys, studies, and reports on the issues and opportunities facing Staten Island. The Staten Island Taxpayers Association, along with the New Dorp Beach and Midland Beach Civic Associations, have been working with Beacon of Hope Louisiana, in conjunction with Yellow Boots, to provide recovery and support services to their respective communities.

Health and Social Services Needs

Despite these resources, recovery from Superstorm Sandy was complicated by a lack of coordination and pre-storm planning between local organizations, local government and outside aid organizations. In response to these challenges, health and social services organizations have already begun planning to be more coordinated in the future.

Staten Island residents are served by three private hospitals and, unlike the four other boroughs in New York City, have no access to a public hospital on the Island. SIUH's East Shore location was severely damaged, causing medical risk to patients and job loss for employees, while its South Shore location was only moderately damaged, due to its higher elevation and shoreline defenses. Both locations experienced partial service interruptions during and immediately after Superstorm Sandy. When SIUH closed due to the impacts of the storm, Staten Island residents had limited access to sufficient medical services. Although service at SIUH has returned to normal since the storm, the hospital needs to implement a hazard mitigation plan in order to be better prepared for future disasters, including hardening of electrical equipment and raising mechanicals.

Senior centers provide important resources to the elderly population on Staten Island. Facilities for this vulnerable population on the East and South Shores include the South Beach Senior Center, New Dorp Beach Friendship Club and the Mt. Loretto Friendship Club Senior Center. The New Dorp Beach Friendship Club, which was housed in a building on the waterfront in New Dorp Beach, was destroyed by Superstorm Sandy and remains vacant today. Organizations such as Richmond Senior Services and Meals on Wheels also provide critical resources to elderly populations, including aid to seniors who live independently. Non-profit organizations such as these could help to better prepare seniors for disaster events by providing storm

preparedness materials and education, as well as post-disaster response.

Response by relief organizations after Superstorm Sandy was hindered by a lack of housing for volunteers. The ability to house skilled volunteers is essential to disaster response; however, the impact of Superstorm Sandy on the housing stock of the East and South Shores worsened the lack of volunteer housing opportunities. National organizations could not provide the highest level of recovery support, due to lost housing resources. This issue could be addressed in the future by coordinating with National Volunteer Organizations Assisting in Disaster (NVOADs) and creating permanent volunteer housing resources that could be used for local disasters on Staten Island or for regional disasters that affect the tri-state area.

Health and Social Services Opportunities

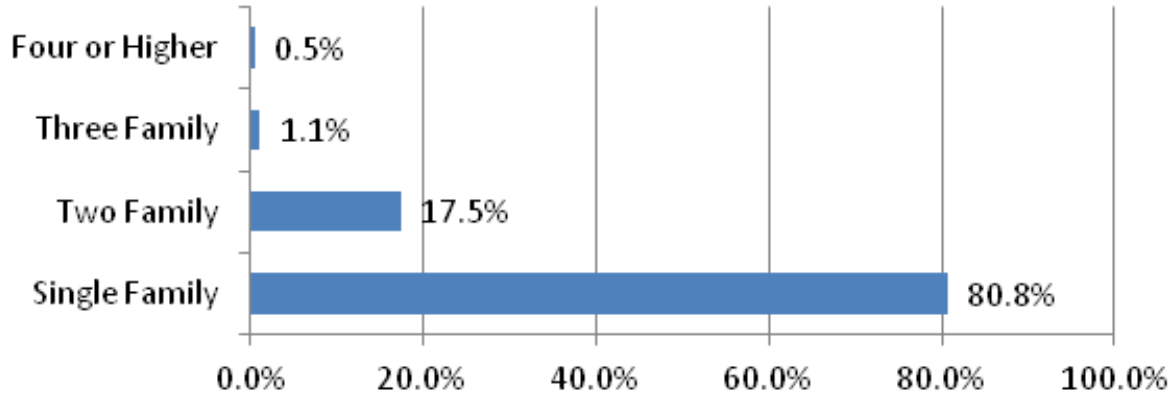
The Staten Island Foundation and SINFPA convened a town hall event in August 2013 focused on the ability of non-profit organizations to recover and continue to provide services after a storm like Superstorm Sandy. In addition, SINFPA established the "Response to Disaster Coalition" to continue the conversation about how local organizations can establish a more coordinated network. The need remains to establish greater coordination between Staten Island organizations that serve vulnerable populations with City, State and Federal databases, in order to better account for residents during extreme conditions. However, Staten Island's strong network of community-based organizations, civic pride, and neighborhood identification can be built upon to improve education and outreach. These ongoing efforts to create a coordinated disaster response network among Staten Island organizations will be greatly aided by additional training and resources that allow non-profit organizations to expand their services to meet the needs of Staten Island residents during disasters.

Midland Beach

Housing

The Housing Needs Analysis considers data obtained from a variety of sources with the goal of understanding the types of housing in the Community, the population and households that occupy that housing and the impact Superstorm Sandy had on the housing inventory. The data provides the background for developing a strategy and actions that will be required to protect the residential populations most at risk in future storms. Demographic data, housing unit trends, housing unit characteristics, and housing affordability information was gathered for the Community and analyzed. To get an understanding of the housing most prone to flooding, PLUTO data was utilized to identify the number and types of homes located in High and Extreme Flood Risk Areas.

Figure 16: Residential Dwelling by Size - High and Extreme Flood Risk Areas



Housing Needs

Housing in the High and Extreme Flood Risk Areas

Housing in the High and Extreme Flood Risk Areas was significantly impacted by Superstorm Sandy. Midland Beach, a low-lying community of bungalow homes with insufficient drainage, was one of the hardest hit on the East Shore, with nearly the entire neighborhood experiencing flooding. While inundation on the East Shore was primarily located southeast of Hylan Boulevard, flood waters nearly reached the Staten Island Railroad tracks in Midland Beach and Dongan Hills, due to low topography, the proximity of New Creek, and the lack of storm sewers. Oakwood and New Dorp Beaches were also largely inundated during Superstorm Sandy. Like Midland Beach, these neighborhoods had previously been wetlands before their residential development. Housing damage in the South Shore occurred primarily in Tottenville, as well as in the vicinity of Lemon Creek and Prince's Bay, Annadale and, Great Kills.

According to available PLUTO data, there are nearly 7,513 residential units in the High and Extreme Flood Risk Areas within the Community. These areas generally experienced flooding during Superstorm Sandy and some type of damage was likely experienced by these structures during the storm.

Of the 7,513 residential units, nearly 6,100 are single-family homes, by far the dominant residential building type in the Community and in Staten Island overall. While 17% of the dwellings in the higher-risk areas are two-family residences, less than 2% of residential structures have three or more residential units. Further, there are only 66 mixed-use buildings in these higher risk flood areas, reinforcing the low-density residential nature of the neighborhoods most susceptible to flooding.

Figure 16 presents the percentage of residential dwellings by size for the High and Extreme Flood Risk Areas.

Housing unit data for the Community shows a strong level of homeownership, suggesting that the majority of these single-family and two-family homes are owner-occupied; this high level of ownership results in a high level of financial and emotional commitment from the owner.

Affordability Analysis

According to analysis of homeownership and rental affordability, homeownership is unaffordable at even 120% of the median household income for the Community. In fact, homeownership is affordable only for households making greater than 150% of the median household (HH) income. As the Community's unadjusted median household income is already much higher than the City-wide statistic, the current home prices could potentially reduce the level of homeownership and overall character of Staten Island's East and South Shores.

Residential rents, by comparison, are affordable for households earning as little as 80% of the overall median. Rents, however, are unaffordable for households earning 50% or less of the Median HH Income.

Housing Opportunities

Challenges exist to improve the resilience of Housing Assets in the Community, due to the location of residential neighborhoods within the High and Extreme Risk Zones and affordability concerns. However, the presence of mature neighborhoods and a strong sense of civic pride within the Community also present opportunities for coordination between Staten Islanders with New York City and New York State to develop recovery and reconstruction programs that build upon Staten Island's strength. Much attention has been paid to the buyout components of New York City's Build It Back program and the NY Rising Housing Recovery Program, but these programs also have great potential to stabilize neighborhoods in Staten Island. The NYRCR Committee also identified opportunities to provide resources to homeowners beyond what these programs currently provide.

Infrastructure

Infrastructure upgrades were identified as one of the primary needs to make communities on the East and South Shores of Staten Island more resilient. These upgrades could strengthen coastal protections, improve stormwater capacity, expand sewer networks, improve roads--including new connections--and build a more reliable power grid and transportation network. Deficiencies in infrastructure systems on the East and South Shores impact neighborhoods beyond the boundaries of the Community, therefore, opportunities to make the East and South Shores more resilient will also benefit residents throughout Staten Island. The Planning Committee recognizes the need for infrastructure improvements across Staten Island.

Infrastructure Needs

Stormwater Drainage and Sewer Networks

Much of Staten Island remained undeveloped until suburban expansion that followed World War II. This growth escalated with the opening of the Verrazano-Narrows Bridge in 1964, and the subsequent development of the borough outpaced New York City's ability to install the necessary infrastructure. In many areas, no formal stormwater management systems were installed, or existing systems became inadequate as development continued. Today, in the absence of stormwater management infrastructure, runoff during rain events flows across roads, creating ponding conditions, and into undersized culverts that cannot properly convey runoff. This is a common condition that occurs throughout the Community and results in flooding of local streets and properties, even during regular rain events, along with the erosion and sedimentation of natural surface water features.

During Superstorm Sandy, as surge waters receded along the Island's coast, the lack of proper stormwater management prevented standing water from draining in many locations, most notably at Hylan Boulevard between Hunter and Naughton Avenues. This was confirmed at numerous Public Engagement Events, where residents reported standing water for up to one week.

Streets throughout the East and South Shores are subject to frequent flooding, due to stormwater backups, indicating a need to restore functionality of existing catch basins and outfalls. During combined rainfall and high-tide events, existing tide gates at sewer outfalls close to prevent tidal water from flowing into the system. Outflow from the trunk sewers is also prevented, causing sewers to surcharge onto streets and adjacent properties. Reduced street flooding would diminish storm event infiltration into sanitary sewers in the lower watershed.

In addition to inadequate stormwater systems, sedimentation in sections of the Bluebelt also contributes to frequent flooding. In the lower portion of the New Creek watershed, several stream channels in close proximity to residential areas are filled with sediment, which constricts flow and reduces conveyance capacity. Urban stormwater discharges into receiving wetlands are currently causing erosive runoff velocities within the streams, due to low retention times.

Transportation Network

Transportation infrastructure for Staten Island presents risks for residents in the event of a storm, in part because of assets that are within the risk zone, but also because of difficulties in accessing transportation routes that are outside of the risk zone, due to damage to roads, persistent flooding, loss of automobiles and congestion. Assets that are particularly at risk include parts of Hylan Boulevard, which was flooded during Sandy in the East Shore communities of Midland Beach. On the South Shore, transportation infrastructure that flooded during Superstorm Sandy includes Amboy Road in Tottenville, streets in Prince's Bay and Richmond Valley, and the Tottenville and Richmond Valley train stations on the Staten Island Railway (SIR). The Clifton Rail Yards, which is outside the Community, flooded as well. The Richmond Valley SIR Station sits on top of tidal wetlands with streams running behind both the eastbound and westbound platforms. As part of the Mill Creek Watershed Bluebelt project currently underway, both streams adjacent to the Richmond Valley Train Station will be removed and directed under the tracks to NYC DEP Bluebelt BMP's (Best Management Practices). Tottenville Station, which has experienced erosion, extends to the water where Raritan Bay meets the Kill Van Kull. While outside of the Community, as noted in previous sections, the St. George Ferry Terminal is a key asset that is at risk of damage and loss during Sandy-like events, including both the ferry facility and Staten Island Railway infrastructure. New York City operated temporary ferry service connecting Great Kills Park to Manhattan in the days after Superstorm Sandy. This ferry service helped to ease commutes for South Shore residents

There are also several critical assets that are outside of the Community that impact the ability of residents and businesses within the East and South Shores of Staten Island to recover. These include the Korean War Veterans Parkway, formerly known as the Richmond Parkway, the Staten Island Expressway, Pearl-Harbor Memorial Expressway, formerly known as the West Shore Expressway, and bridges such as the Verrazano-Narrows Bridge, which was closed for several days after Superstorm Sandy. Completing planned on and off ramps for these key roadways, as well as investing in upgrading these roads, is critical to the safety of Staten Island residents during times of evacuation and post-storm recovery.

Utility Infrastructure

After Superstorm Sandy, Staten Island experienced widespread power outages. As a result of these outages, residents across Staten Island – not just the Community—faced challenges such as the lack of heat, interrupted communications, hardship for local businesses, and reduced capacity of medical facilities. The Planning Committee recognizes the interconnectivity of these systems and its impact on the entire Island during a major event like Superstorm Sandy. In particular, residents and businesses on the East and South Shores would be better served by a power grid that includes greater protections and redundancies to limit outages and provide reliable back-up electricity. A reliable, redundant power system would benefit the entire borough.

Infrastructure Opportunities

Superstorm Sandy highlighted the fact that infrastructure systems on Staten Island, especially coastal protections and stormwater management, do not have adequate capacity to protect residents and businesses from extreme weather or frequent rain events. Though Superstorm Sandy was an unprecedented event, the sources and causes of flooding observed on the greater scale during Superstorm Sandy are regularly reflected on a smaller scale during high tides, rain storms, and nor'easters. Superstorm Sandy has effectively exposed the greater system-wide inadequacy of flood mitigation and protection systems within Staten Island, as well as the need for more robust comprehensive planning. Important opportunities exist to enhance the resilience of both grey infrastructure to make the Community more resilient to storm surge and coastal flooding, most notably, the seawall proposed by the U.S. Army Corps of Engineers (USACE) for the East Shore, and green infrastructure, such as implementing the Staten Island Bluebelt.

Other key infrastructure opportunities include strengthening the existing transportation network by elevating evacuation routes out of the flood zone, and creating a more resilient power grid to limit widespread outages by leveraging the Community's major institutions as hubs for new microgrid networks and broader district energy solutions.

The following specific infrastructure opportunities have been identified:

Coastal Protections

- Create an integrated plan for protection of the East and South Shore Waterfronts by undertaking proactive planning to leverage and complement medium and long-term plans by USACE, most notably the seawall proposed for the East Shore; and identifying short-term measures to protect the coastline while USACE projects are in planning phases.
- Support the New York State Department of Environmental Conservation (NYS DEC) proposal to work with USACE to develop a network of natural infrastructure protections for post-buyout Oakwood Beach. The project could include tidal wetlands, maritime forests, breakwater reefs, and earthen levees, and include recreational and educational overlays.

Stormwater Drainage and Sewer Networks

- Implement upgrades to both grey and green stormwater networks, including expansion of the Staten Island Bluebelt, installation and maintenance of tide gates at sewer outfalls, and expansion of sewage capacity.

Transportation Network

- Create a more resilient transportation network by elevating roads, preventing flooding of SIR stations, and implementing education campaigns that guide residents to high ground.

Utility Infrastructure

- Create Microgrids that generate power in low-risk locations and form networks of critical facilities that can provide important relief and recovery services after a major storm.

Natural and Cultural Resources

As sea levels rise, unreinforced shorelines and weakened shoreline structures along the lowest-lying areas of the Community will become more vulnerable to regular flooding and erosion from daily and monthly high tides. The East Shore of Staten Island, which includes coastal marshes (post glacial deposits, glacial outwash plains and landfill), is characterized by low elevations and gradual slopes. During Superstorm Sandy, surge waters extended far into East Shore neighborhoods due to the low topography of the area.

Natural and Cultural Resource Needs

Sea level rise will result in storm surges that flood a larger area. Changes in storm activity are possible that could lead to a greater frequency or more intense storms. FEMA's flood maps identify both the East and South Shores to be in the coastal V zones. The V zone is mapped in areas where wave hazards are most pronounced.

The strength and direction of waves is highly dependent on a variety of factors for each storm, including storm track, speed, and winds. It is also dependent on geography. The East Shore is exposed to the open ocean and creates a very large "fetch," meaning there is a expanse of water over which ocean-going waves can form and generate extensive energy before breaking on the shores. The large waves along the Atlantic oceanfront are daily evidence of this. In the event of a storm, these areas experience much larger and more destructive waves than other areas. Shellfish reefs, shallow areas nearshore and low elevation, and undeveloped uplands are beneficial for breaking these waves and protecting more inland communities. These features should be preserved where they already exist and/or enhanced, if possible.

In places that are more sheltered from the open ocean, like the South Shore of Staten Island, or have shorter fetch, the reduced open water means that waves are generally smaller and carry less force. While wave forces are reduced, storm surge from the ocean can be concentrated in narrow connecting water bodies, leading to spillover of the banks and flooding in surrounding areas. This area is classified as oceanfront slopes (glacial till plains) of medium elevation and medium slopes. The South Shore has steeper shorelines and bluffs, as compared to the East Shore, which helped to protect many neighborhoods from surge waters. However the extent of storm surge caused by Superstorm Sandy was so great that some areas on the South Shore still experienced devastating flooding, and surge from Superstorm Sandy propagated up the Arthur Kill, flooding some areas on the west side of Staten Island.

Natural and Cultural Resource Opportunities

While Superstorm Sandy damaged natural resources and exposed deficiencies in the ability of current natural systems to mitigate additional damage from stormwater and storm surge, opportunities exist to restore these systems and integrate them into broader objectives to increase resilience and improve wildlife habitat. Natural systems on the East and South Shores

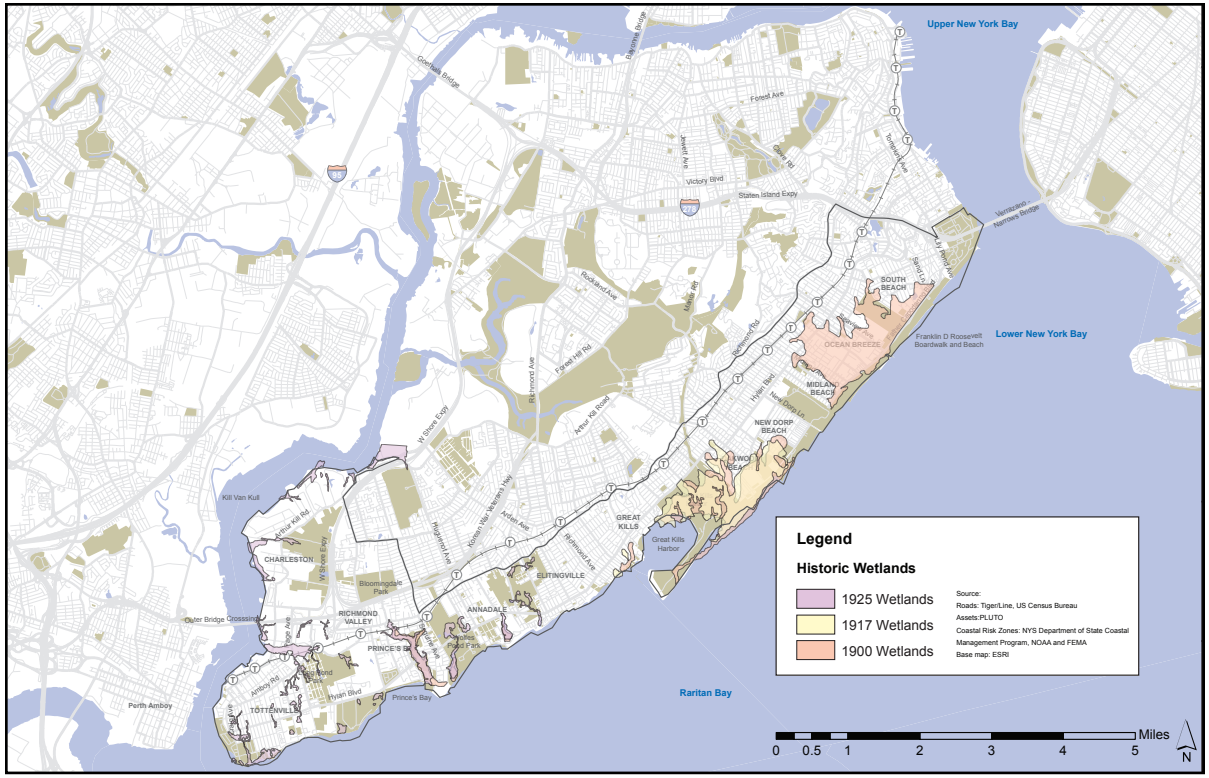
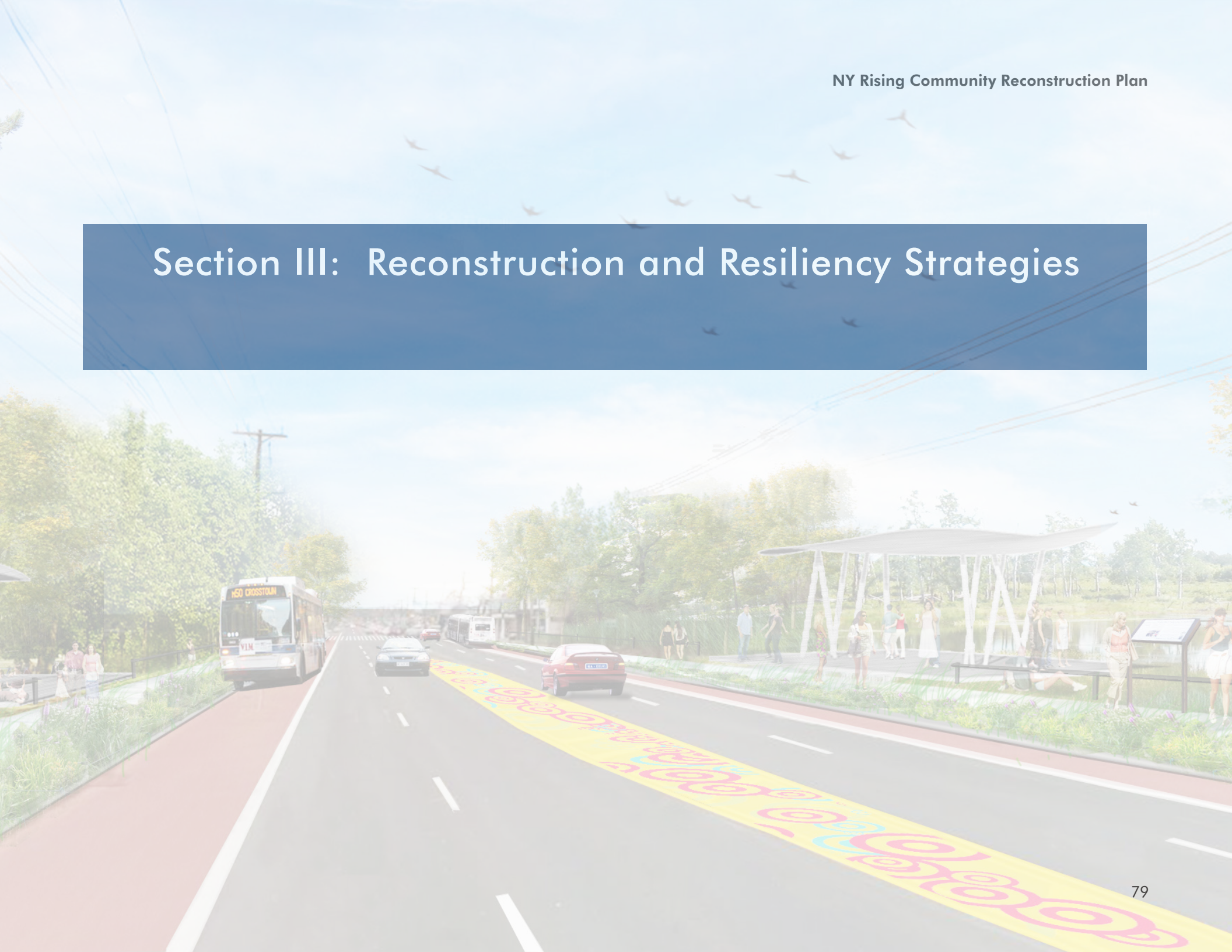


Figure 17: Historic Wetlands

of Staten Island can be made more resilient by:

- Restoring natural resources, including parks and wetlands, to increase their capacity in absorbing flood and rainwater (increasing Green Infrastructure);
- Restoring degraded marshes and wetlands to help filter stormwater and buffer approaching storms; these measures will increase the quality of surrounding bodies of water and help to reduce the damage caused by wave-action in moderate storm events;
- Expanding the Bluebelt program to create stormwater wetlands and protect and restore wildlife habitat. This could include initiatives such as:
  - Using wetlands created within the Bluebelt as a living classroom for neighboring schools, including Oakwood Beach and Lemon Creek;
  - Creating a natural areas conservancy to improve prospects for their future maintenance and upkeep, and thus effectiveness;
  - Removing monotypic stands of invasive reeds (Phragmites australis) to provide a range of habitats from open water to upland forest. This will increase habitat types and vegetative communities that can support greater and more diverse populations of birds, fish, amphibians, and mammals;
  - Updating waterfront revitalization programs to enhance wetland protections.
- Constructing continuous natural and man-made tidal barriers, reefs, floodgates, berms, dunes, and breakwaters in appropriate locations to enhance coastal flood protections;
- Evaluating changes in land use and stormwater regulations to further enhance and protect current and future locations of tidal and freshwater wetlands and natural based infrastructure;
- Utilizing coastal parks and natural areas as a "first defense", such as development of flood protective features along these spaces to protect communities from storm surge.

Section III: Reconstruction and Resiliency Strategies



Reconstruction and Resiliency Strategies

Based on input from the Planning Committee, feedback from Public Engagement Events, and the outcome of the Risk Assessment and Needs and Opportunities Assessment, five Strategies emerged to guide the Planning Committee as it created a comprehensive set of solutions to the needs identified for Staten Island. These Strategies are:

Strategy A: Coastal Protection

Strategy B: Stormwater Management

Strategy C: Key Connections

Strategy D: Emergency Response Capacity

Strategy E: Neighborhood Integrity

The Planning Committee identified Proposed and Featured Projects to implement these strategies; these Proposed and Featured Projects are summarized below and a more detailed description of the projects can be found in **Section IV: Implementation—Project Profiles.**

The Proposed and Featured Projects have been assessed for their ability to mitigate future risk and to address the needs and opportunities identified by the Committee. They were developed and selected by the Planning Committee and the public, and categorized by their capacity to address the strategies and the Recovery Support Functions (RSFs).

Strategy A/Coastal Protection: Leverage existing coastal protection initiatives, including those by the U.S. Army Corps of Engineers, to more comprehensively limit the exposure of the East and South Shores to storm surge.

Strategy A: Coastal Protection directly addresses the impacts that communities on the East and South Shores of Staten Island experienced due to Superstorm Sandy, as well as the potential storm surge risk that could be posed by future storms. Strategy A addresses the Infrastructure and Housing RSFs, and Proposed and Featured Projects under this Strategy seek to improve infrastructure by increasing coastal edge elevations, taking into account future sea level rise to minimize inland tidal flooding. Increasing the height of existing protection measures and constructing additional measures will help to form a continuous barrier to tidal surges. Strategy A impacts housing by providing physical infrastructure that protects neighborhoods from coastal risks and helps residents feel safe in their homes during times of potential danger.

Risks addressed by Strategy A include the potential for catastrophic storm surge in the event of a future storm. This strategy addresses coastal risks by protecting low-lying areas with dunes, dune plantings, and by creating medium-term plans for additional coastal protections. The Proposed and Featured Projects under Strategy A capitalize on opportunities to work with New York City, New York State, and Federal agencies that have their own plans or priorities for the Community. In particular, the projects in Strategy A have been developed to support work that is planned by the U.S. Army Corps of Engineers (USACE).

Strategy A resolves critical issues faced by residential neighborhoods in low-lying areas along the Staten Island coastline. Many of these neighborhoods will only be fully protected from future storm surge by large scale infrastructure projects. Therefore, Strategy A includes a combination of implementable projects and medium and long-term plans that will provide additional benefit to the Community's neighborhoods.

Table 6: Strategy A—Coastal Protection

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
A1	Interim East Shore Coastal Protection Measures	Create a contiguous, stabilized dune system to protect the shoreline in the East Shore against storm surge. This project is meant to augment the USACE Phase I Study.			
	Phase I	Add plantings to existing temporary dunes from Seaview Avenue to Oakwood Beach WWTP.	Proposed	$2,300,000	Y
	Phase II	No connection exists from between the NYC DPR dunes in Midland and New Dorp Beaches to the dunes at Miller Field dunes; this project will 'fill the gaps' by constructing and planting cellular containment barrier core sand dunes at the end of New Dorp Lane and Father Capodanno Boulevard, forming a continuous line of interim coastal protection on the East Shore.	Proposed	$350,000	N
A2	Tottenville and Great Kills Dunes and Coastline Dune Plantings	Construct permanent dune system to protect Tottenville and Great Kills shoreline against storm surge; plant dunes in Tottenville and Great KIlls.			
	Phase I	Planting of existing dunes in Great Kills	Proposed	$450,000	N
	Phase II	Reconstruction and planting of existing dunes in Tottenville from Brighton St. to Sprague Ave. (stone core – includes 1 access point)	Proposed	$3,800,000	N
	Phase III	Construction and planting of dunes in Tottenville from Sprague Ave. to Joline Ave. (stone core – includes 1 access point and potential easement costs)	Proposed	$2,500,000	N
	Phase IV	Construction and planting of dunes in Tottenville from Joline Ave. to Page Ave and in Great Kills at Goodall Street (stone core, no access points, potential easement costs)	Featured	$5,000,000	N
	Phase V	Construction and planting of dunes in Tottenville from Conference House Park along Surf Ave. to Brighton St. (stone core, no access points)	Featured	$10,000,000	N
A3	Integrated South Shore Protection Plan	Prepare supplemental studies beyond the scope of USACE study of the South Shore. Feasibility study for flood protection alternatives at Mill Creek and near the Tottenville SIR Station.	Proposed	$400,000	Y

Midland Beach Temporary Dune Reconstruction

South Shore Inlet

Strategy B/Stormwater Management: Leverage existing stormwater management measures, especially the Staten Island Bluebelt, to better protect East and South Shore communities from frequent flooding caused by heavy rains and high tides.

Strategy B: Stormwater Management is a response to the potential for dangerous flooding that could occur during large storms that bring a greater extent of rainfall than occurred during Superstorm Sandy. Strategy B also addresses more frequent flooding that occurs during much smaller rain events, ranging from tropical storms, nor'easters, and even light rains accompanied by everyday high tides. Strategy B addresses the Infrastructure, Natural and Cultural Resources, and Housing RSFs. Proposed and Featured Projects under Strategy B seek to improve infrastructure by addressing the intersection between green infrastructure, such as the Staten Island Bluebelt and more traditional stormwater infrastructure, such as storm drains and outfalls. Further, the Strategy B projects enhance natural resources on Staten Island by accelerating the improvement of stormwater management, by coordinating with the ongoing Bluebelt program and private land acquisition and protect housing by increasing the capacity of stormwater management systems adjacent to residential neighborhoods.

This strategy, therefore, has significant co-benefits - not only will it limit extreme flooding during heavy rains, it will also prevent flooding during more frequent events that currently impact neighborhoods within the Staten Island on a regular basis.

Table 7: Strategy B—Stormwater Management

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
B1	New Creek Bluebelt Implementation	Implementation of Bluebelt BMPs at Last Chance Pond (NC-11), Boundary Avenue (NC-12), Joyce Street, Hylan Boulevard, and Meadow Place	Proposed	$5,500,000	N
B2	"Gateway to the Blulebelt" project, Hylan Boulevard Green Streets and Streetscape Improvements	Implement green street from Hull Avenue to Liberty Avenue, incorporating linear green infrastructure practices, including vegetated bioswales, connected bioretention tree pits, and permeable paving. Create a gateway to Bluebelt BMPs NC-11 and 12, with educational signage and decorative streetscape.	Proposed	$1,770,000	N
B3	McLaughlin Street Residential conversion to Bluebelt	Buyout of four homes in South Beach that are surrounded by the Bluebelt and redesign Bluebelt BMP SBE-1C.	Featured	$2,600,000	N
B4	Assess Stormwater Outfalls	Investigate stormwater outfalls identified by NYC DEP.	Featured	$570,000	N

Strategy C/Key Connections: Strengthen key connections and physical infrastructure that link communities in the East and South Shores to each other and with the rest of Staten Island, by improving upon transportation infrastructure and the power grid.

Strategy C: Key Connections includes a broad range of Proposed and Featured Projects that make the electrical grid more resilient, improve education and disaster preparedness, and strengthen the transportation network on Staten Island. Recovery Support Functions addressed by this Strategy include Community Planning and Capacity Building, Infrastructure, and Health and Social Services. Proposed and Featured Projects under Strategy C address community planning and capacity building, by providing education to the Staten Island community, targeted at socially vulnerable populations. Infrastructure is addressed by this Strategy by increasing the potential for transportation access during disasters and increased redundancy in electricity infrastructure. Many of these improvements to electrical infrastructure also benefit health and social services, by making critical facilities such as Staten Island University Hospital (SIUH) more resilient to power outages.

Risks to vulnerable populations are amplified during power outages and interruptions to transportation networks. Strategy C helps to mitigate these risks by creating educational programs, increasing community outreach, and strengthening critical networks. The educational component emphasizes that resilience is just as much about social programs and preparedness as it is about physical infrastructure.

Table 8: Strategy C—Key Connections and Physical Infrastructure

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
C1	IIdentify key locations for microgrids and renewable energy to create the "Staten Island Resiliency Network"	Complete an action plan and conceptual design for a microgrid that would provide reliable communication during emergencies.	Proposed	$320,000	Y
C2	'Go to High Ground'	Study for wayfinding signage and staging area for automobile evacuation.	Proposed	$250,000	Y
C3	East Shore Microgrid Network Pilot Project	Create a microgrid network centered around the Staten Island University Hospital – North Campus as the key node.	Proposed	$6,000,000	N
C4	South Shore Microgrid Network Pilot Project	Create a microgrid network centered around the Staten Island University Hospital – South Campus as the key node.	Proposed	$4,000,000	N
C5	South Shore Resilient Dock Feasibility Study	Analyze potential sites for multi-purpose resilient dock, with the primary goal of emergency transportation during disaster events. Build upon the findings of the Citywide Ferry Study Preliminary Report, published in 2013 by NYCEDC.	Proposed	$350,000	Y
C6	St. George / Tompkinsville Promenade Master Plan / Engineering Study / Planning, Architecture / Landscape Design				
	Phase IA	Develop a master plan for the new St. George-Tompkinsville Promenade concept. Cost includes analyzing storm damage to incorporate resiliency measures.	Proposed	$200,000	Y
	Phases 1B - 1D	Additional field surveys to document existing pilings. Develop multi-disciplinary conceptual design and engineering solutions. Schematic design and construction documents for review.	Featured	$3,300,000	Y

Strategy D/Emergency Response Capacity: Build the emergency response capacity of existing municipal agencies, non-profit relief organizations, and civic networks to increase the ability of local organizations to help vulnerable populations recover from major storms.

Strategy D: Emergency Response Capacity seeks to improve the capacity, communication capabilities, and coordination abilities of emergency response groups and non-profit organizations, which were active in helping Staten Island recovery from Superstorm Sandy. Strategy D addresses the Community Planning and Capacity Building and Health and Social Services RSFs. Proposed and Featured Projects under this Strategy benefit community planning and capacity building by strengthening the support infrastructure for socially vulnerable populations to help prepare these groups in advance of a potential disaster. Health and social services are addressed by generating greater coordination between these critical organizations to effectively communicate services to all populations, with attention paid to populations that are often forgotten.

Strategy D addresses risks to vulnerable populations, by improving the support network that can help to evacuate more quickly, locate those who need assistance during the immediate aftermath, and provide resources to return the community back to normal soon after. Strategy D provides expanded capacity and community space to improve service by recovery organizations that provide resources to seniors, those with disabilities, and other vulnerable populations.

Table 9: Strategy D—Emergency Response Capacity

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
D1	Staten Island 'Community Emergency Resource Center' Location and Feasibility Study	Study the feasibility of and potential locations for a year-round resource center for Staten Island residents and for disaster response and recovery organizations.	Proposed	$250,000	Y
D2	Provide support for the Staten Island COAD	Provide support for the Staten Island COAD. Develop relationships with citywide and regional agencies to ensure communications in times of crisis. Identify assets and vulnerabilities of local not-for-profit organizations and define roles and responsibilities in disaster response. Develop coordinated disaster preparedness plans that coordinate activities among and between groups.	Proposed	$280,000	Y
D3	Port Richmond CERT Reconnaissance, Radio Augmentation, and Training	Training and establishment of a permanent repeater site for the Port Richmond Community Emergency Response Team (CERT).	Proposed	$65,000	N

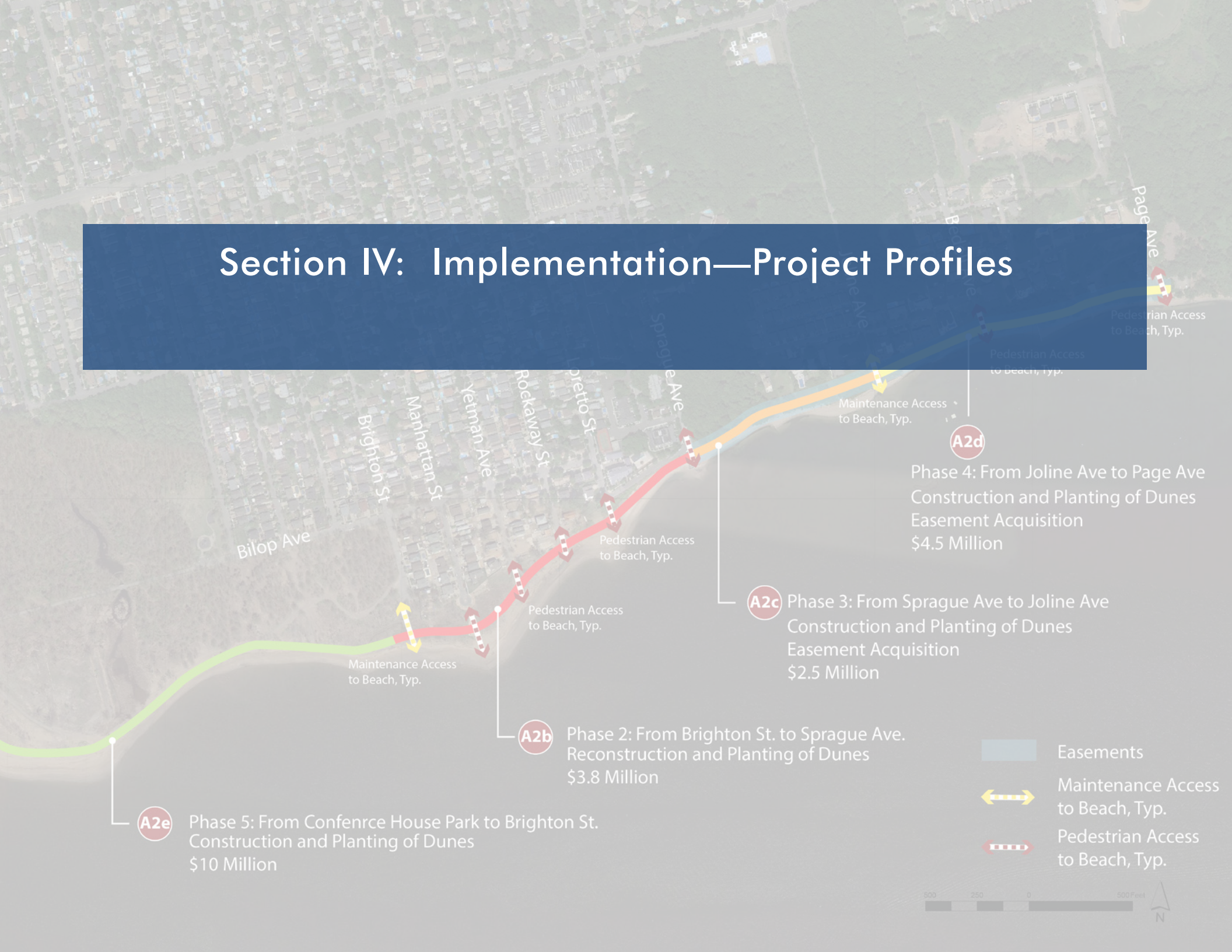
Strategy E/Neighborhood Integrity: Rebuild residential communities in the East and South Shores in a way that increases resilience to future storms, while maintaining neighborhood integrity.

Strategy E: Neighborhood Integrity serves to help stabilize residential and commercial neighborhoods that have struggled to recover from Superstorm Sandy, while also making Staten Island better prepared to bounce back from future disasters. Strategy E addresses the Economic Development and Housing RSFs. Proposed and Featured Projects under this Strategy address economic development by strengthening support networks for local businesses to increase the ability of the business community to serve Staten Islanders prior to, during, and following extreme weather events. These projects also help to foster a robust and diverse business base that builds upon the advantages of being located in coastal areas, while also improving the resilience of the business community to coastal risks. Housing and residential neighborhoods are supported by projects that provide residents in low-lying and coastal areas with a range of housing options that are resilient in design and location. This strategy especially requires new policies that are responsive to the impacts of both increased coastal risks and higher flood insurance rates.

Table 10: Strategy E—Neighborhood Integrity

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
E1	East Shore Waterfront Vision Plan	This Vision Plan will complement the proposed USACE seawall along the East Shore and NYC DCP's East Shore Resilient Neighborhood Framework Plan. It will address how the seawall is integrated with adjacent neighborhoods and specifically study economic development opportunities, waterfront access, and design.	Proposed	$250,000	Y
E2	Home Elevation and Resiliency Assistance Program	Loan and grant program to provide gap funding for home elevation costs to homeowners not covered by existing assistance programs. Grants and/or loans would be provided on a sliding scale depending on income levels. Program could be administered by a centralized entity (e.g. NYC or a city/statewide non-profit), but would be implemented at the local level by organizations that have been integral to post-Sandy reconstruction assistance.	Proposed	$4,000,000	N
E3	Establish East Shore LDC	Provide marketing for local businesses, a cohesive retail strategy for the East Shore, acquire properties to be redeveloped, assist in obtaining financing, and advocate for the smaller businesses that characterize the area.	Proposed	$600,000	N
E4	Implement 'Race for Space' Grant Program	Replicate NYC EDC Staten Island Storefronts Race for Space Program in particularly hard-hit communities such as Midland Beach.	Proposed	$400,000	Y
E5	Create Common Application for Disaster Relief Grant Funding for Local Businesses	Combine Federal, State, City and other disaster relief sources into larger block grants that would be administered by a single local organization.	Featured	$200,000	Y

Section IV: Implementation—Project Profiles



The NYRCR Program has allocated to the Community up to $25 million. 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, 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. 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 necessarily indicate the Community's prioritization of these projects and actions.

Proposed Projects are projects proposed for funding through the Community's allocation of CDBG-DR funding.

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

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

The total cost of Proposed Projects in the NYRCR Plan exceeds the NYRCR Community's CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in the NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in the NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented.

NYRCR Project Descriptions

This section provides an overview of each potential NYRCR project including the elements listed below. A more detailed description of each of the projects including the Risk Assessment and Cost Benefit Analysis can be found in Section V.

- ***Project Description:*** A brief summary of the project including tasks, components or phases
- ***Cost:*** High (over $1 million), medium (between $1 million and $500,000), or low (less than $500,000)
- ***Benefits:*** Whether the project has local direct benefits within the East and South Shores of Staten Island or regional benefits, and whether those benefits are primarily public or private
- ***Cost benefit:*** The following types of benefits were reviewed for the cost-benefit analysis: risk reduction benefits, economic benefits, environmental benefits, and health and social benefits.
- ***Timeframe:*** 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 whether a project is likely to face regulatory obstacles including issues with permits or other approvals, any real property constraints, and project readiness
- ***Jurisdiction:*** The entity with jurisdiction over the project, such as New York City
- ***Funding:*** Consideration of whether a project is best suited for implementation with CDBG-DR funding through the New York Rising Community Reconstruction Program, or with other state, federal, county, or local funds. Possible funding sources are noted for each potential project; however, the ultimate funding source(s) will be determined at a later stage in the planning process.

Adding up the Costs

The Planning Committee worked with a team of cost estimators, engineers, architects, landscape architects, and planners (Consultant Team) to develop estimated costs for each Proposed and Featured Project. All costs are preliminary and based on available data as well as the Consultant Team's understanding of the issues learned through site visits, Planning Committee member knowledge and feedback, and input from the greater Staten Island Community. Local government entities and nonprofit organizations also provided input regarding project scope and estimated costs. As available, construction costs are based upon similar projects that have been constructed within the greater New York City area. Where applicable, actual construction cost quotes from vendors were used. Each phase within a project (design, construction, construction management and

other direct labor costs) include a contingency factor and costs are based on the level of detail available for each individual project at the time of the estimate.

Maximizing the Benefits

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

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

- Risk Reduction Benefits;
- Economic Benefits;[23]
- Environmental Benefits; and
- Health and Social Benefits.

For feasibility studies, action plans or advocacy projects, the discussion of benefits 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.

Based on the process described above for evaluating the costs and benefits of projects, the Planning Committee arrived at the following list of Proposed and Featured Projects for inclusion in the NYRCR Plan. The goal in creating this list of Proposed and Featured Projects was to identify projects that would address all five strategies, thus addressing the needs of the community post-Sandy, while emphasizing geographical diversity, physical projects over studies or plans, and including short, medium and long-range projects.

Staten Island East & South Shores

A Coastal Protection	B Stormwater Management	C Key Connections	D Emergency Response Capacity	E Neighborhood Integrity
A1a Interim East Shore Coastal Protection Measures Phase I	B1 New Creek Bluebelt Implementation	C1 Identify Key Locations For Microgrids And Renewable Energy	D1 Staten Island 'Community Emergency Resource Center' Location and Feasibility Study	E1 East Shore Waterfront Vision Plan
A1b Interim East Shore Coastal Protection Measures Phase II	B2 Gateway to the Bluebelt: Hylan Blvd Green Streets and Streetscape Improvements	C2 'Go To High Ground'	D2 Provide support for the Staten Island COAD	E2 Home Elevation and Resiliency Assistance Program
A2a Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase I: Plant of existing dunes in Great Kills	B3 McLaughlin Street Residential conversion to Bluebelt *Featured Project	C3 East Shore Microgrid Network Pilot Project	D3 Port Richmond CERT Reconnaissance, Radio Augmentation, and Training	E3 Establish East Shore LDC
A2b Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase II: Reconstruction/planting of existing dunes from Brighton St to Sprague Ave	B4 Assess Stormwater Outfalls *Featured Project	C4 South Shore Microgrid Network Pilot Project		E4 Implement 'Race for Space' Grant Program
A2c Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase III: Construction/planting of dunes from Sprague Ave to Joline Ave		C5 South Shore Resilient Dock Feasibility Study		E5 Create Common Application for Disaster Relief Grant Funding for Local Businesses *Featured Project
A2d Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase IV: Construction/planting of dunes from Joline Ave to Page Ave and at Goodall St *Featured Project		C6a St. George/Tompkinsville Promenade Master Plan / Engineering Study Phase 1A		
A2e Tottenville and Great Kills Dunes & Coastline Dune Plantings Phase V: Construction/planting of dunes from Conference House Park to Brighton St *Featured Project		C6b St. George/Tompkinsville Promenade Planning, Architecture / Landscape Design Phases 1B-1D *Featured Project		
A3 Integrated South Shore Protection Plan				

Proposed and Featured Projects

FIVE STRATEGIES FOR PROPOSED AND FEATURED PROJECTS:

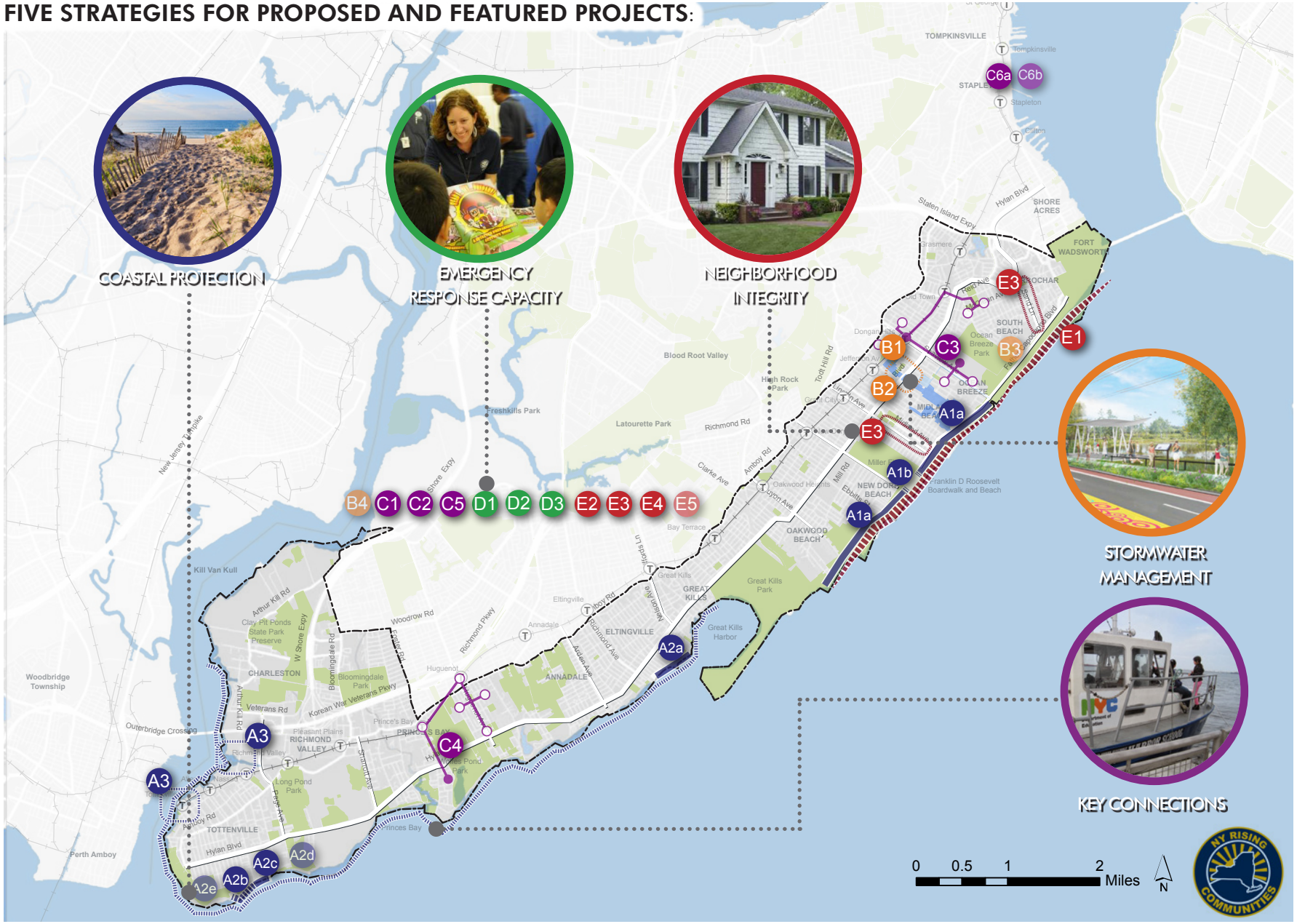


Figure 18: 21 Proposed and six Featured Projects included in the NYRCR Plan for the East and South Shores of Staten Island

A1: Interim East Shore Coastal Protection Measures [Proposed Project]

This project would provide interim coastal protections for the area that is the subject of the U.S. Army Corps of Engineers (USACE) Phase I Study. The approximate study area extends from Fort Wadsworth to Great Kills .

Peak storm tides during Superstorm Sandy reached 16 feet on Staten Island and data suggests that waves up to 6 feet crashed along the borough's shoreline, causing tidal flooding and extensive damage along Staten Island's coastal areas. One of the key causes of flooding on the east shore was inadequate coastal flooding protection, as discontinuous natural and manmade coastal protection systems along the shoreline exposed coastal areas to storm surges. The most extensive inundation occurred in the low-lying residential neighborhoods of the east shore, and in what is commonly referred to as "the bowl" in Midland Beach and Ocean Breeze – an area formed north of Father Capodanno Boulevard. This project would focus on coastal protection on the east shore, protecting the bowl and other low-lying areas. Two phases are proposed:

Figure 19: Interim East Shore Coastal Protection Measures

Phase I: Planting and stabilization of existing, temporary dunes

This phase would entail planting and stabilizing the existing, temporary dunes from Seaview Avenue to the end of Father Capodanno Boulevard and from New Dorp Lane to Oakwood Beach Wastewater Treatment Plant for added erosion protection. The NYC Department of Parks and Recreation (NYC DPR) has constructed trap-bag core sand dunes from Seaview Avenue to the end of Father Capodanno Boulevard, and from New Dorp Lane to Oakwood Beach Wastewater Treatment Plant at elevation 13' NAVD (North American Vertical Datum), while the U.S. National Park Service (NPS) has stabilized the dunes adjacent to Miller Field from the end of Father Capodanno Boulevard to New Dorp Lane at an approximate elevation of between 12'-12.5' NAVD. The cost estimate for this option is $2,300,000, which includes additional stabilization and planting for the entire stretch of dunes, as well as typical regulatory, labor costs, and construction contingency costs.

Phase II: Construction of dunes where none exist.

This phase would establish connections between the existing NYC DPR dunes and the NPS dune adjacent to Miller Field. The cost estimate for this option is $350,000, which includes the construction of cellular containment barrier core sand dunes (similar to the existing NYC DPR temporary dunes), planting of these new dune connections, and the construction of an Americans with Disabilities Act (ADA) Accessible beach access location. This would ensure that no gaps exist along the interim east shore coastal protection system.

Cost Estimate

Phase I: approximately $2,300,000

Phase II: approximately $400,000

Benefits or Co-Benefits

Economic Benefits

This project is expected to employ 28 full-time equivalent individuals. Economic benefits also include the avoided or reduced costs of property damages and business losses from 100-year tidal flooding events, against which the dunes should provide protection, as well as avoided or reduced government expenditures for emergency response.

Environmental Benefits

The primary intent of Phase I of the project is to stabilize existing dunes by planting vegetation on the dunes. Phase II would create new dunes in locations where dunes do not currently exist, and would stabilize these dunes with vegetation. Dunes that are populated with vegetation are generally stabilized by the root systems of the plants and are less susceptible to wind and water erosion and more capable of withstanding wave action during storm events. As such, stabilized dunes would help protect landside resources from marine inundation during storm events. By reducing marine inundation, landside drainage systems are more capable of handling precipitation runoff, thereby reducing flooding and easing pressure on the Oakwood Beach Wastewater Treatment Plant.

The approximate 3.0 mile extent of the dune stabilization project would protect environmental resources and infrastructure along the East Shore. Parks and open space within this area include portions of the Staten Island Unit of Gateway National Recreational Area (Miller Field and Great Kills Park), Midland Field Park, Last Chance Pond Park, the Franklin D. Roosevelt Boardwalk and recreational facilities along the shore. Important natural systems that would be protected by the project include the New Creek and Oakwood Beach Bluebelt systems, Oakwood Beach wetland areas, and other wetland systems along the east shore, as well as the streams leading to and from the wetlands.

Health and Social Benefits

The proposed project impacts the East Shore of the Staten Island Community, from Fort Wadsworth to Great Kills, with a population of 34,017. This project does not secure a specific health and social services facility, but instead would likely benefit the health and social services assets along the eastern coastline such as the Staten Island University Hospital North Campus and the South Beach Psychiatric Center.

Cost-Benefit Analysis

Superstorm Sandy illustrated the need for a continuous line of coastal protection along the East Shore in the immediate term, prior to implementation of measures recommended by the USACE Phase I Study. This phased project with a total proposed project cost of $2,650,000 would reinforce investments by NYC DPR by stabilizing their existing dunes, and NPS by tying those dunes into a contiguous system. This project would cost-effectively provide continuous coastal protection, while reducing the costs of property damage and government expenditures for future storm events.

Anticipated Reduction of Risk

Dunes along the shoreline reduce exposure to features landside of the dunes. The project would reduce exposure during 10-year events, as well as less frequent events (e.g., 100-year), to assets located from Seaview Avenue to Great Kills Park, an extent of approximately 3.0 miles. Planting vegetation on dunes stabilizes the dunes because the root structures bind the sand, reducing wind and water erosion, while promoting enlargement of the dunes by accretion. Higher, more stable dunes would create a living shoreline, which protect the shoreline from erosion, protects inland marshes, wetlands and natural preserves, create or maintain habitat for plants and animals, provide aesthetic value, and improve water quality and clarity. In terms of risk assessment, the vulnerability of assets would decrease as a result of the project due to less frequent and less intense flooding, and less wind, wave and storm surge damage. The Assessment of Risk to Assets in Section V illustrates the reduction in risk scores to affected assets included in the asset inventory as a result of implementing the proposed project.

A reduction of risk may benefit populations in the Community from Seaview Avenue to Great Kills. This area had an approximate population of 34,017, as outlined above. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Phase I: Immediate (<2 years);

Phase II: Immediate (< 2 years)

Regulatory Requirements

No permits should be required to plant dunes (Phase I) but a federal wetlands permit, nationwide permit and other permits may be required from the USACE, New York State Department of Environmental Conservation (NYS DEC), and New York State Department of State (NYS DOS) Coastal Zone Management (CZM) consistency to construct the dune connections (Phase II). Coordination with the NYC DPR on the design and types of plants as well as coordination with the NPS for dune tie-ins will be necessary.

Entity with Jurisdiction

Phase I of the proposed project would be in Staten Island and would therefore fall under the jurisdiction of the City of New York.

Phase II of the proposed project would also fall under the jurisdiciton of the National Park Service.

A2: Tottenville and Great Kills Dunes and Coastline Dune Plantings [Proposed Project – Phases I – III; Featured Project – Phase IV and V]

This project would construct a permanent dune system to protect both the shorelines in Tottenville and Great Kills against storm surge. Tottenville experienced similar tidal flooding impacts to those experienced along the East Shore(see project A 1 above), with discontinuous coastal protection systems along the shoreline that exposed coastal areas to storm surges. Extensive inundation occurred in the residential areas of Tottenville west of Conference House Park.

There are currently temporary dunes in place along the South Shore that were constructed by the NYC DPR from Wiman Avenue to Oceanic Avenue with a gap at Goodall Street in Great Kills and Sprague Avenue past Brighton Street in Tottenville at elevation 13′ NAVD. This project would focus on coastal protection in Tottenville by constructing a permanent dune system from Page Avenue, at elevation 14′ NAVD. This project includes five phases:

Phase I: Existing dunes would be stabilized and planted in Great Kills.

Phase II: Dunes would be reconstructed and planted from Brighton Street to Sprague Avenue. The new dunes would consist of a stone core with sand cap, and includes one beach access point, at a location to be determined during design.

Phase III: Dunes would be constructed and planted from Sprague Avenue to Joline Avenue. The new dunes would consist of a stone core with sand cap, and include one beach access point, at a location to be determined during design.

Phase IV: Dunes would be constructed and planted from Joline Avenue to Page Avenue. The new dunes would consist of a stone core with sand cap, and do not include access points. Dunes or revetments would also be constructed in Great Kills at Goodall Street.

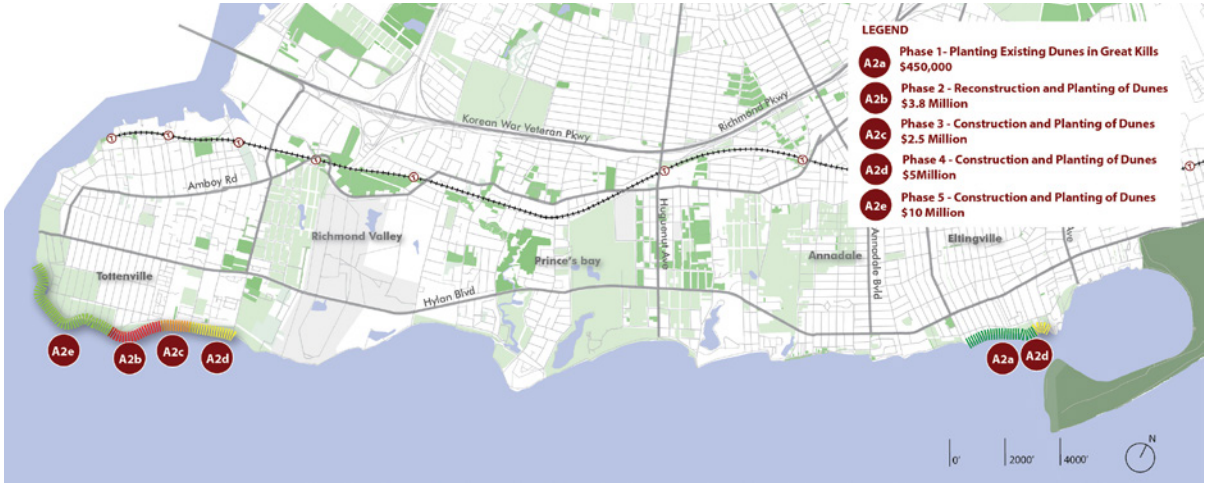


Figure 20: Tottenville and Great Kills Dunes and Coastline Dune Plantings

Phase V: Dunes would be constructed and planted from Brighton Street through Conference House Park. The new dunes would consist of a stone core with sand cap.

In areas from Page Avenue to Sprague Avenue, easements along the mapped but unbuilt portions of Surf Avenue may be necessary. The new dunes would consist of a stone core with sand cap, and does not include beach access.

The total cost of the project is estimated to be $21,750,000, which includes construction of a permanent dune system with stone core and coastal dune planting, as well as the construction of two Americans with Disabilities Act (ADA) Accessible beach access points at two locations, to be determined. The estimated project cost includes the cost of securing easements, as necessary, from Page Avenue to Loretto Street. Typical regulatory and labor costs, as well as construction contingency costs, were also included in the cost estimate. Benefits of the project are public in nature to protect the coastline.

Cost Estimate

Phase I: Low Cost (approximately $450,000)

Phase II: High Cost (approximately $3,800,000)

Phase III: High Cost (approximately $2,500,000)

Phase IV: High Cost (approximately $5,000,000)

Phase V: High Cost (approximately $10,000,000)

Figure 21: Tottenville Dunes and Coastline Dune Plantings

Benefits or Co-Benefits

Economic Benefits

This project would create an estimated 236 full-time equivalent jobs for the construction of the project. Economic benefits also include the avoided or reduced costs of property damages and business losses from 100-year tidal flooding events, against which the dunes should provide protection, as well as avoided or reduced government expenditures for emergency response.

Environmental Benefits

The intent of this project is to protect the shoreline in Tottenville and Great Kills against storm surges by the construction of a permanent dune system. The natural bluffs in Tottenville were severely eroded after the storm, offering little protection to the community behind them. This project would stabilize these dunes in their place. Establishing dunes along the shoreline acts as a natural buffer and protects landside areas from the destructive storm surges and wave actions. Plantings on dunes stabilize these features, allowing for natural sediment deposition, making them better able to withstand storm surge and wave action. Dune systems

are a natural habitat along the waterfront that would promote better habitat quality and habitat connections within the South Shore of Staten Island. These dunes would stabilize the shoreline that has experienced erosion due to the long-shore sediment, wave actions and development. Dunes would mimic the coastal bluff that remain in the area and protect the freshwater forest that lies behind them from erosional wave forces and salt intrusion. Loss and degradation threaten ecosystem functions that these forests provide, including wildlife habitat, migratory bird stopover and feeding areas, water quality enhancement, soil stabilization, aesthetics, and timber production.

Environmental assets that would be protected include, Conference House Park, Crescent Beach Park, Seaside Wildlife Nature Park, Butler Manor Woods, and Hybrid Oak Woods Park.

Health and Social Benefits

The construction of new dunes within the proposed project impacts the town of Tottenville, from Page Avenue to Conference House Park with a population of 4,184. The coastline dune plantings would impact the Great Kills area, from Wiman Avenue to Oceanic Avenue and in the Tottenville area from Sprague Avenue past Brighton Street, with a combined population of 8,636. This project does not secure a specific health and social services facility, but instead aims to protect multiple health and social services assets along the South Shore coastline.

Cost-Benefit Analysis

Current erosion of the Tottenville Dunes warrants consideration of different coastal protection measures. This phased project with a total proposed project cost for all phases of $21,750,000 would stabilize dunes in Great Kills while creating a stronger, permanent system of dunes and berms in Tottenville that would cost-effectively provide coastal protection, reducing the costs of property damage and government expenditures for future storm events. The location of the dunes behind the mean high water line and their stone core construction would reduce repair costs in comparison to the current dunes and increase the useful life of the enhanced dune system, while providing co-benefits of improved beach access and value of protected forest habitat.

Anticipated Reduction of Risk

Dunes along the shoreline reduce exposure to features landside of the dunes. The project would reduce exposure during 10-year events, as well as less frequent events (e.g., 100-year) to assets located south of Great Kills Park between Wiman Avenue and Oceanic Avenue, an extent of roughly 0.6 miles, and from Page Avenue to Conference House Park, an extent of approximately 1.5 miles. Creating dunes provides a coastal barrier to storm surge, extreme tides and wave action, and can reduce wind velocity. Planting vegetation on dunes helps stabilize them with root structure that bind the sand, helping to reduce wind and water erosion, while promoting enlargement of the dunes by accretion. Larger, more stable dunes would create a living shoreline, which protects the shoreline from erosion, protects inland marshes, wetlands and natural preserves, creates or maintains habitat for plants and animals, provides aesthetic value, and improves water quality and clarity. In terms of risk assessment, the vulnerability of assets would decrease as a result of the project, due to less frequent and less intense flooding, and less wind, wave and storm surge damage. The Assessment of Risk to Assets in Section V illustrates the reduction in risk scores to affected assets included in the asset inventory, as a result of implementing the proposed project.

A reduction of risk may benefit populations in the project area between Wiman Avenue and Oceanic Avenue in Great Kills, and from Page Avenue to the approximate midpoint of Conference House Park in Tottenville, where wave forces from Superstorm Sandy destroyed homes and displaced many residents, some of whom still have not returned. The approximate population of the area is 8,636. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Phase I: Immediate (< 2 years)

Phase II: Immediate (< 2 years)

Phase III: Immediate (< 2 years)

Phase IV: Immediate (< 2 years)

Phase V: Intermediate (2-5 years)

Regulatory Requirements

Permits may be required by the USACE, CZM coastal consistency concurrence (NYS DOS) and NYS DEC. Coordination with the NYC DPR regarding design will be necessary. A sand source is necessary for the project.

Entity with Jurisdiction

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

A3: Integrated South Shore Protection Plan [Proposed Project]

Along the South Shore, powerful waves eroded the area's protective bluffs, causing significant erosion and damage, especially in the neighborhoods of Great Kills, Annadale, Prince's Bay, and Tottenville. Storm surges traveled inland into low-lying areas along creeks and tributaries, including Mill Creek, flooding roads and disrupting businesses. This plan would build upon the USACE Feasibility Study of the South Shore of Staten Island, preparing supplemental studies beyond the scope of the USACE study. The scope of the USACE study is along the coast from Great Kills Park to Conference House Park, including key coastal areas such as Prince's Bay, Lemon Creek, Crescent Beach, Annadale Beach, Mt. Loretto, and Tottenville.

The estimated cost for the plan is $400,000 to provide additional studies in partnership with the USACE, focusing on the South Shore. Tasks within the larger plan include a feasibility study for flood protection alternatives at Mill Creek and in the vicinity of the Tottenville Staten Island Railway (SIR) Station along Ellis Street, to prevent erosion of the shoreline and flooding of streets, businesses, and homes. The included feasibility studies would be detailed and include a review of existing information, baseline studies, such as habitat mapping, wetland delineations, surveys, and hydrodynamic, hydrologic and hydraulic modeling (among others). In addition, a thorough analysis of alternative flood components would be investigated and a conceptual design for the preferred alternative in each of the individual studies would be developed. Typical regulatory and labor costs were included in the cost estimate for each floodgate study. Benefits of the project are mostly public, as they would provide a detailed implementation plan for coastal protections along the entire south shore.

Figure 22: Integrated South Shore Protection Plan

Cost Estimate

Medium Cost (approximately $400,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 7 full-time equivalent jobs. The plan takes a similar approach to the one used by the New York City Department of Environmental Protection (NYC DEP), in that it considers the South Shore Estuary system as a single integrated entity and therefore must be studied and planned as a whole. This approach reduces the cost of creating multiple plans for various neighborhoods along the southern section of Staten Island. In addition, the plan can harness funding more effectively as a single planning entity, instead of having several plans that compete for the same sources of funding. The plan would also fuse together a cohesive and synergistic strategy that relies on the total areas' strengths and weaknesses, thereby making investment choices more effective.

Environmental Benefits
This plan would build upon the USACE Feasibility Study of the South Shore of Staten Island, preparing supplemental studies beyond the scope of the USACE study. Therefore, tasks within the larger plan include a feasibility study for flood protection alternatives at Mill Creek, and in the vicinity of the Tottenville SIR Station along Ellis Street, to prevent or reduce flooding. Depending on the recommended flood protection alternatives resulting from the study, natural resources that would be protected by the actions include Lemon Creek and the associated wetlands and Mill Creek and associated wetlands. Additional benefits to flood protection in the Mill Creek area include potential water quality improvements to Arthur Kill, due to reduced runoff reaching the kill and reduced flooding at the Richmond Valley SIR Station, North Mt. Loretto State Forest, and Long Pond Park.

Health and Social Benefits
The proposed project impacts the areas of Lemon Creek, Mill Creek, Tottenville SIR Station and Ellis Street, with a population of 11,243.

This project does not secure a specific health and social services facility, but instead aims to protect multiple health and social services assets along the south shore of Staten Island coastline such as the NYPD Police Station 123 Precinct, SIUH – South Campus, and the South Richmond High School.

Cost-Benefit Analysis
Superstorm Sandy demonstrated the need for a permanent, continuous line of coastal protection along the South Shore. The total proposed project cost of $400,000 would build upon the South Shore Dunes and Coastline Dune Plantings project and capitalize upon investments by the USACE, NYC DPR, and Rebuild by Design to determine the most cost-effective strategies and innovative financing to fill the gaps in coastal protection measures. The recommendations of the study would reduce the costs of property damage and government expenditures for future storm events.

Anticipated Reduction of Risk
The study would evaluate options for strategies to prevent/minimize flooding and improve community safety in areas where options are pursued. If options are adopted, they would reduce exposure to assets in the area(s) of Mill Creek, Lemon Creek, and in the vicinity of the Tottenville Staten Island Railroad (SIR) Station along Ellis Street. In terms of risk assessment, the vulnerability of assets would decrease as a result of the project due to less frequent and less intense flooding. Assets that provide a service would therefore experience fewer and/or shorter periods when service is unavailable.

This project may provide a reduction of risk to populations in the proposed project areas of Lemon Creek, Mill Creek, Tottenville SIR Station and Ellis Street, with an approximate population of 11,243. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation
Intermediate (2-5 years)

Regulatory Requirements
No permits should be required for a study. Coordination with the USACE, NYS DOS, NYC DEP, NYC DPR and NYS DEC is recommended.

Entity with Jurisdiction
The proposed project would be in Staten Island and would therefore fall under the jurisdiction of the City of New York.

B1: New Creek Bluebelt Implementation [Proposed Project]

Staten Island experienced severe flooding during Hurricane Irene and Tropical Storm Lee, which both brought higher rainfall totals (between 5-10 inches) to the Borough than Superstorm Sandy (between 1-3 inches). Flooding was reported along the East Shore including several roadways within the New Creek watershed such as Hylan Boulevard and Midland Avenue. These intense precipitation events warrant increased stormwater management through the expansion of the New Creek Bluebelt.

The NYC DEP is currently expanding the Mid-Island Bluebelt, which would detain stormwater and help mitigate stormwater flooding in the New Creek Bluebelt. NYC DEP has already acquired 325 acres of wetlands and adjacent areas for the Staten Island Bluebelt, with plans to acquire an additional 195 acres over the next 30 years, including acquisitions in Oakwood Beach, New Creek, and South Beach.

This project would install selected best management practices (BMPs) in the New Creek Bluebelt. These BMPs have been identified by NYC DEP as high priority projects that serve as detention ponds for upstream flows, which when installed could alleviate the flooding downstream by allowing the downstream flows to exit before the upstream flows reach them. This delayed release of the upstream system would not exacerbate downstream stormwater issues. The first of these BMPs, furthest along in design, is Last Chance Pond and Hylan Boulevard (NC-11 and 12). Boundary Avenue (NC-6), Joyce Street and Meadow Place (NC-13 and 14) are also future BMPs that could be installed as separate phases of New Creek Bluebelt Implementation.

Figure 23: New Creek Bluebelt Implementation at Last Chance Pond (NC-11), Boundary Avenue (NC-12), Joyce Street, Hylan Boulevard and Meadow Place

1. Phase I: NC - 11 and 12 at Last Chance Pond and Joyce Street is estimated to cost $11 million, which covers surveying, earthwork and grading, landscaping, sediment and erosion control, stream bank stabilization and new structures, including headwalls and weirs. Interpretive signage would be installed along Hylan Boulevard to create a visual connection to the BMP. This cost could be partially funded (50% or $5.5 million) by CDBG-DR funds allocated to Staten Island, with matching contribution by NYC DEP.

2. Phase II: NC-6 at Boundary Avenue includes extended detention wetland and includes permanent pool installation, outfalls, and grading.

3. Phase III: NC-13 and 14 at Hylan Boulevard and Meadow Place include outfalls, culvert

and weir structures, pools, berms and stabilization, as well as an outlet stilling basin.

All BMPs would include enhancement of perimeter areas, especially along roadways, such as signage, boulders, and landscaping. Benefits of the project are public in nature, as they reduce flooding, increase green space, and enhance waterways and wetlands. The expansion of the New Creek Bluebelt would help stabilize conditions along the Hylan Boulevard economic corridor, and allow business owners to invest within a more secure environment.

Cost Estimate

Phase I: NC – 11 and 12: High cost (approximately $11,000,000); $5,500,000 proposed project cost with $5,500,000 in potential matching funds from NYC DEP)

Phase II: NC – 6: N/A (Advocacy)

Phase III: NC- 13, 14: N/A (Advocacy)

Benefits or Co-Benefits

Economic Benefits

This project will create an estimated 120 full-time equivalent jobs. The potential for real estate impacts can occur as more land is acquired and turned into Bluebelt BMPs. This would reduce development in areas that could be adversely impacted by stormwater flooding. The potential savings when storms occur can be tremendous for both residents and NYC DEP, as storm damage is minimized and costs to local authorities is reduced as their area of evacuation and recovery shrinks.

Environmental Benefits

NYC DEP is currently expanding the Mid-Island Bluebelt, which would detain stormwater and help mitigate stormwater flooding in the Community. This project would involve acquiring and adding to the Mid-Island Bluebelt system 195 acres over the next 30 years, including acquisitions in Oakwood Beach, New Creek, and South Beach.

The project would provide comprehensive stormwater management to reduce chronic flooding of streets and properties in Mid-Island by preserving and enhancing existing wetlands, as wetlands retain and slowly release stormwater. Additionally, wetlands capture and remove pollutants from stormwater, reducing transport of such pollutants. The project would also reduce influent and thereby provide benefits to the Oakwood Beach Wastewater Treatment Plant

Health and Social Benefits

Phase I of the proposed project impacts the areas of Hylan Boulevard and Seaview Avenue with a population of 7,885. This project would minimize the risk of flooding impacts ay health and social service facilities along and southeast of Hylan Boulevard. Additional risk reduction benefits would result from future potential Phases II and III of the project near where NC-6, 13 and 14 would be implemented.

Cost-Benefit Analysis

NYC DEP recognizes the need for expanding the Staten Island Bluebelt to prevent localized flooding that occurred during most severely during Hurricane Irene and Tropical Storm Lee. The total proposed project cost of $5,500,000, matched with $5,500,000 by NYC DEP, would use the innovative stormwater management system of the Staten Island Bluebelt to cost-effectively mitigate downstream flooding by retaining stormwater, building upon previous investments by NYC DEP in the Mid-Island Bluebelt and enabling the agency's future investments in other Bluebelt BMPs, as well as reducing the costs of property damage and government expenditures for future storm events.

Anticipated Reduction of Risk

This project would advance methods to reduce inland flooding. As such, the project would reduce the hazard from heavy precipitation events. The project would reduce flooding by increasing the capacity of natural flood control features, such as wetlands and pervious open space. The project would accomplish these goals by controlling erosion and reducing sediment migration, stabilizing soils, retaining rain water, improving drainage, and reducing the quantity and enhancing the water quality of runoff. In terms of risk assessment, the vulnerability of assets would decrease as a result of the project, due to less frequent and less intense flooding. Assets that provide a service would, therefore, experience fewer and/or shorter periods when service is unavailable.

Phase I of this project would provide a reduction of risk to populations near Hylan Boulevard and Seaview Avenue where NC-11 and 12 would be implemented. According to data for census blocks in the area, this is a population of 7,855. Specific characteristics of the population can be found in the health and social benefits subsection above. Additional risk reduction benefits would

result from future potential Phases II and III of the project near where NC-6, 13 and 14 would be implemented.

Timeframe of Implementation

Phase I: NC-11 and NC-12: Intermediate (2-5years)

Phase II: NC-6: Intermediate (2-5 years)

Phase III: NC-13, 14: Long-Range (>5 years)

Regulatory Requirements

Permits may be required from the NYS DEC, USACE and CZM coastal consistency concurrence (NYS DOS), NC-11 and 12 are the most ready of the three phases, while the remaining BMPs would require further hydrological modeling. The NYC DEP has completed the Final Environmental Impact Statement for the Mid-Island Bluebelt and is currently applying for permits from the NYS DEC. Real property constraints should not exist, as the BMPs are located on public property owned by the NYC Department of Parks and Recreation.

Entity with Jurisdiction

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

B2: "Gateway to the Bluebelt:" Hylan Boulevard Green Street and Streetscape Improvements–New Creek Bluebelt Crossing [Proposed Project]

Hylan Boulevard, Staten Island's primary economic corridor, was inundated during Hurricane Irene and Superstorm Sandy from approximately Delaware Avenue to Bancroft Avenue and Isabella Avenue to Hopkins Avenue. Vehicular congestion occurs regularly along Hylan Boulevard and this is compounded during weather events when roads are flooded and impassable.

This project would utilize an adapted green street concept along Hylan Boulevard from Hull Avenue to Liberty Avenue that incorporates a combination of conventional stormwater management infrastructure such as storm drain inlets and linear green infrastructure practices, including vegetated bioswales, connected bioretention tree pits (also known as right-of-way bioswales) and permeable paving. The green street would incorporate native, drought and heat tolerant vegetation. This alternative option would allow for increased infiltration and capture of stormwater where it falls, reducing the peak flow volumes of stormwater entering the storm sewer system and also improve the water quality – all goals which tie in to the greater Bluebelt system.

While stormwater management is the primary goal, this project would also have positive public health impacts on air quality and economic and aesthetic benefits to Hylan Boulevard, which may spur economic development in the area. Street improvements that would enhance access between the local communities would help expand the potential customer base for businesses in the Community and also facilitate evacuations and access for first responders.

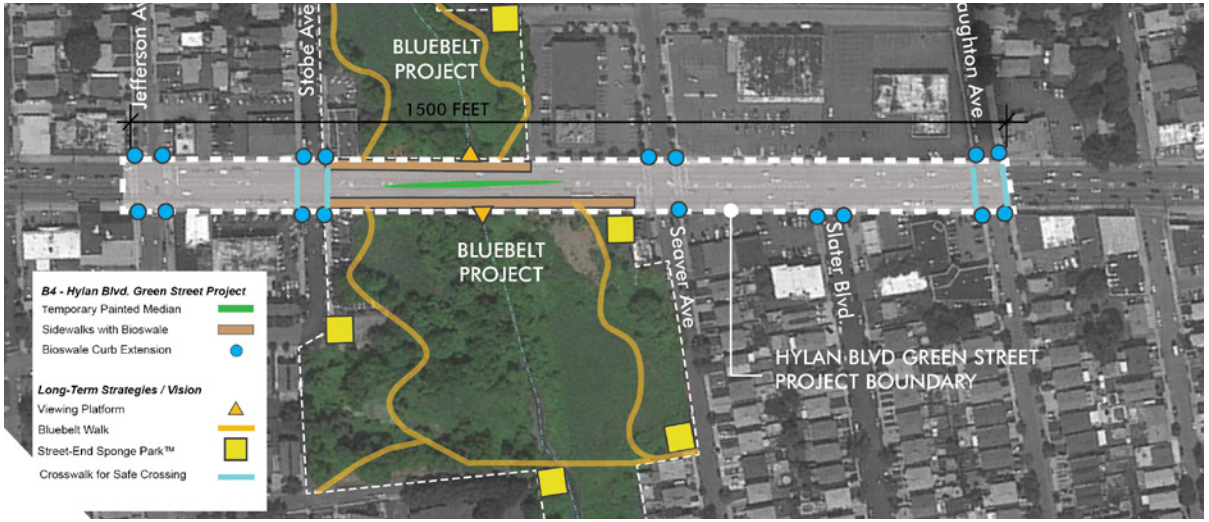


Figure 24: "Gateway to the Bluebelt:" Hylan Boulevard Green Street and Streetscape Improvements

Through traffic calming techniques, this project would create shorter, direct crosswalks; more usable public space; and safe, comfortable travel paths for pedestrians, cyclists and motorists alike.

This project is designed to connect to the Staten Island Bluebelt NC-11 and 12, creating a visual appearance of a 'gateway' to a Bluebelt area with educational interpretive signage, decorative streetscape features, and a viewing platform that provides shade, and some sense of shelter, while framing the view out to the Bluebelt. This project would establish this section of Hylan Blvd as a virtual bridge that communicates the idea of the roadway going over water, the vastness and scale of the Bluebelt system, and the continuity of the Bluebelt on both sides of boulevard, and out to the sea. While Hylan is an automobile oriented environment, suggesting a horizontal movement, the "Bluebelt crossing" is an opportunity to create a moment of stasis and pause, projecting that this is a place for people to go to, and dwell, rather than move through quickly.

The Bluebelt gateway would create a unique opportunity to educate the community about the importance of the Bluebelt in managing stormwater on Staten Island and create an opportunity for them to interact with nature by bringing them closer to the Bluebelt. This project can serve as a model for other areas where the Bluebelt intersects with the built environment, as well as a model for upgrading the visual quality and aesthetic value of Hylan Boulevard.

The primary project area is between Hull Avenue and Liberty Avenue, and the total cost of the project is estimated to be $1,800,000, which includes the design and construction of green infrastructure best management practices (bioswales and permeable pavements) and streetscape improvements. Green street treatments would not reduce the curb-to-curb width of Hylan Boulevard, and sidewalks would remain at the New York City Department of Transportation (NYC DOT) minimum standard. Typical regulatory, labor, and construction contingency costs were included in the cost estimate. Benefits of the project are public in nature as they reduce flooding, increase green space, enhance wetlands and improvements to the streetscape. Coordination with the adjacent property owners will be necessary.

Cost Estimate

High (approximately $1,800,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 10 full-time equivalent jobs during the planning and construction of the project(s). Increasing open space and beautifying Hylan Boulevard can also increase property values along the Corridor.

Environmental Benefits

The focus of this project is to increase stormwater infiltration and capture to reduce runoff and flooding along Hylan Boulevard between Hull Avenue and Liberty Avenue, using linear green infrastructure BMPs. The project would reduce peak flow volumes of stormwater entering the storm sewer system and also improve water quality. Natural resources that would benefit from this project include the creek flowing southeast from the area and the wetlands bordering the stream. The project would protect Last Chance Pond Park, Gen. Douglas MacArthur Park and reduce flooding at Midland Beach and along the Franklin D. Roosevelt Boardwalk and Beach.

Health and Social Benefits

The proposed project impacts the area surrounding Hylan Boulevard between Naughton and Adams Streets with a population of 11,425. This project does not secure a specific health and social services facility, but may improve access to health and social services assets nearby, such as the Staten Island Community Center.

Cost-Benefit Analysis

As a key economic and transportation corridor flooded in both Superstorm Sandy and Hurricane Irene, the NYRCR Planning Committee recognizes the importance of increased stormwater management measures along Hylan Boulevard. The total proposed project cost of $1,800,000 would use innovative green infrastructure measures to retain additional rainfall, reducing the costs of property damage and government expenditures for future storm events, while increasing property values through the addition of green space and beautification of Hylan Boulevard.

Anticipated Reduction of Risk

This project would reduce the vulnerability of assets along Hylan Boulevard between Hull Avenue and Liberty Avenue, by reducing the frequency and severity of flooding during precipitation events. Assets that provide a service would therefore experience fewer and/or shorter periods when service is unavailable. Green infrastructure, such as pervious pavement, increases infiltration, thereby reducing the frequency and severity of flooding. Additional benefits include relatively low implementation cost, increased downstream water quality, potential habitat improvements and a more attractive environment for residents and visitors.

This project should provide a reduction of risk to populations near the Hylan Boulevard stormwater management project, surrounding Hylan Boulevard between Naughton and Adams Streets. According to 2010 Census data, the project area has a population of 11,425. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project is likely to be technically feasible and permits may be required by NYS DEC, USACE and CZM coastal consistency concurrence (NYS DOS). Coordination with NYC DEP will be necessary to utilize their existing plans and determine how this project can enhance the Bluebelt effort.

Entity with Jurisdiction

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

Figure 25: "Gateway to the Bluebelt:" Hylan Boulevard Green Street and Streetscape Improvements

B3: McLaughlin Street Residential conversion to Bluebelt [Featured Project]

As with the New Creek Bluebelt Implementation, this project responds to stormwater flooding during Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee, in which South Beach experienced flooding from both stormwater and tidal surges. This project consists of a buyout of four homes in South Beach that are surrounded by the Staten Island Bluebelt, and replaces them with Bluebelt BMPs. The project is entirely voluntary, although some homeowners have expressed interest in New York City's Build-it-Back acquisition program.

Development of wetlands and low lying areas which otherwise would have served as natural drainage ways reduced the ability for the landscape to absorb storm and flood waters. One of these low-lying areas is South Beach, where McLaughlin Street is located, which has mostly older bungalow homes, many that were historically built as vacation homes and built to lower building standards than primary residences, increasing their vulnerability.

The total cost of the project is estimated to be $2,600,000 which includes appraisals, floodplain management, acquisition and demolition of the four homes, taxes, property insurance, broker, legal, closing and other fees, and necessary Phase I and Tier 2 environmental site assessments. The project cost also includes the redesign of the proposed BMP SBE-1C at McLaughlin Street, as detailed in the Mid-Island Bluebelt Final Environmental Impact Statement.

The project is likely to be technically feasible, however participation would be voluntary and require consensus from all four property owners to be considered feasible given real property constraints.

Figure 26: McLaughlin Street Residential conversion to Bluebelt

Cost Estimate

High Cost (approximately $2,600,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 28 full-time equivalent jobs. The project would also prevent the need for construction of a new outfall, saving NYC DEP approximately $2.18 million. The potential for real estate impacts can occur as more land is acquired and turned into Bluebelt BMPs. This would reduce development in areas that could be adversely impacted by stormwater flooding. Although the purchasing of land is a one-time cost for the government, the potential savings when storms occur can be tremendous for both residents and the local governments, as storm damage is minimized and costs to local authorities reduced as their area of evacuation and recovery shrinks.

Environmental Benefits

This project would increase the pervious area and improve the function of the South Beach Bluebelt system. As impervious surfaces are removed, more area is available for the infiltration of stormwater and reduced flooding in the surrounding area results. Natural resources that would benefit from the project include the South Beach Wetlands and the wetlands located in Ocean Breeze, and the Franklin D. Roosevelt

Boardwalk and Beach.

Health and Social Benefits
While this proposed project only directly impacts four homes, it would have indirect benefits to a larger population in the vicinity of McLaughlin Street, with a population of 8,275.

Cost-Benefit Analysis

NYC DEP recognizes the need for expanding the Staten Island Bluebelt to prevent localized flooding such as occurred during Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. The total featured project cost of $2,600,000 is a cost-effective way to expand the South Beach Bluebelt, building on previous Bluebelt investments by NYC DEP, reducing the costs of property damage and government expenditures for future storm events, as well as avoiding the costs of constructing a new stormwater outfall for four properties surrounded by the bluebelt.

Anticipated Reduction of Risk

This project would remove vulnerable assets, four homes in South Beach, while reducing exposure and vulnerability to other assets in the area. By increasing the area available for stormwater infiltration and temporary stormwater storage, nearby assets would experience fewer and shorter periods when the service they provide is unavailable.

This project should provide a direct reduction of risk to residents in those residences that are converted, as well as an indirect risk reduction benefit to those living near the McLaughlin street project. According to 2010 Census data, the project area has a population of 8,275. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

Permits may be required by NYS DEC, USACE, and CZM coastal consistency concurrence (NYS DOS). Coordination with NYC DEP would be necessary to utilize their existing plans. The property acquisitions need to be completed prior to the redesign and implementation of the Bluebelt BMP.

Entity with Jurisdiction

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

B4: Assess Stormwater Outfalls [Featured Project]

This project would provide further investigation of stormwater outfalls identified by NYC DEP. Several outfalls have been recommended for further study by NYC DEP as they don't currently have flapper valves. Outfalls without flapper valves can cause backups of tidal flows into the storm sewer system, as occurred during Sandy.

Under appropriate topographic and other situational conditions, installation of tide gates at specific outfalls may prohibit tidal waters from entering into the stormwater system, allowing for more storage during a rain event and reducing street flooding during a normal high tide. However, each outfall requires specific investigation to determine if tide gates would be of benefit or a detriment. A preliminary analysis was performed by NYC DEP to determine the viability and impacts of tide gate installations at 211 DEP-owned stormwater outfalls in New York City. The analysis demonstrated that tide gates must be analyzed on a case-by-case basis at each outfall to examine the hydraulics of the local drainage system, the surrounding topography of the community, and the typical tidal elevation along the associated shoreline. This project would conduct the further analysis recommended by NYC DEP along the East and South shores.

The total cost of the project is estimated to be $570,000, which includes a tide gate analysis, with hydrologic/hydraulic modeling, wetland delineations, surveying, and development of the preferred design (among other items). Typical regulatory and labor costs were included in the cost estimate.

Cost Estimate

Medium Cost (approximately $570,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated six full-time equivalent jobs.

Environmental Benefits

This project would provide further investigation of stormwater outfalls identified by NYC DEP. Under appropriate topographic and other situational conditions, installation of flapper valves at specific outfalls may prohibit tidal waters from entering into the stormwater system, allowing for more storage during a rain event and reducing street flooding during a normal high tide. If the study indicates that flapper valves would achieve this in any location, the resulting reduction in flooding would benefit resources in the surrounding area and potentially within a larger area. Approximately 15 outfalls would be evaluated in this project and, depending on the results of the study, none, some or all of the outfalls may be outfitted with valves. Depending on what resources are located in the vicinity of the outfalls, natural and cultural resources may be protected by the project. Natural resources may include wetland systems, ponds and the streams leading to and from the systems and ponds. Cultural resources were not identified in the vicinity of the outfalls, which are generally located at the shoreline.

Health and Social Benefits

As discussed in the risk reduction benefits subsection above, the impacts of this study cannot be fully determined until the study is completed. The proposed project has the potential to impact the Community, as a whole, whose population is 135,616. This project does not secure a specific health and social services facility, but may benefit various health and social services assets within the Community, such as Staten Island University Hospital, South Beach Psychiatric Hospital, Staten Island Community Center, various FDNY fire houses and NYPD police stations.

Cost-Benefit Analysis

While tide gates can benefit flood protection, NYC DEP recognizes that they can be detrimental in certain cases and has identified outfalls that require further study to determine if a tide gate would be both beneficial and cost-effective. The total featured project cost of $570,000 would enable NYC DEP to proceed with the additional Tide Gate Analysis recommended in the agency's Climate Change and Population Growth Effects on New York City Sewer and Wastewater Systems, to determine where tide gates would be effective at reducing flooding, and cost-effective at minimizing the costs of property damage and government expenditures for future storm events.

Anticipated Reduction of Risk

This project would evaluate the efficacy of flapper valves at selected sewer outfalls throughout the Community. If such valves were found effective in preventing sea water from entering the sewer system and exacerbating inland flooding, assets in the vicinity would experience reduced vulnerability, due to less frequent flooding and/

or flooding of shorter duration.

The risk reduction benefits of this study cannot be determined until the study itself is completed. Given the broad nature and interconnectivity of the drainage system, this project may provide a reduction of risk to the entire NYRCR Community along the East and South Shores. However, the installation of tide gates requires detailed analysis to determine risk reduction impacts, and ensure that the installation of a tide gate in a specific location would provide more benefit than harm to the local population. Therefore, this proposed project is designed to ascertain the benefit of tide gates at specific locations, and includes both a risk reduction assessment as well as cost benefit analysis. According to 2010 Census data, the project area has a population of 135,616.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

No permit should be required for the study; coordination with NYS DEC, USACE and NYS DOS would be necessary as permits may be required for implementation. The project can begin immediately, when funding is available.

Entity with Jurisdiction

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

C1: Identify key locations for microgrids and renewable energy sources to ensure reliable communication during emergencies ("Staten Island Resiliency Network") [Proposed Project]

The project is to complete an action plan and conceptual design for a microgrid—or Staten Island Resiliency Network - that would provide reliable communication during emergencies. A total of 121,000 electricity customers on Staten Island, or about 70 percent of Consolidated Edison (Con Ed) customers on the Island, were without power following Superstorm Sandy due to substation damage and downed overhead lines, affecting residential customers, businesses and the two hospitals on the East and South shores. Widespread power outages following Superstorm Sandy dismantled the communications network, among other impacts, and elucidated the need for a reliable, independent power supply network, as well as a dependable method for communications during disaster response.

The study would evaluate incremental implementation of microgrids at strategic locations to supply critical facilities (e.g., hospitals, shelters, colleges, or other facilities that already have emergency backup power sources). A microgrid ties together multiple energy sources that generate electricity, and can function independently from the regular power grid. These can be conventional energy sources, such as diesel or natural gas, fuel cells, or renewable energy, such as solar, wind and other sources. During normal conditions, the microgrid can provide electricity back to the traditional power grid, helping to reduce peak electricity demands. If the regular grid fails during an emergency, the microgrid would continue to supply power to those facilities connected to it. Microgrids can also be combined with "Smart Grid technology", which allows for distribution of electricity better-tailored to localized-demand and can be connected to a larger network of microgrids, thereby reducing the risk of outages.

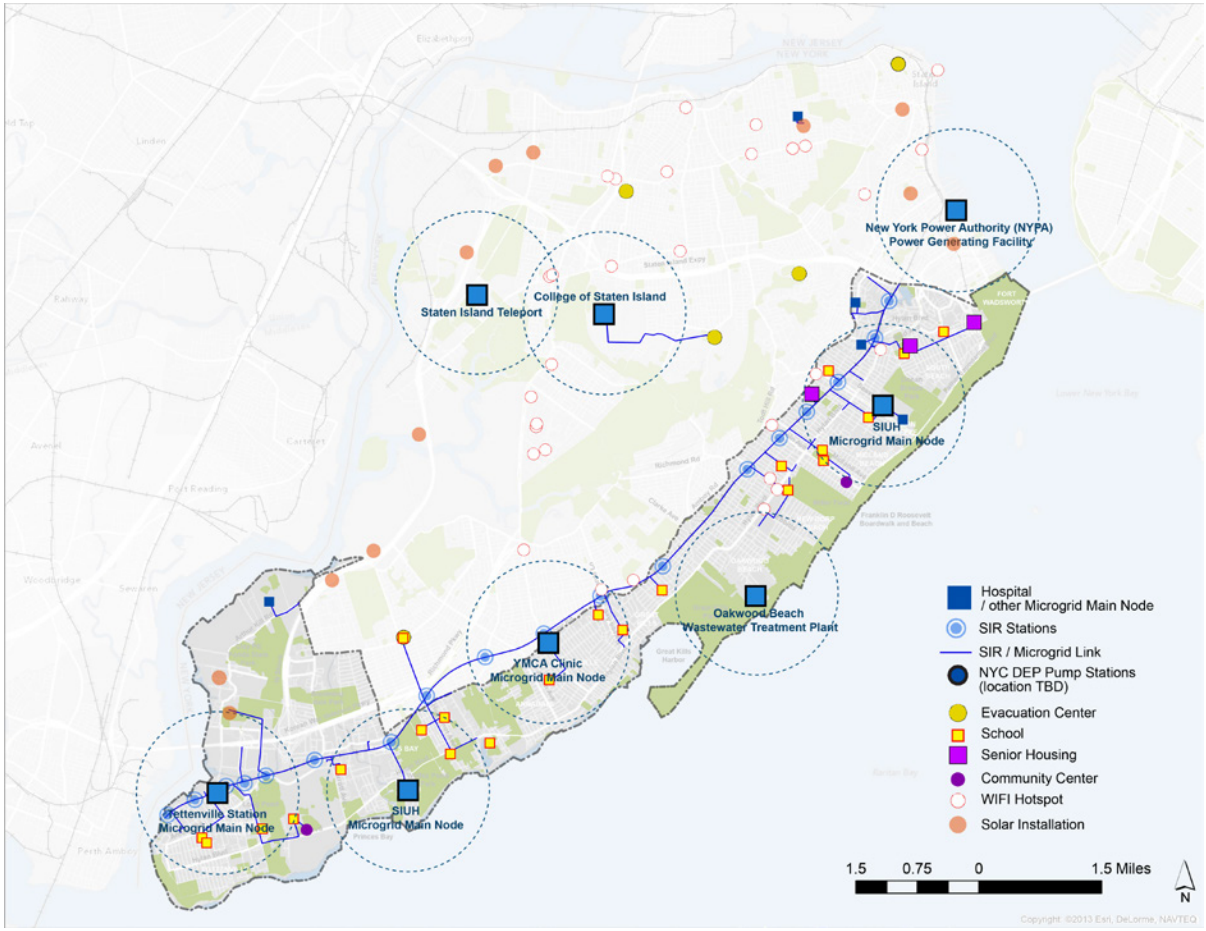


Figure 27: Identify key locations for microgrids

The total cost of the project is estimated to be $320,000, which includes a review of available technologies, funding sources and financing, and regulatory barriers and incentives. In addition, identification and analysis of sites were included in the cost estimate. Conceptual

design completion and community outreach were also incorporated into the preliminary cost estimate.

Cost Estimate

Low Cost (approximately $320,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 3 full-time equivalent jobs. Studying the most effective area to place microgrids can greatly enhance the success of their impact on the regional electrical grid. The installation of micro-grids and other energy saving devices can reduce the overall strain on the regional electrical network. In addition to reducing storm-related power outages, this project could have potential economic benefits such as reducing the impact of blackouts and brownouts due to demand outpacing capacity.

Health and Social Benefits

The proposed project has the potential to impact all of Staten Island, which has a population of 472,038.

This proposed project does not secure a specific health and social services facility.

Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response operations by interrupting the communications network and disabling building systems. The total proposed project cost of $320,000 would determine the most cost-effective way to provide reliable, efficient backup power to critical and locally significant facilities through a microgrid network. Implementation of the study's recommendations would reduce costs by shortening the recovery time for critical facilities and improving the efficiency of emergency response through reliable power and communications.

Anticipated Reduction of Risk

This project would evaluate incremental implementation of microgrids at strategic locations. In areas where power from microgrids is available, assets experience reduced vulnerability, resulting in less frequent service disruptions, and/or service disruptions of shorter duration. Backup power supplies would allow an asset's equipment to operate during primary power failure, and would allow first responders to communicate without interruption, thereby providing better service to the community.

This project is expected to provide a reduction of risk to all residents living in Staten Island, approximately 472,038 residents. Reliable power during an emergency results in increased safety and response capabilities. Specific characteristics of the population can be found above in the health and social benefits subsection.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits for a study should be required. Coordination with NYC DEP, the New York State Energy Research and Development Authority (NYSERDA), New York Power Authority (NYPA), New York City Mayor's Office of Long Term Planning and Sustainability (NYC OLTPS), local communities, and utilities is recommended. Other city agencies should be consulted, including the NYC DPR, New York City Housing Authority (NYCHA), New York City Department of Housing Preservation and Development (NYC HPD), New York City Fire Department (FDNY), New York City Police Department (NYPD), New York City Department of Sanitation (DSNY), and New York City School Construction Authority (NYC SCA). The project can begin immediately, when funding is available.

Entity with Jurisdiction

Various City and State entities

C2: Preparedness/Education: 'Go to High Ground' – Study of Wayfinding Signage and Staging area for automobile evacuation [Proposed Project]

During Sandy, thousands of cars were flooded, leaving Staten Island residents without their sole method of transportation. For those that were not flooded, power was lost across the Island, gas pumps were incapacitated and gas became scarce for a borough dependent on automobiles. This project would provide an educational campaign and designated areas for automobile evacuation. The College of Staten Island (CSI), City University of New York, has proposed a system of wayfinding signage paired with designated areas for automobile evacuation that encourage residents to 'go to high ground' during a storm surge event. The permanent signage would serve as a continuous information campaign that would visually educate the residents of Staten Island about storm surge. CSI has developed a template for the signs, and is developing an accompanying brochure, which illustrates where the Island is vulnerable, and the importance of emergency preparedness. The goal of the education campaign is to reduce the potential for loss of life and property.

The Go to High Ground initiative encompasses production of a Staten Island Severe Storm Survival Guide; Transportation Guide; and Go to High Ground: Vulnerable Population Emergency Preparedness and Evacuation brochures to inform all residents of pre-storm preparedness, post-disaster recovery and resource information. As a borough dependent upon automobile transportation, vehicle protection is critical to maintain the economic viability of the Community's workforce. The CSI's storm surge analysis provided information regarding evacuation routes and strategies to mitigate future inundation of low-lying areas during storm surges.

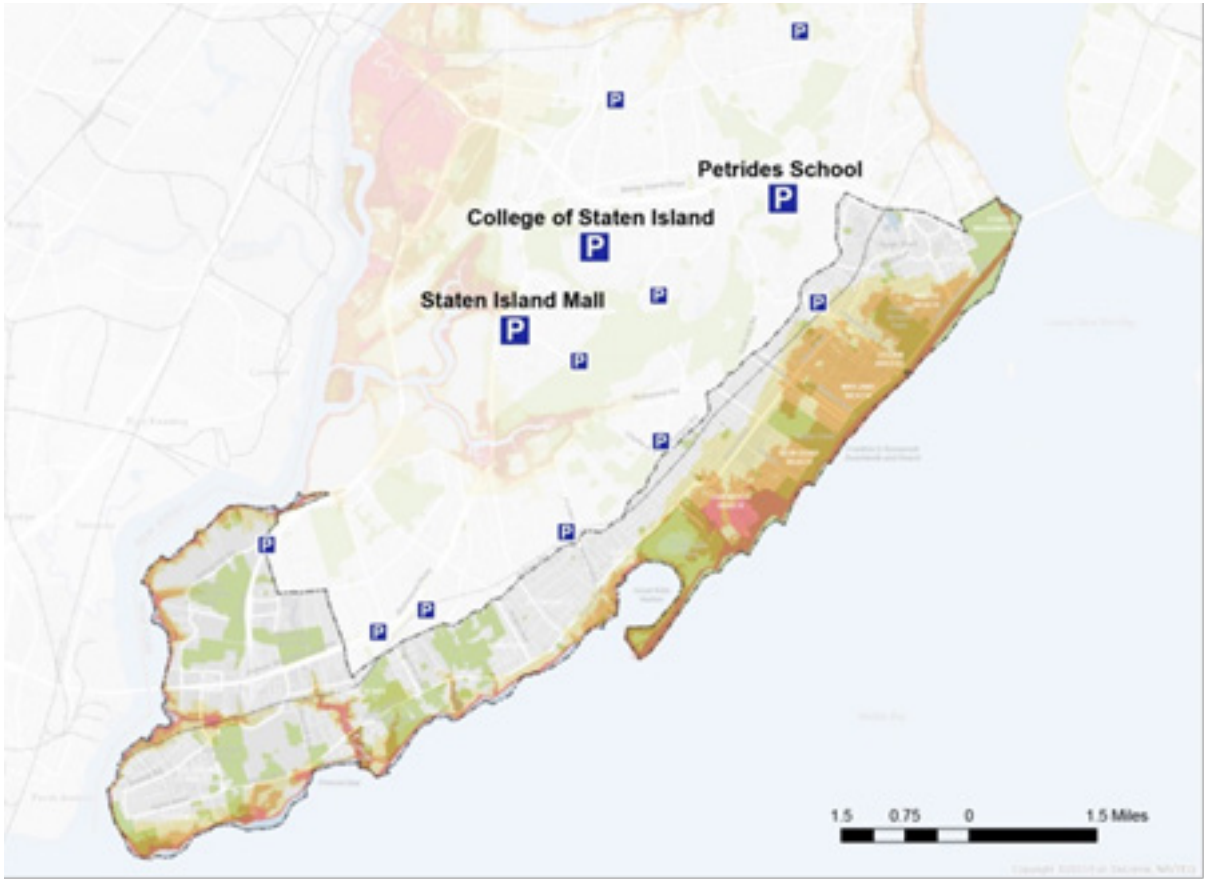


Figure 28: Preparedness/Education: 'Go to High Ground'

As this program is in its infancy, a study is proposed for further development, which would include a wayfinding signage program, study of potential locations for parking, evaluation of the legal and regulatory barriers to such parking agreements, and conceptual design of the 'Go to High Ground' network.

The cost estimate of $250,000 includes transportation modeling and demand analysis, siting locations for signs and for 'Go to High Ground' parking, considerations of liability for parking areas and memoranda of

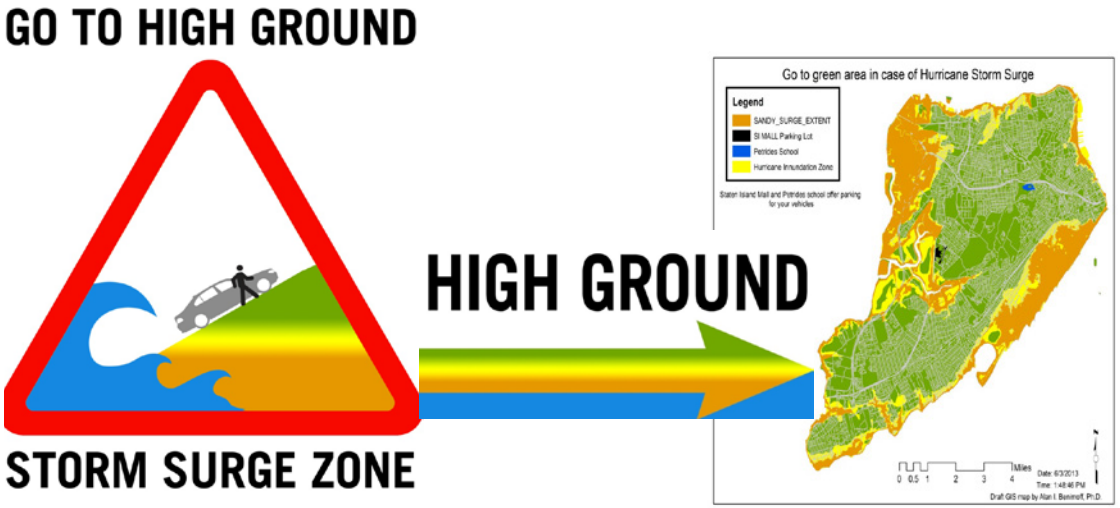


Figure 29: Preparedness/Education: 'Go to High Ground'

Source: College of Staten Island

understanding, development of a conceptual plan for the signs, and other associated costs. This project cost reflects a scope of work for Staten Island, but could be scaled to encompass all five Boroughs.

Cost Estimate

Low Cost (approximately $250,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 3 full-time equivalent jobs. While both the educational component and the additional signage would provide a one-time cost to the City, the return on investment in terms of storm preparedness and lifesaving capabilities would be positive. As local residents and business owners know how to react to a major event, they can plan for themselves alternatives to be safe and possibly reduce the impacts of the storm on their equipment and employee's lives. The project would also save the City and local jurisdictions money by making the manpower during evacuations more efficient, as residents would know what to do on their own more effectively. The plan would also follow the City's evacuation plans to assist in streamlining aid to the boroughs more efficiently.

Health and Social Benefits

The proposed project has the potential to impact all of Staten Island, which has a population of 472,038.

Cost-Benefit Analysis

The thousands of cars lost when Superstorm Sandy's surge flooded the East and South Shores demonstrate that parking in less vulnerable areas prior to storm events could prevent the loss of vehicles. The total proposed project cost of $250,000 is a modest investment that would develop a system for emergency parking which, once implemented, would yield high returns in cars that are not damaged in future storm events.

Anticipated Reduction of Risk

This project would disseminate information regarding preparedness in the event of an emergency, and provide information and signage indicating favorable evacuation routes and the locations of designated shelters. As such, the project would decrease the vulnerability of residents and visitors to the Community.

This project is expected to provide a reduction of risk to all residents living in Staten Island. Enhanced evacuation procedures reduce risk to everyone in the city. According to 2010 census data, the project area has a population of 472,038. Specific characteristics of the population can be found in the health and social benefits subsection above. As this project is scalable, it could be implemented city-wide with benefits to all boroughs.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits for a study would be required. Coordination with emergency management officials at NYC Office of Emergency Management (NYC OEM) and NYS Division of Homeland Security and Emergency Services (NYS DHSES), and NYC DOT is recommended

Entity with Jurisdiction

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

C3: East Shore Microgrid Network Pilot Project [Proposed Project]

This project would create a microgrid network centered on the SIUH North Campus, as the key node of a microgrid network. Widespread power outages following Superstorm Sandy dismantled the communications network, among other impacts, and elucidated the need for a reliable, independent power supply network as well as a dependable method for communications during disaster response.

CDBG-DR Funding would be used to construct above-ground utility lines among critical and community facilities, including those that serve socially vulnerable populations. It would link to other community facilities, potentially including: the NYC DEP Mason Avenue and South Beach Pump Stations, Public Schools 52 and 11, the South Beach Psychiatric Center, the NYC Department of Parks and Recreation's Elevated Track and Field Facility, NYCHA's South Beach and Berry Houses / Senior Centers, FDNY Engine Company 159, the Hylan Boulevard Retail Corridor and the traffic signals along this key evacuation route, as well as the Jefferson Avenue SIR station. Other potential facilities can be connected, either through alternate routing of wires or future phases.

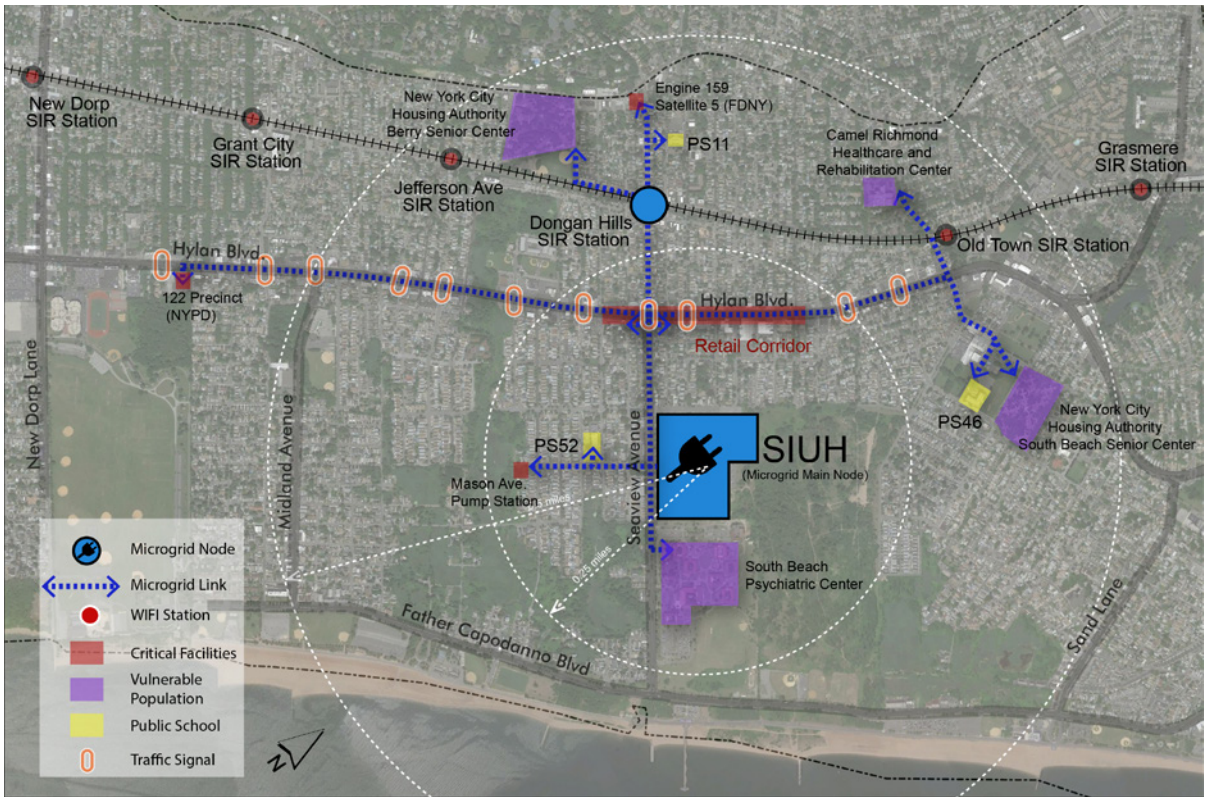


Figure 30: East Shore Microgrid Network Pilot Project

The SIUH North Campus, although located in a high risk zone, remained operational during Superstorm Sandy, due to its elevation and independent power supply, consisting of Combined Heat and Power (CHP) with a dual fuel (diesel/natural gas) power backup system. The facility is projected to implement major resiliency upgrades, including construction of replacement CHP capacity at higher elevations and energy efficiency measures. This project would build upon the anticipated power and telecom resiliency upgrades, as well as potential additional capacity (including renewables, energy efficiency, and conservation) and configuration upgrades to create a microgrid that can serve nearby critical facilities. It would also connect to other nodes of the microgrid as they are completed (Staten Island Railway). The estimated cost of $6,000,000 includes the costs necessary to link independent power sources by constructing above-ground utility wiring.

Cost Estimate

High Cost (approximately $6,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 65 full-time equivalent jobs. The installation of microgrids and other energy saving devices can reduce the overall strain on the regional electrical network. In addition to storm-related power outages, this project may have potential economic benefits such as reducing the impact of blackouts and brownouts, due to demand outpacing capacity. It would also enable critical facilities to function, potentially including two NYC DEP stormwater pumping stations, which in turn could reduce the costs of property damages associated with stormwater flooding. The program should include a demand response program which pays the electricity consumer to stand ready as a last line of defense to these rare but dangerous electric reliability crisis situations. This can become an additional income stream in the future if included in the project's financial model. This type of project aligns with the City's electrical power component of PlaNYC.

Health and Social Benefits

The proposed project impacts the area centered on the North Campus of SIUH with a population of approximately 20,245. Health and Social Services assets secured by this project include the SIUH North Campus, South Beach Psychiatric Center, and possibly Carmel Richmond Healthcare Center, as well as Public Schools 11, 52 and 46. Specific facilities that serve vulnerable populations would also be secured, including the NYCHA South Beach Houses and Berry Houses.

Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response by interrupting the communications network and disabling building systems. Connecting critical and locally significant facilities on the East Shore to a microgrid network, at a total proposed project cost of $6,000,000, would yield a high value in providing reliable, efficient emergency response operations and enabling critical and locally significant facilities to recover faster after future storm events.

Anticipated Reduction of Risk

This project would establish a 'Community Grid' centered on the SIUH North Campus, as the key node of a microgrid network. In areas where power from microgrids is available, assets experience reduced vulnerability, resulting in less frequent service disruptions, and/or service disruptions of shorter duration. Backup power supplies would allow an asset's equipment to operate during primary power failure, and would allow first responders to communicate without interruption, thereby providing better service to the community.

This project is expected to provide a reduction of risk to critical facilities surrounding Staten Island University Hospital's North Campus. According to 2010 Census data, the project area has a population of 20,245. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Intermediate (2 - 5 years)

Regulatory Requirements

Coordination with NYC DEP, NYSERDA, the New York City Department of Community and Administration Services (NYC DCAS), or other public building owners, local communities, and utilities would be necessary. Other city agencies should be consulted, including the NYC DPR, NYCHA, NYC HPD, FDNY, NYPD, DSNY, and NYC SCA.

Entity with Jurisdiction

Various City and State entities

C4: South Shore Microgrid Network Pilot Project [Proposed Project]

As described in the East Shore Microgrid Pilot Project, widespread power outages following Superstorm Sandy illustrated the need for a reliable, independent power supply network for disaster response. This project would create a microgrid network centered on the SIUH South Campus as a key resiliency node. CDBG-DR Funding would be used to construct above-ground utility lines among critical and community facilities, including those that serve socially vulnerable populations. These facilities include the Prince's Bay and Huguenot SIR Stations, the NYC DPR Blue Heron Nature Center and District 3 facility, as well as Public School 5 and Intermediate School 7. Other potential facilities can be connected, either through alternate routing of wires or future phases.

While it is located in a high risk zone, SIUH remained partially operational during Superstorm Sandy. The facility lost grid power and relied on backup generators as the single power source. As a result life-critical operations had to be discontinued. The facility is projected to implement major resilience upgrades including increase of emergency power capacity at higher elevations and energy efficiency measures. This project would build upon the anticipated power and telecom resiliency upgrades with potentially additional capacity (including renewables and energy efficiency and conservation) and configuration upgrades to create a microgrid that can serve nearby critical facilities.

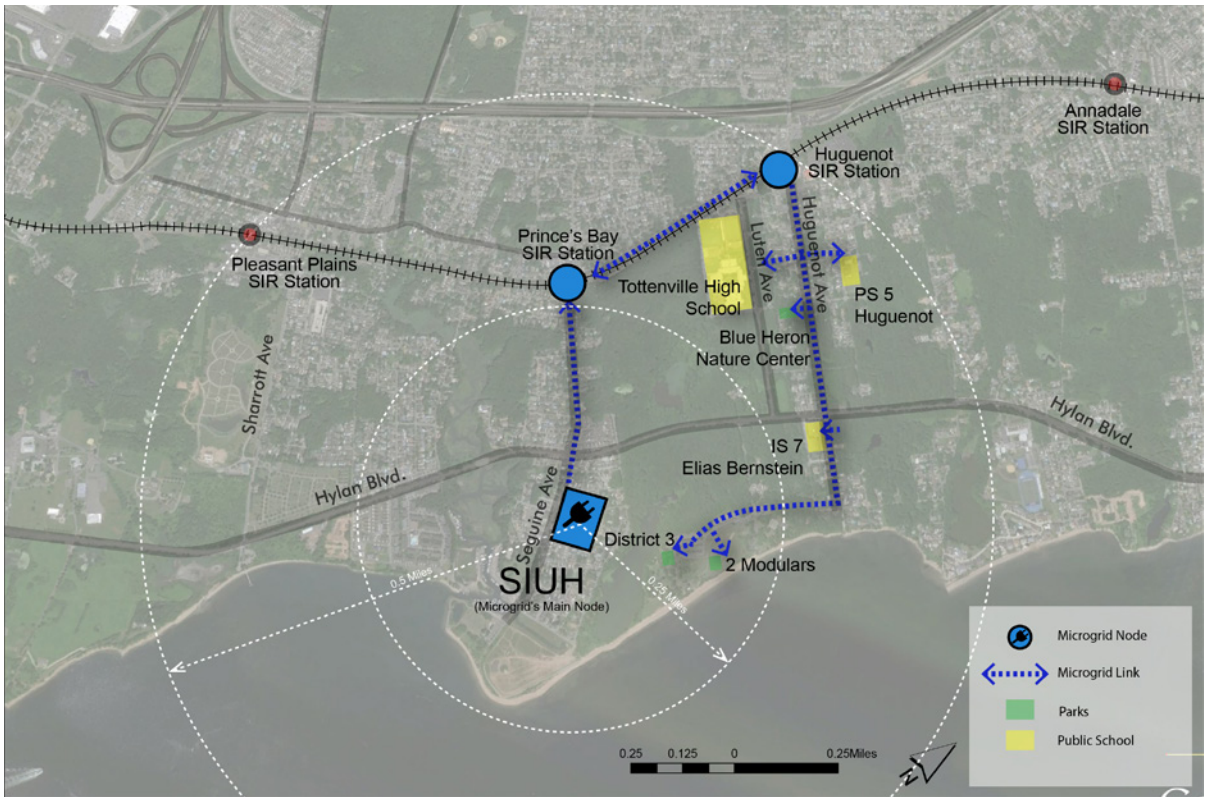


Figure 31: South Shore Microgrid Network Pilot Project

The estimated cost of $4,000,000 includes the costs necessary to link independent power sources by constructing above-ground utility wiring.

Cost Estimate

High Cost (approximately $4,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 43 full-time equivalent jobs. The new electrical generation can extend beyond storm events and can provide the region with "grid" resiliency using on demand response electrical generation. The new electrical generation can provide the wholesale electrical grid market with on demand

response power in the case of brownouts and other instances where the peak capacity of the area is being threatened. Demand response programs pay the electricity consumer to stand ready as a last line of defense to these rare but dangerous electric reliability crisis situations. Not only does demand response have a lower cost and shorter ramp up period than building new power plants, it's environmentally friendly with virtually no emissions. This can become an additional income stream in the future if the project includes this in its financial model. This type of project falls into to the City's electrical power component of PlaNYC.

Environmental Benefits

Similar to project C1:Identify key locations for microgrids and renewable energy sources to ensure reliable communication during emergencies, above, this project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project impacts the area centered on the South Campus of SIUH with a population of 6,462. The Staten Island University Hospital South Campus is identified as a health and social services asset to be secured by this project and three schools may be included in the network: Elias Bernstein Intermediate School 7, and Public School 5.

Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response by interrupting the communications network and disabling building systems. Connecting critical and locally significant facilities on the South Shore to a microgrid network, at a total proposed project cost of $4,000,000, would yield a high value in providing reliable, efficient emergency response operations and enabling critical and locally significant facilities to recover faster after future storm events.

Anticipated Reduction of Risk

This project would establish a 'Community Grid' centered on the SIUH South Campus as the key node of a microgrid network. In areas where power from microgrids is available, assets experience reduced vulnerability resulting in less frequent service disruptions, and/or service disruptions of shorter duration. Backup power supplies would allow an asset's equipment to operate during primary power failure, and would allow first responders to communicate without interruption, thereby providing better service to the community.

This project is expected to provide a reduction of risk to critical facilities near Staten Island University Hospital's South Campus. According to data from census blocks in the area, this is a population of 6,462. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Intermediate (2 - 5 years)

Regulatory Requirements

Coordination with NYC DEP, NYSERDA, local communities, and utilities will be necessary. Other city agencies should be consulted including NYC DPR, NYCHA, NYC HPD, FDNY, NYPD, DSNY, , and NYC SCA.

Entity with Jurisdiction

Various City and State entities

C5: South Shore Resilient Dock Feasibility Study [Proposed Project]

Interest in constructing a multi-purpose resilient dock along the South Shore for the purpose of providing emergency ferry service after a disaster was repeatedly raised during Public Engagement Events. The project would analyze potential sites for a resilient ferry dock, with the primary goal of emergency transportation and temporary commuter service during disaster events.

Just before and after Superstorm Sandy made landfall on Staten Island, the three bridges connecting the borough to New Jersey as well as the Verrazano Narrows Bridge, were shut down for safety reasons, isolating the entire borough. The Staten Island Ferry, one of the most utilized mass transit options to Manhattan, ceased operations and local rail and bus service stopped functioning. Emergency ferry service was provided; this study would explore options for a more suitable ferry landing and more efficient emergency ferry service.

The proposed resilient dock could be accessed by other emergency vessels in the event that other forms of transportation access to affected areas are compromised during or after emergency conditions. The resilient dock could also be utilized to support regular commuter ferry service and recreational use, and provide co-benefits, such as economic development opportunities. Precedents to be studied include the Bay Ridge Eco Dock at the 69th Street Pier in Bay Ridge, Brooklyn, a recently completed storm resilient dock which also supports other potential uses, such as education, on-water recreation, cultural tourism, etc.

Other potential benefits such as recreational uses or commuter ferry service may also be explored. The study would build upon and complement the findings of the Citywide Ferry Study Preliminary Report, published in 2013 by the New York City Economic Development Corporation (NYC EDC), which evaluated potential sites in Tottenville and Prince's Bay (at Camp St. Edward).

The total cost of the project is estimated to be $350,000 which includes the evaluation of potential sites for the dock with an engineering analysis of physical conditions, site suitability, constraints and opportunities. Among these constraints and opportunities include considerations of property acquisition, parking, traffic and access, service model operations analysis, and demand analysis. Programming and economic development activities surrounding potential sites would be reviewed. The cost estimate also includes developing the conceptual design of the preferred site, and identification of funding sources for construction and operations.

Cost Estimate

Low Cost (approximately $350,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 4 full-time equivalent jobs. One of the hardest hit infrastructure assets during Superstorm Sandy were marine docks. This project would limit damages to the docks and provide possible transportation alternatives that may be needed after the storm. For instance bulk supplies can be shipped in if bridges are compromised.

Environmental Benefits

The potential recommendations of the study could provide emergency ferry service, if feasible, via construction of a resilient dock that could be accessed by emergency vessels (including regular ferry boats) in the event that other forms of transportation access to affected areas are compromised during or after emergency situations. This project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project has the potential to impact the South Shore portion of the Community, with a population of 61,272.

Cost-Benefit Analysis

Emergency ferry service assisted Staten Island residents in commuting after Superstorm Sandy. The total proposed project cost of $350,000 would determine the cost-effectiveness of future investments in emergency ferry service, evaluate potentially suitable locations for a resilient dock, and identify innovative financing to reduce government expenditures in emergency transportation following future storm events.

Anticipated Reduction of Risk

By providing redundant transportation options, this project would reduce *vulnerability* of residents and visitors during periods when storms or other events disrupt transportation services. By providing emergency ferry service, this project is expected to provide a reduction of risk to all residents living on the South Shore.

Enhanced evacuation procedures reduce risk to everyone in the city. According to data from census blocks in the area, this is a population of 61,272. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits for a study should be required. Coordination with the Office of the Staten Island Borough President, USACE, New York City Department of City Planning (NYC DCP), Metropolitan Transportation Authority (MTA), NYC DOT, NYC DEP, NYC DPR, NYS DOS and NYS DEC would be necessary.

Entity with Jurisdiction

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

C6: St. George/Tompkinsville Promenade Master Plan/Engineering Study [Phase 1A: Proposed Project; Phase 1B—1D: Featured Project]

The St. George/Tompkinsville Promenade is a vital link to the East and South Shores of Staten Island due to its proximity to the St. George Ferry Terminal. The St. George/Tompkinsville Promenade was severely damaged during Superstorm Sandy and repairs are still underway. The overall vision is to repair, re-design, and rebuild the promenade in order to increase resiliency, improve connectivity and enhance economic opportunity and natural resources. The promenade is situated in a downtown hub, so it is ideal for redevelopment. As such, the project is not simply the reconstruction and replacement of an existing structure but a pilot project for regional economic growth and community development. The project resulted from nine months of conversations with local and regional stakeholders, as well as international experts in resiliency.

The goals of this project are to improve the resilience of Staten Island's critical transportation and service hub in St. George, including the Sandy-impacted ferry and rapid transit system; enhance the North Shore's economic corridor integrating the $1.3 billion of private/public investment east and west of the Promenade as well as offering East and South Shore linkages to the nearly 22 million annual Ferry passengers; and augment scarce waterfront recreation/green space for the North Shore, which is also home to 60% of the families living in poverty on Staten Island. This project could connect recreational and tourism facilities to the east, including the Promenade to the existing National Park at Fort Wadsworth and boardwalk in South Beach and Midland Beach, and facilities to the west, including the Lenape Indian Greenway Heritage Trail. It would also coordinate with NYC DCP's ongoing Brownfield Opportunity Area Study on the North Shore.

This project is divided into four phases, as follows.

- ***Phase I A:*** The objective of this phase is to develop a master plan for the new St. George-Tompkinsville Promenade concept. A master plan would involve planning, engineering, architectural, ecological and landscape design expertise. The estimated cost includes analyzing storm damage to incorporate resiliency measures and reviewing New York City's existing plans and projects to integrate them into the master plan. The plan would also consider transportation issues, circulation patterns and resident needs.
- ***Phase I B:*** This phase includes the additional field surveys and diving team conditions survey as necessary to develop engineering designs in further phases. Specific tasks include conducting field surveys to document existing pilings, measure and map the harbor bottom as well as tidal currents, prepare section diagrams including upland areas to harbor channel and prepare detailed mapping of existing promenades, roadways, seawalls, pilings, underwater structures and the harbor channel line.
- ***Phase I C:*** This phase would develop a multi-disciplinary conceptual design and engineering solutions for the Promenade. Specific tasks include preparing 2-3 alternate engineering and design solutions for innovative coastal protection (such as breakwaters, oyster reefs, constructed wetlands, landscaped barriers, levees, etc.) and formulate 2-3 alternate solutions for wrapping pier pilings. Simulations and testing would be performed on these alternates, and construction cost estimates developed.
- ***Phase I D:*** This last phase would produce schematic design and sealed construction documents for agency review. Specific tasks include preparing a full schematic design through construction documents, to be followed by bidding of construction contracts and permitting, leading to Phases 2 (Demolition and Removal) and 3 (Construction and Project Improvement).

Cost Estimate

Proposed Project

Phase I A: Low cost (approximately $200,000)

Featured Project

Phase I B: Medium cost (approximately $800,000)

Phase I C: Medium cost (approximately $500,000)

Phase I D: High cost (approximately $2,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 38 full-time equivalent jobs during the planning and construction of this project. The project is consistent with the NYC Comprehensive Waterfront Plan, the City's overall vision of redevelopment along the waterfront. It is anticipated that the attraction of the promenade could beneficially affect the retail and service establishments in the area.

Environmental Benefits

The objective of this project is to develop a master plan for the new St. George-Tompkinsville Promenade concept that would create additional open space and provide connectivity for the public and create and enhance natural resources such as oyster beds, wetlands and dunes. As currently envisioned, the promenade would extend northwest from the Stapleton area to the Staten Island Ferry Terminal, with off-shore and landside coastal protection components. Connectivity between the East and South Shore to Ferry passengers and augment scarce waterfront recreation/green space for the North Shore would be provided. This project would connect recreational and tourism facilities to the east, including the Promenade, to the existing National Park at Fort Wadsworth and the FDR Boardwalk in South Beach and Midland Beach, and facilities to the west, including the Lenape Indian Greenway Heritage Trail. Off-shore components include constructed barrier islands and pier improvements, both of which would reduce the impact of storm surge and destructive wave action. Landside components include wetlands and vegetated berms which would prevent or reduce storm surge

Figure 32: St. George/Tompkinsville Promenade

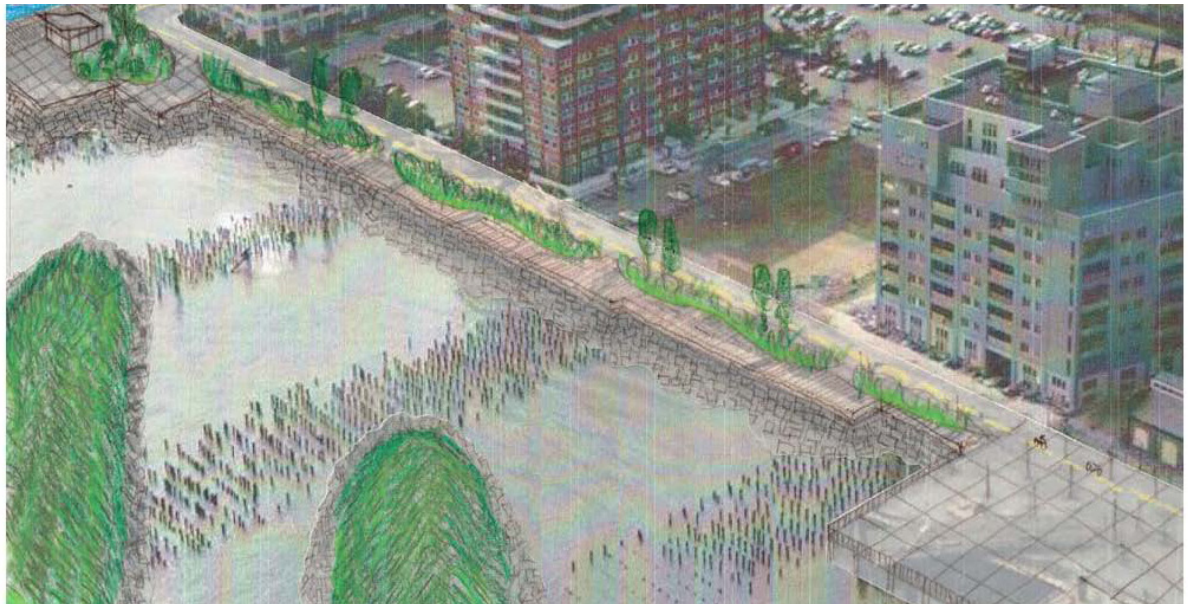


Figure 33: St. George/Tompkinsville Promenade

Source: St George-Tompkinsville Promenade Committee

inundation and provide habitat benefits for threatened and endangered species. Cultural resources that would be protected by the project include Merchant Marine Plaza (better known as Lighthouse Plaza or the former Coast Guard Station), and the Tompkinsville (Joseph H. Lyons) Pool, a designated landmark. Additional resources that could be protected by the project include the Old Administration Building (Third District U.S. Lighthouse Depot), a designated landmark, and National Lighthouse Museum.

Health and Social Benefits

The proposed project impacts the North Shore of Staten Island, with a population of 79,462. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

The NYRCR Planning Committee recognizes the need to strengthen connections with the St. George area in the North Shore for transportation and economic development. The total proposed project cost of $200,000 for Phase I A is a minor investment that would yield high returns by enabling Phases I B-D, which, when completed, would facilitate future private investment in the St. George/Tompkinsville Promenade area and generate economic growth to benefit the entire Island.

Anticipated Reduction of Risk

This project would provide waterside and landside coastal protection elements. Off-shore components include constructed barrier islands in combination with habitat and pier improvements, both of which would reduce the impact of storm surge and destructive wave action. Landside components include vegetated berms which would prevent or reduce marine inundation. Such structures would reduce *exposure* of assets in the vicinity of the project, thus reducing *vulnerability* of those assets.

This project should provide a reduction in risk to those living near the promenade as well as to those using this area to connect to resources in this area as well as resources to the north and south of it, such as the Ferry Terminal and the Staten Island East and South Shore waterfront. According to data from census blocks in the area, the population is 11,136. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Phase I A: Immediate (< 2 years)

Phase I B: Immediate (< 2 years)

Phase I C: Intermediate 2-5 years)

Phase I D: Intermediate (2-5 years)

Regulatory Requirements

No permits should be required for a study. Coordination with the NYC DCP, USACE, NYS DOS, NYS DEC, NYC DPR, and NYC DEP would be necessary.

Entity with Jurisdiction

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

D1: Staten Island 'Community Emergency Resource Center' Location and Feasibility Study [Proposed Project]

This initiative aims to study the feasibility of and potential locations for a year-round resource center for Staten Island residents and for disaster response and recovery organizations. During Superstorm Sandy, some residents did not know where to turn for resources or information, especially given communications networks which were dismantled due to lack of power. This facility, a repeated suggestion during public outreach meetings, would provide a year-round venue for information on emergency preparedness, social services, and state or federal programs prior to hazardous weather events.

The facility would also include storage for Community Response Team (CERT) equipment and training space, as well as meeting space for community preparedness. During After a disaster, the resource center could provide residents with a one-stop location for recovery resources, function as a central command center, enabling residents access to a reliable power supply, phone charging stations, food and supplies; as well as obtain post-disaster financial assistance. Serving as a distribution location rather than a shelter, this command center would then become a hub for FEMA, New York State, New York City, and local organizations to administer disaster recovery programs. This project corresponds with the recommendation for reliable power supplies, as it would be a key location for a micro-grid or other independent source of power. The facility would be maintained by a non-profit organization affiliated with the Staten Island Community Organizations Active in Disaster (COAD) that would coordinate with the NYC OEM and for emergency management and preparedness.

The total cost of the project is estimated to be $250,000 which includes an identification, analysis, programming, and review of potential building sites and funding sources. The study would consider various types of disasters and how the needs for disaster response may change depending on the type and scale of the event. It would seek to ensure that the recommended Community Resource Center does not conflict with any existing location for post-disaster response, and should be ADA compliant. Community outreach, coordination with disaster officials and the conceptual design is also included in the cost estimate.

Cost Estimate

Low Cost (approximately $250,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 3 full-time equivalent jobs. This project can have cost savings in terms of being able to limit the cost of having multiple command centers. An effective single center could provide both cost savings and be an effective management platform for disaster situations.

Environmental Benefits

The study would evaluate the efficacy and feasibility of a year-round resource center for Staten Island residents to provide space for disaster response and recovery organizations. As such, this project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project has the potential to impact all of Staten Island, which has a population of 472,038. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

Superstorm Sandy demonstrated a need for a central community resource center on the Island that would provide disaster preparedness resources during clear weather and serve as a one-stop resource center following disaster events. The total proposed project cost of $250,000 is a modest investment that can yield high returns by improving the efficiency of emergency response operations, reducing government expenditures for future storm events.

Anticipated Reduction of Risk

This project, while not reducing the risk of assets from flooding and storm activity, would reduce the *vulnerability* of residents and visitors in Staten Island by providing a recovery center for residents and for disaster response and recovery organizations.

This project is expected to provide a reduction of risk to all residents living in Staten Island by providing a central location where residents can obtain recovery resources following a disaster and get education and disaster preparedness resources year-round. According to data from

census blocks in the area, this is a population of 472,038. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits should be required. Coordination with emergency management officials including NYC OEM, NYS DHSES and FEMA, as well as communities will be necessary.

Entity with Jurisdiction

New York State Division of Homeland Security and Emergency Services (DHSES)

D2: Provide support for the Staten Island COAD [Proposed Project]

In response to the challenges faced by not-for-profits operating in the post-Sandy period, the Staten Island Non-for-Profit Association has created, through the support of the Staten Island Foundation, the Community Organizations Active in Disaster (COAD) coalition. This group, organized around a FEMA model that has been implemented throughout the nation, is designed to draw together organizations that would be charged with responding to future crises in the community to create a plan for community responses and to better prepare these responding organizations for the roles that they would play in a post-crisis period. The goals of the COAD, which has been meeting since April 2013, have focused on identifying the challenges that responding organizations faced in the post-Sandy period, conducting an assessment of what services these organizations are expecting to provide in a future post-crisis period and what services need to be fulfilled by other partners, cross-sector coalition building and on engaging in a comprehensive sector-wide training program to address capacity gaps among COAD members and other members of the Borough's not-for-profit and civic communities.

Through this proposed project, the COAD would provide training that would improve the capacity of non-profit organizations to provide critical service and support during disaster events.

- Develop relationships with citywide and regional agencies and officials to ensure appropriate communications and interaction in times of crisis.
- Identify the assets and vulnerabilities of local not-for-profit organizations and define their roles and responsibilities in disaster response.
- Develop coordinated disaster preparedness plans that are unique to each individual nonprofit organization that coordinate activities among and between groups.

The impetus for this component of the COAD's work is drawn from the post-Sandy experience through which Staten Island's not-for-profit organizations found themselves at the forefront of providing service and support to the thousands of individuals who needed help with everything from finding a place to sleep and a meal to eat to mucking out their basements, locating necessary medical assistance, and accessing financial assistance that might be available to them. The work of these organizations continues to this day; not-for-profit organizations continue to serve Sandy victims and have provided assistance to close to 15,000 such individuals since the storm hit.

The COAD has recognized the distinct need that Staten Island has to improve their own internal capacity to respond to crises in the community. The leaders of Staten Island's not-for-profits have recognized the significant challenges that their organizations face - challenges related to continuing to serve the community when their facilities and staff are unavailable, challenges related to managing an influx of volunteers in the aftermath of a crisis, and challenges related to providing services to the hundreds or thousands of new individuals who require assistance. The COAD coalition aims specifically to focus on these organizational challenges and to devise solutions to them.

The activities of the COAD coalition would include trainings, organizational assessments, sector-wide planning efforts, and the creation of relationships with citywide and regional agencies and officials that would facilitate appropriate communications and interaction in times of crisis.

Specifically, the first year of the proposed COAD project would include a training component designed to bring high quality training opportunities to the not-for-profit and civic organizations of Staten Island. The sector-wide plan that is implemented would include a collection of pre-determined responses to potential crises that might occur in our community, as drawn from the New York City OEM Hazard Mitigation Plan. For each potential crisis the COAD group would have identified the assets and vulnerabilities of local not-for-profit organizations and the roles that each of these respective organizations would be responsible for filling.

Some proposed project activities in which the coalition would engage are:

- Implementation of a facilitated training program based on the examined needs of the Borough's not-for-profit and civic communities and led by a professional training provider;

- Establishment of a comprehensive sector plan for meeting the needs of vulnerable populations in the event of disaster, active participation as a member of the New York City Volunteer Organizations Active in Disaster (VOAD), disaster preparedness tabletop exercises;
- The creation of a series of coordinated disaster preparedness plans that are unique to each individual organization but which include provisions for coordinating activities among and between groups; and
- Learning sessions with disaster preparedness experts from across the nation to benefit from a discussion of lessons learned in previous crises and disasters

The requirements necessary to successfully implement the COAD project focus primarily on securing the services of dedicated staff members and on working with specific consultants and firms with experience in coordinating coalitions and in implementing emergency response plans and systems. The staff members required to launch and sustain the COAD coalition would include a full time Project Manager as well as an organizational executive director who commits a small amount of their time to administering the project. In addition, in year one specifically there would be a need to contract with an experienced training provider to plan, deliver, and evaluate the trainings required by targeted not-for-profit and civic organizations.

Cost Estimate

Low Cost (approximately $280,000)

Benefits or Co-Benefits

Economic Benefits

This project would create an estimated 3 full and part-time equivalent jobs. The creation of a non-profit network can have positive economic gains. Aside from community capacity building and use of volunteer labor, the non-profit can qualify for a variety of funding that would not be available to government. The non-profit can also provide relief to local funding entities such as the City through providing assistance in areas that may be inefficient for the government to provide due to high overhead and other reasons.

Environmental Benefits

This project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project has the potential to impact all of Staten Island with a population of 472,038.

This project does not secure a specific health and social services facility.

Cost-Benefit Analysis

The Staten Island COAD played an invaluable role in Superstorm Sandy recovery, and seeks to expand its role in disaster preparedness for future storm events. The total proposed project cost of $280,000 is a cost-effective way to coordinate emergency response operations by non-profit organizations, as it would build capacity for an existing coalition organizational capacity, leading to high returns and reduced government expenditures for future storm events.

Anticipated Reduction of Risk

While not reducing the risk to assets, the project would foster a more resilient community by coordinating and facilitating the recovery efforts of different groups. As such, recovery time would be expected to decrease. By decreasing recovery time, the *vulnerability* of the community, and assets within the community, is reduced.

This project is expected to provide a reduction of risk to all residents living in Staten Island by providing increased response capability among nonprofits within the City. According to data from census blocks in the area, this is a population of 472,038. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Intermediate (2-5 years); may vary by component, but overall Intermediate.

Regulatory Requirements

No permits should be required. Coordination with emergency management officials including NYC OEM, NYS DHSES and FEMA, as well as communities would be necessary.

Entity with Jurisdiction

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

D3: Port Richmond CERT Reconnaissance and Radio and Augmentation Training [Proposed Project]

Under this project the Port Richmond CERT and Rescue, Inc. would expand their emergency operations capacity through training and the establishment of a new frequency and repeater site. In telecommunications, a repeater is an electronic device that receives a signal and retransmits it at a higher level or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances. Prior to the arrival of Superstorm Sandy, the Port Richmond CERT team began to canvas parts of Zone A on Staten Island, informing residents that they should evacuate. During Sandy, the team staffed or supported shelters, cleared downed trees, aided in missing person searches, assisted at food distribution sites and at donation centers, and conducted dwelling checks to provide food, water and supplies to homebound and those without power.

Training would include the National Park Service Brush Fire Class, Brushfire Augmentation Equipment (rakes, hoses, Indian cans), Search and Rescue (Area Support) and Crowd and Traffic Equipment Upgrades, Firewise Community Outreach Materials and Deployment Strategy, MTA Track Safety Course (MTA), Fire Guard Training Course (FDNY), Communication Upgrade Equipment, EC-001 Training (emergency communication training), NYC TICP compliance (Tactical Interoperability Communications Plan), and Deployment Sustainment Equipment. The estimated cost of the proposed project is $65,000, which includes training and the establishment of a permanent repeater site.

Port Richmond CERT Mobile Response Vehicle

The benefits are considered public and private in nature. While the Port Richmond CERT and Rescue would increase its operational capacity, the enhanced training would benefit the public with skilled responders.

Cost Estimate

Low Cost (approximately $65,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 1 full-time equivalent job. This project can have benefits by creating a more skilled workforce.

Environmental Benefits
This project would expand the emergency response capacity through of the organization through training, and would establish a new radio transmission frequency and a new repeater site. Although it would not directly protect natural or cultural resources, the project could facilitate emergency response to threatened cultural resources.

Health and Social Benefits
The proposed project has the potential to impact all of Staten Island with a population of 472,038. This project does not secure a specific health and social services facility.

Cost-Benefit Analysis
The Port Richmond CERT played an invaluable role in Superstorm Sandy recovery, but recognizes that it could provide services more efficiently with increased training and a permanent repeater site. The total proposed project cost of $65,000 is a cost-effective way to improve the CERT's emergency response capacity, leading to more efficient operations and reduced government expenditures for future storm events.

Anticipated Reduction of Risk
While not reducing the risk to assets, the project would foster a more resilient community by providing training, equipment and communications to emergency response teams, coordinating and facilitating recovery efforts. As such, recovery time would be expected to decrease. By decreasing recovery time, the *vulnerability* of the community, and assets within the community, is reduced.

This project is expected to provide a reduction of risk to all residents living in Staten Island by providing increased response capability within the City. According to data from census blocks in the area, this is a population of 472,038. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation
Immediate (<2 years)

Regulatory Requirements
No permits should be required; however, due to legal and safety issues, there may be limits on the types of CERT trainings and the Port Richmond CERT should work with NYC OEM to determine eligible training courses. Coordination with emergency management officials including NYC OEM, NYS DHSES and FEMA, as well as communities would be necessary. The project can begin immediately when funding is available.

Entity with Jurisdiction
The proposed project would be in Staten Island and would therefore fall under the jurisdiction of the City of New York.

E1. East Shore Waterfront Vision Plan [Proposed Project]

This plan would focus on the seam between NYC DPR's work with the USACE on the proposed seawall along the East Shore. As discussed in project A1, the discontinuous natural and manmade coastal protection systems along the shoreline exposed coastal areas to flooding from tidal surge. While the USACE Study focuses long term coastal protection on the East Shore, protecting the bowl and other low-lying areas, this plan seeks to integrate these coastal protections with a comprehensive vision plan for economic growth and maintaining neighborhood character.

This plan would identify opportunities for economic development, waterfront access points, and corridors and urban design recommendations. Specifically, the plan would develop urban design and economic development strategies to leverage the potential created by the USACE seawall along the Father Capodanno corridor and key east-west commercial corridors such as Seaview Avenue, Midland Avenue, Sand Lane, and Ebbitts Street. The goal of the plan is to enable those communities located immediately adjacent to the proposed seawall to best position themselves to take maximum advantage of a major new infrastructure investment that would fundamentally alter the relationship between the East Shore communities and the ocean.

Cost Estimate

Medium Cost (approximately $250,000)

Figure 34: East Shore Waterfront Vision Plan

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 8 full-time equivalent jobs. This project would work in partnership with the USACE Phase I study, and build upon ongoing interagency coordination efforts as a part of that process to develop a plan for economic resilience that would spur economic growth along the East Shore. It is assumed that the Vision Plan would build off of the Vision 2020 NYC Comprehensive Waterfront Plan, the future neighborhood plans undertaken by the NYC DCP, and other planning efforts.

Environmental Benefits

This plan would accompany the proposed USACE seawall along the East Shore between Fort Wadsworth and Great Kills Park. It would address how the seawall is integrated with adjacent neighborhoods and study impacts on economic development and open space. If developed, a seawall along the East Shore would protect those resources west of the wall. Natural resources in the area include the Staten Island Unit of Gateway National Recreational Area

(Fort Wadsworth, Miller Field and Great Kills Park), Ocean Breeze Park, Midland Field Park, the Mid-Island Bluebelt system, the Franklin D. Roosevelt Boardwalk, and recreational facilities along the shore.

Health and Social Benefits

The proposed project impacts the waterfront of the east shore of Staten Island from Fort Wadsworth to Great Kills Park with a population of 34,768. This project does not secure a specific health and social services facility, however, assets identified that sit directly along the coast are the SIUH North Campus, and the South Beach Psychiatric Center.

Cost-Benefit Analysis

The NYRCR Committee recognizes the need to integrate the proposed USACE seawall into an economic development strategy and neighborhood vision for the East Shore. The total proposed project cost of $250,000 would yield high returns in economic development and open space, while maintaining the character of the communities along the East Shore.

Anticipated Reduction of Risk

This project is not expected to provide a reduction of risk to residents in Staten Island, however it would provide economic, environmental, and health and social services benefits to residents along the East Shore.

Timeframe of Implementation

Immediate (< 2 years)

Regulatory Requirements

No permits should be required. Coordination with city, state and federal agencies would be necessary.

Entity with Jurisdiction

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

E2. Home Elevation and Resiliency Assistance Pilot Program [Proposed Project]

The objective of this proposal is to provide assistance to Staten Island homeowners to make their homes more resilient to future storm surge events and prevent potential financial consequences of an increase in flood insurance costs. Both of these threats would be especially burdensome for vulnerable populations, such as the elderly, families with young children, or families with employment concerns or short term financial crises.

Superstorm Sandy's impacts on adults and families included the loss of housing units. According to the New York City Department of Buildings damage assessment in December 2012, of those buildings that were tagged as red (indicating structural damage) or yellow (signifying non-structural damage or safety issues), 23% were located within Staten Island's East and South Shores. Currently, 69 single and two family dwellings are located in the extreme risk area, while 589 are located in the high risk area.

This proposal would help to make homes more resilient to flooding and could mitigate the impact of increased flood insurance costs by providing home elevation assistance in the form of grants and subsidized loans. At present, NYC Build It Back provides home repair and elevation assistance for substantially damaged homes only; therefore, many applicants to the City of New York's Build It Back program may not receive assistance.

The goal of this program is to provide gap funding that would provide resources to low- to moderate-income homeowners who do not currently qualify for or are not assisted by Build It Back or other programs, but are in need of grant and/or subsidized loan assistance in order to make their homes more resilient. Considering the USACE may construct a seawall (levee) from Forth Wadsworth to Great Kills with an anticipated construction start date of 2016, this program would target homes in the extreme and high risk areas south of Great Kills where no large-scale coastal protection measure is currently planned.

Since this program identifies a need that is common across multiple New York City NYRCR Communities, this proposal is offered as a pilot, presuming that a centralized non-profit housing assistance organization, NYC agency, or NYS agency could ultimately administer a broad program that covers areas beyond Staten Island. Therefore, immediate funding for this program from the Staten Island CDBG-DR allocation would serve as a pilot on Staten Island's South Shore. Implementation of this program would be distributed at the local level, but a centralized financial administrator could ensure common solutions across New York City, provide efficiencies in establishing a new program, and create additional opportunities for leveraging funds. In Staten Island, local non-profit organizations have been actively providing post-Sandy reconstruction assistance and are best placed to conduct public outreach efforts in their communities.

This program seeks to target homeowners who are not covered by existing home elevation assistance programs, including but not limited to NYC Build It Back. To avoid duplication of programming and benefits with existing programs, this program could implement a tiered approach that provides grants, a combination of grants and Resiliency Loans, or Resiliency Loans, depending upon household income and other resources. The purpose of the tiered structure is to acknowledge that some households may not require a grant in the full amount of home elevation costs, but still may be unable to pay the costs on their own or borrow in the amount of the full costs.

Tier A: Income Constraint [80% - 130% of Area Median Income (AMI)]

Under Tier A, the Resiliency Loan does not require debt service, but imposes affordability requirements to resale of the property. Resale value of the house would be set at a price affordable to a household at 80% - 130% of AMI.

Tier B: Blended Resiliency Loan/Grant (130% - 165% of AMI)

Tier B is targeted at moderate-income homeowners who do not possess the resources to pay debt service on a loan in the full amount of home elevation costs, but can pay debt service on a smaller loan. The proportion of Resiliency Loan to Grant awarded would be assessed on a sliding scale, dependent on income and additional resources.

Tier C: Bank Constraint (>165% of AMI)

Tier C provides assistance on a sliding scale to households that have income to pay debt service, but have exhausted available public and private funds because a primary lender has reached the maximum lending ration allowed on the property. The Resiliency Loan would be sized to a higher loan to value ratio than the primary lender. The Resiliency Loan would

carry a lower interest rate than the primary loan and would place no further obligations on the property as long as the debt service is paid.

Geography

Through the Pilot Phase, this proposal would identify priority areas on Staten Island for initial allocations of funds. As the USACE is anticipated to construct a FEMA-certified flood protection wall or levee on the East Shore of Staten Island, future storm surge and there is the possibility that flood insurance rates may be reduced or stabilized in the newly-protected communities on the East Shore. Therefore, the suggested program catchment area would initially target homes in the South Shore of Staten Island that lie within the Extreme and High Risk flood zones, especially in the neighborhoods of Tottenville, Prince's Bay and Great Kills.

Program Cost and Impact

The Staten Island Planning Committee has allocated $4,000,000 to this pilot program. This budget would be enhanced through matching funds from private and public sources such as non-profit and for-profit entities.

There are approximately 650 single-family and two-family homes in the extreme and high risk flood zones south of Great Kills. While some of these homes would be assisted through NYC Build it Back and others would either elevate on their own or choose not to elevate, with $8,000,000 in funding, the pilot program would have the capacity to elevate more than 110 homes in the first 2 years (based on an average cost of $70,000 dollars per elevation). Debt service on Resiliency Loans would contribute to ongoing operating income over time. Additional public and private funds would be required to maintain the program beyond the initial two year timeframe and expand the program beyond the pilot area.

Cost Estimate

High (approximately $4,000,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 43 full-time equivalent jobs. This type of program would have positive economic benefits by using local construction trade labor to provide resiliency improvements to homes. The improvements would increase the marketability of the homes and may provide additional taxable income in the form of additional property taxes.

Environmental Benefits

As such, the program would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project impacts the Community as a whole, with a population of 135,616. This project is residential in nature and does not secure a specific health and social services facility.

Cost-Benefit Analysis

Gaps exist for low- to moderate-income homeowners who do not currently qualify for or are not currently assisted by the existing programs, including NYC Build It Back. The total proposed project cost of $4,000,000 would build upon the investments made through the City to serve additional populations, reducing the costs of property damage and government expenditures for emergency response from future storm events while increasing the marketability of resilient homes.

Anticipated Reduction of Risk

This program would provide gap funding for resiliency costs not covered by either traditional lending practices or government assistance for activities including raising homes above base flood elevations. As such, the program would decrease vulnerability of housing. This project would allow for the elevation of homes above base flood elevation and increased freeboard. In conjunction with New York City's Flood Resiliency Design Guidelines (Coastal Climate, Designing for Flood Risk) and the New York City Construction Code, resilient construction through this program can improve safety through enhanced standards and design.

The project could provide direct risk reduction benefits to the homeowners that take advantage of the program, which could feasibly raise approximately 35 homes. Indirectly, this project may provide a reduction of risk to all residents living in the NYRCR Community by increasing resiliency of residential properties and stabilizing neighborhoods to prevent blight. According to data from census blocks in the area, this is a population of 135,616. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

Permits may be required from the NYC Department of Buildings. Coordination with FEMA, NYS DEC, U.S. of Housing and Urban Development (US HUD), NYC DEP, NYCHA, and NY Homes and Community Renewal, NYC HPD, and communities would be necessary.

Entity with Jurisdiction
Various City and State entities

E3: Establish East Shore Local Development Corporation [Proposed Project]

An East Shore Local Development Corporation (LDC) could enhance commercial districts on the Island's East Shore by providing marketing for local businesses, creating a cohesive retail strategy for the area, acquiring properties to be redeveloped, assisting in obtaining financing, and advocating for the smaller businesses that characterize the area. Approximately 9,500 jobs were interrupted by Superstorm Sandy and key retail corridors such as Midland Avenue, Hylan Boulevard and Sand Lane experienced significant flooding. Challenges facing businesses impacted by Sandy include building damage, inventory losses, insufficient insurance, and in some cases, a reduced customer base.

By advocating for resiliency-oriented infrastructure improvements and strengthening local businesses through increased promotion to attract residents and beach goers and other revenue supporting activities, the LDC would help prepare the East Shore's commercial districts for future storms. For example, in the Midland Beach area the LDC could acquire residential properties and lots that break up the continuous retail frontage on Midland Avenue, ensuring that future development features ground floor retail. The LDC could also work with NYC EDC to promote the location to potential lessees through a plan to attract a mix of retailers in order to create a destination retail district and encourage design standards and zoning changes that would unify the retail frontage along this hard-hit retail corridor. In the Sand Lane and Midland Beach corridors, the LDC could enhance pedestrian connections with the nearby beach, cleaning up vacant lots and providing signage to create awareness of the district at the beach.

Cost Estimate

Medium Cost (approximately $600,000)

Benefits or Co-Benefits

Economic Benefits

This project could create an estimated 6 full-time equivalent jobs. As with any business development corporation, the potential for attracting, retaining, and growing businesses is possible. The creation of an entity that supports economic growth would have an economic benefit. Based on the type of organization being proposed, the association would embody the region's economic development goals and plans. The local community would benefit with increased economic activity and property values could increase based on the higher demand to be located in or near the area to receive benefits.

Environmental Benefits

The project would not directly protect natural or cultural resources; however the establishment of a business association would create an entity with the capacity to improve streetscape, open spaces and both the natural and built environment. Initiatives that are undertaken by this organization, depending on its established goals and management, may result in environmental benefits.

Health and Social Benefits

The proposed project impacts the East Shore of the Staten Island Community, with a population of 74,344. This project does not secure a specific health and social services facility, but instead would likely benefit the health and social services assets along the eastern coastline such as the SIUH North Campus and the South Beach Psychiatric Center.

Cost-Benefit Analysis

The NYRCR Planning Committee recognizes the need to support local Staten Island businesses, and their capacity to advocate for future investments in resilient infrastructure. The total proposed project cost of $600,000 would yield high returns in business continuity and retention, increasing economic activity and property values, and growing the local economy.

Anticipated Reduction of Risk

This project is not expected to provide a direct reduction of risk to assets; however it would indirectly reduce the overall risk of the east shore by reducing the *vulnerability* of local businesses, thereby increasing their resiliency to withstand future storm events.

Indirectly, this project may provide a reduction of risk to all businesses on the East Shore within the NYRCR Community by increasing the resiliency of commercial properties and stabilizing neighborhoods to prevent blight. According to data from census blocks in the area, this is a population of 74,344. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

The project may require local government approval. Coordination with NYC EDC, the Staten Island Chamber of Commerce, SIEDC, and community and area businesses would be necessary.

Entity with Jurisdiction

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

E4: Implement 'Race for Space' Grant Program to Fill Vacant Storefronts [Proposed Project]

This project would replicate the NYC EDC Staten Island Storefronts Race for Space Program in particularly hard-hit communities such as Midland Beach. Challenges facing businesses still in operation include building damage, inventory losses, insufficient insurance, and in some cases, a reduced customer base. Several storefronts are still vacant, as businesses were lost permanently during Superstorm Sandy. Partnering with NYC EDC or another appropriate entity, the program would provide awards on a competitive basis ranging from $25,000 to $75,000 for businesses opening new storefronts on the East Shore.

Cost Estimate

Low Cost (approximately $400,000)

Benefits or Co-Benefits

Economic Benefits

This project would create an estimated 4 full-time equivalent jobs. The overall economic impact of this project can greatly boost the economic base for areas with large concentrations of store front property. This program falls under the administration of the NYC EDC and therefore links in with the City's strategic economic goals of maximizing business creation, retention, and employment opportunities. The full employment impact of this project is unclear; however, additional economic activity would boost commercial property values and may have a residual effect of raising residential property values if the project creates retail and services demanded by residents.

Environmental Benefits

The project would replicate the NYC EDC' Staten Island Storefronts Race for Space Program in particularly hard-hit communities such as Midland and South Beaches. The project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project impacts the Community as a whole, with a population of 135,616. This project is commercial in nature and does not secure a specific health and social services facility.

Cost-Benefit Analysis

Superstorm Sandy's impact on Staten Island's commercial districts left vacant storefronts and permanent business losses. The total proposed project cost of $400,000 would be a cost-effective method to attract businesses, with proven success in its previous iteration by NYC EDC, that could increase economic activity and property values, grow the local economy.

Anticipated Reduction of Risk

This project is not expected to provide a direct reduction of risk to assets; however it would indirectly reduce the overall risk of the east shore by lowering the *vulnerability* of local businesses, thereby increasing their resiliency to withstand future storm events.

Indirectly, this project may provide a reduction of risk to all businesses within the NYRCR Community by filling vacant properties and stabilizing neighborhoods to prevent blight. According to data from census blocks in the area, this is a population of 135,616. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Immediate (<2 years)

Regulatory Requirements

No permits should be required. Coordination with NYC EDC, the Staten Island Chamber of Commerce, SIEDC, and area businesses would be necessary.

Entity with Jurisdiction

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

E5: Create Common Application for Disaster Relief Grant Funding for Local Businesses [Featured Project]

Applications for Federal, State, City and other disaster relief funding sources and programs could be combined in to a common application form and administered by a single organization. That organization would be a one stop shop for disaster relief funding application and processing, and at the local level coordinate with other existing organizations such as the College of Staten Island Small Business Development Center (CSI-SBDC), which has been administering the U.S. Small Business Administration (SBA) loan program. The results of the Business Survey conducted in conjunction with the NYRCR process highlighted the difficulty businesses have had applying for and even identifying eligibility for the various sources of funding. Empowering one organization or agency to develop a single simplified application process to help these small businesses obtain funds would eliminate having to complete multiple applications and likely reduce wait-times to receive recovery funds. It is important to note that this Featured Project has much wider applicability and it is not limited to the geographic reach of the Planning Area or Staten Island.

Cost Estimate

Low Cost (approximately $200,000)

Benefits or Co-Benefits

Economic Benefits

This project would create an estimated 2 full-time equivalent jobs. This project would aid the creation, retention, and expansion of local businesses that have been impacted by recent disasters. The impact of this project may include increased employment, property values, and overall economic activity. Since the project aligns itself with a variety of local businesses and their needs for relief funding, this project saves the businesses money by aggregating their requests into one common form. This approach would save time and money for the businesses and may reduce the processing load for the funding entities, thereby reducing their costs as well.

Environmental Benefits

The project would not directly protect natural or cultural resources.

Health and Social Benefits

The proposed project impacts the entire Borough of Staten Island with a population of 472,038. This project is directed toward local businesses and does not secure a specific health and social services facility.

Cost-Benefit Analysis

Superstorm Sandy illustrated the need for streamlining the application process for disaster recovery funding. The total featured project cost of $200,000 would help businesses recover faster after a future storm event, yielding high returns in business continuity, increasing economic activity and property values, and growing the local economy.

Anticipated Reduction of Risk

This project may provide a reduction of risk to all businesses on Staten Island, and may indirectly benefit all residents of Staten Island by decreasing the vulnerability (i.e., loss of service) of local businesses and allowing them to recover quicker from disaster events. According to data from census blocks in the area, this is a population of 472,038. Specific characteristics of the population can be found in the health and social benefits subsection above.

Timeframe of Implementation

Intermediate (2-5 years)

Regulatory Requirements

No permits should be required. Coordination with emergency management offices, FEMA, communities, and utilities would be necessary.

Entity with Jurisdiction

Various City, State, and Federal entities

Section V: Additional Materials

A: Additional Resiliency Recommendations

Additional Resiliency Recommendations

	Project Name	Short Description	Estimated Cost	Regional (Y/N)
Strategy A: Coastal Protections	Advocate for the USACE East Shore Wall to be FEMA Certified	Call for USACE and FEMA to coordinate so that flood protections constructed by USACE on the East Shore are FEMA certified. FEMA certification will prevent significant increases in flood insurance rates that could cripple many residential communities on the East Shore.	N/A	N
	Endorse the Recommendations of Rebuild By Design	Endorse concept of Living, Growing Breakwaters in Staten Island and Raritan Bay.	N/A	Y
	Study floodgates at the mouth of Lemon Creek	Study potential movable tidal surge barriers at the mouth of Lemon Creek to prevent water from flooding homes in the Prince's Bay neighborhood.	N/A (area included in USACE Phase I Study)	N
	Short-term coastal protections at Annadale Beach	Install temporary coastal protection measures (e.g. sand replenishment, berms, and jetties) at Annadale Beach to control coastal erosion in the short term as the study continues for the proposed USACE seawall.	$5,000,000-$10,000,000	N
	Construct Lemon Creek Floodgates in Prince's Bay	Construct movable tidal surge barriers at the mouth of Lemon Creek to prevent water from flooding homes in the Prince's Bay neighborhood.	$10,000,000-$15,000,000	N
	Construct floodgates at the mouth of Mill Creek	Pending recommendations of the Integrated South Shore Protection Plan, construct floodgates at the mouth of Mill Creek to protect the Richmond Valley SIR station from flood damage.	$10,000,000-$15,000,000	N
	Extend Father Cappodano Blvd to Cedar Grove	Extend Father Cappodano Boulevard to Cedar Grove through Miller Field to relieve traffic on Hylan Boulevard and serve as a berm to buffer tidal flow.	$8,000,000-$13,000,000	N
	Install offshore breakwaters adjacent to and south of Great Kills Harbor	Endorsement for USACE to study and potentially install offshore breakwaters adjacent to and south of Great Kills Harbor. Benefits of this project include wave attenuation, which would protect businesses, marinas, and residential communities subject to strong wave action and erosion during extreme weather events.	N/A (Rebuild by Design Project)	N

Additional Resiliency Recommendations

	Project Name	Short Description	Estimated Cost	Regional (Y/N)
	Seawall Reconstruction at Atlantic Village	Repair the seawall at Atlantic Village, which was damaged by Superstorm Sandy, for flood protection and to expand public access to the waterfront.	$1,500,000	N
	Tottenville nature restoration project	Buy out properties in Tottenville between Swinnerton Street to the west, Sprague Avenue to the east and some distance north of Billop Avenue. Once the homes have been acquired and demolished, the land should be restored as designated open space that would create a maritime forest and provide coastal protection through wave attenuation.	$8,000,000	N
Strategy B: Stormwater Management	Residential backflow preventers installation program	Create a program to assist residential homeowners in installing backflow preventers to reduce internal flooding damage due to sewage backups.	$750,000	N
	Community bluebelt maintenance program for flood control	Increase maintenance capacity of NYC DEP through community partnerships and volunteering, promoting environmental education and stewardship of the Bluebelt among Staten Island residents.	N/A (Efforts already underway by NYC DEP)	N
	Bluebelt Greenbelt	Enhance proposed coastal protection barriers with recreational access by providing walking/biking paths, nature trails and natural features along the coastal barriers (levees, seawalls, dikes, etc.). The Greenbelt would connect to the Bluebelt, creating a continuous pathway from the east shore of Staten Island to the south shore in a natural setting.	$7,000,000	N
	Complete Lemon Creek Wetlands Restoration	Restore freshwater wetlands near Lemon Creek Preserve to achieve stormwater management benefits as well as habitat protection.	$5,000,000	N
Strategy C: Key Connections	Creation of offsite data warehouse or 'hot sites' for small businesses	This study would identify locations for offsite data warehouses to preserve business data so that small businesses could continue to operate immediately following a disaster, even during power outages, and prevent lost data due to flooding. The study would result in recommended site(s), and produce conceptual designs with cost estimates.	N/A	Y
	Relocation of the Richmond	Endorse proposal in SIRR to study the potential for the	$205,000	N

Additional Resiliency Recommendations

	Project Name	Short Description	Estimated Cost	Regional (Y/N)
	Valley Staten Island Railway Station	Richmond Valley SIR station to be relocated to Page Avenue. This would create a rail and bus hub in the Page Avenue commercial area and respond to transit demand created by the closing of the Atlantic and Nassau stations in Tottenville.		
	Tottenville Microgrid Network Pilot Project	Create a microgrid network pilot project in Tottenville connected to the SIR and other critical facilities including the NYPD 123rd Precinct and FDNY Engine Company 151. Other community assets such as PS 1, IS 34 could be tied into the network. Include a commercial solar installation along Route 440 and some smaller solar installations in Tottenville.	$4,000,000	N
Strategy D: Emergency Response Capacity	Security during disaster events	Provide improved disaster security, whether by New York City or private contractors, following natural disasters to prevent looting, relieve residents' fears, and encourage residents in high risk areas to evacuate when necessary.	N/A	Y
Strategy E: Neighborhood Integrity	Economic Development Assistance Exceptions	Expand eligibility for economic development programs (e.g. Avenue NYC) to include Sandy impacted areas, regardless of income	N/A	Y
	Flooding Protections for 128-130 Cedar Grove Avenue.	128-130 Cedar Grove Avenue provided essential services to seniors in the New Dorp Beach area; the building was damaged during Sandy and has not been reopened. Design and construction of additional floodproofing and protections in this area would help protect upland structures from future storm damage. Improvements in this area would be coordinated with the USACE's plans for the area.	$700,000	N

B: Master Table of Projects

Master Project Table

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strategy A: Coastal Protection	Interim East Shore Coastal Protection Measures	Create a contiguous, stabilized dune system to protect the shoreline in the East Shore against storm surge. This project is meant to augment the U.S. ACE Phase I Study.			
	Phase 1	Add plantings to existing temporary dunes from Seaview Avenue to Oakwood Beach WWTP.	Proposed	$2,300,000	Y
	Phase 2	No connection exists from between the NYC Parks dunes in Midland and New Dorp Beaches to the dunes at Miller Field dunes; this project will 'fill the gaps' by constructing and planting cellular containment barrier core sand dunes at the end of New Dorp Lane and Father Capodanno Boulevard, forming a continuous line of interim coastal protection on the East Shore.	Proposed	$350,000	N
	Tottenville and Great Kills Dunes and Coastline Dune Plantings	Construct permanent dune system to protect Tottenville and Great Kills shoreline against storm surge and plant dunes in Tottenville and Great Kills.			
	Phase I	Planting of existing dunes in Great Kills	Proposed	$450,000	N
	Phase II	Reconstruction and planting of existing dunes in Tottenville from Brighton St. to Sprague Ave. (stone core – includes 1 access point)	Proposed	$3,800,000	N
	Phase III	Construction and planting of dunes in Tottenville from Sprague Ave. to Joline Ave. (stone core – includes 1 access point and potential easement costs)	Proposed	$2,500,000	N
	Phase IV	Construction and planting of dunes in Tottenville from Joline Ave. to Page Ave and in Great Kills at Goodall Street (stone core, no access points, potential easement costs)	Featured	$5,000,000	N
	Phase V	Construction and planting of dunes in Tottenville from Conference House Park along Surf Ave. to Brighton St. (stone core, no access points)	Featured	$10,000,000	N

Master Project Table

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
	Integrated South Shore Protection Plan	Prepare supplemental studies beyond the scope of USACE study of the South Shore. Feasibility study for flood protection alternatives at Mill Creek and near the Tottenville SIR Station.	Proposed	$400,000	Y
Strategy B: Stormwater Management	New Creek Bluebelt Implementation	Implementation of Bluebelt BMPs at Last Chance Pond (NC-11), Boundary Avenue (NC-12), Joyce Street, Hylan Boulevard, and Meadow Place	Proposed	$5,500,000	N
	"Gateway to the Blulebelt" project, Hylan Boulevard Green Streets and Streetscape Improvements	Implement green street from Hull Avenue to Liberty Avenue, incorporating linear green infrastructure practices, including vegetated bioswales, connected bioretention tree pits, and permeable paving. Create a gateway to Bluebelt BMPs NC-11 and 12, with educational signage and decorative streetscape.	Proposed	$1,770,000	N
	McLaughlin Street Residential conversion to Bluebelt	Voluntary buyout of four homes in South Beach that are surrounded by the Bluebelt and replacement with Bluebelt BMPs.	Featured	$2,600,000	N
	Assess Stormwater Outfalls	Investigate stormwater outfalls identified by NYC DEP.	Featured	$570,000	N
Strategy C: Key Connections and Physical Infrastructure	Identify key locations for microgrids and renewable energy ("Staten Island Resiliency Network")	Complete an action plan and conceptual design for a microgrid that would provide reliable communication during emergencies.	Proposed	$320,000	Y
	'Go to High Ground'	Study for wayfinding signage and staging area for automobile evacuation.	Proposed	$250,000	Y
	East Shore Microgrid Network Pilot Project	Create a microgrid network centered around the Staten Island University Hospital – North Campus as the key node.	Proposed	$6,000,000	N
	South Shore Microgrid Network Pilot Project	Create a microgrid network centered around the Staten Island University Hospital – South Campus as the key node.	Proposed	$4,000,000	N
	South Shore Resilient Dock Feasibility Study	Analyze the feasibility of a multi-purpose resilient dock, with the primary goal of emergency transportation during disaster events. Build upon the findings of the Citywide Ferry Study Preliminary Report, published in 2013 by NYCEDC.	Proposed	$350,000	Y

Master Project Table

	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
	St. George / Tompkinsville Promenade Master Plan / Engineering Study (Phase 1A)	Develop a master plan for the new St. George-Tompkinsville Promenade concept. Cost includes analyzing storm damage to incorporate resiliency measures.	Proposed	$200,000	Y
	St. George / Tompkinsville Promenade Planning, Architecture / Landscape Design (Phases 1B-1D)	Additional field surveys to document existing pilings. Develop multi-disciplinary conceptual design and engineering solutions. Schematic design and construction documents for review.	Featured	$3,300,000	Y
Strategy D: Emergency Response Capacity	Staten Island 'Community Emergency Resource Center' Location and Feasibility Study	Study the feasibility of and potential locations for a year-round resource center for Staten Island residents and for disaster response and recovery organizations.	Proposed	$250,000	Y
	Provide support for the Staten Island COAD	Provide support for the Staten Island COAD. Develop relationships with citywide and regional agencies to ensure communications in times of crisis. Identify assets and vulnerabilities of local not-for-profit organizations and define roles and responsibilities in disaster response. Develop coordinated disaster preparedness plans that coordinate activities among and between groups.	Proposed	$280,000	Y
	Port Richmond CERT Reconnaissance, Radio Augmentation, and Training	Training and establishment of a permanent repeater site for the Port Richmond CERT.	Proposed	$65,000	N
Strategy E: Neighborhood Integrity	East Shore Waterfront Vision Plan	This Vision Plan will complement the proposed USACE seawall along the East Shore and DCP's East Shore Resilient Neighborhood Framework Plan. It will address how the seawall is integrated with adjacent neighborhoods and specifically study economic development opportunities, waterfront access, and design.	Proposed	$250,000	Y

Master Project Table

Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Home Elevation and Resiliency Assistance Pilot Program	Loan and grant program to provide gap funding for home elevation costs to homeowners not covered by existing assistance programs. Grants and/or loans would be provided on a sliding scale depending on income levels. Program could be administered by a centralized entity (e.g. NYC or a city/statewide non-profit), but would be implemented at the local level by organizations that have been integral to post-Sandy reconstruction assistance. Pilot Program on Staten Island would target homeowners in extreme and high risk zones south of Great Kills.	Proposed	$4,000,000	N
Establish East Shore Local Development Corporation (LDC)	Provide marketing for local businesses, a cohesive retail strategy for the East Shore, acquire properties to be redeveloped, assist in obtaining financing, and advocate for the smaller businesses that characterize the area.	Proposed	$600,000	N
Implement 'Race for Space' Grant Program	Replicate NYC EDC Staten Island Storefronts Race for Space Program in particularly hard-hit communities such as Midland and South Beaches.	Proposed	$400,000	Y
Create Common Application for Disaster Relief Grant Funding for Local Businesses	Combine Federal, State, City and other disaster relief sources into larger block grants that would be administered by a single local organization.	Featured	$200,000	Y

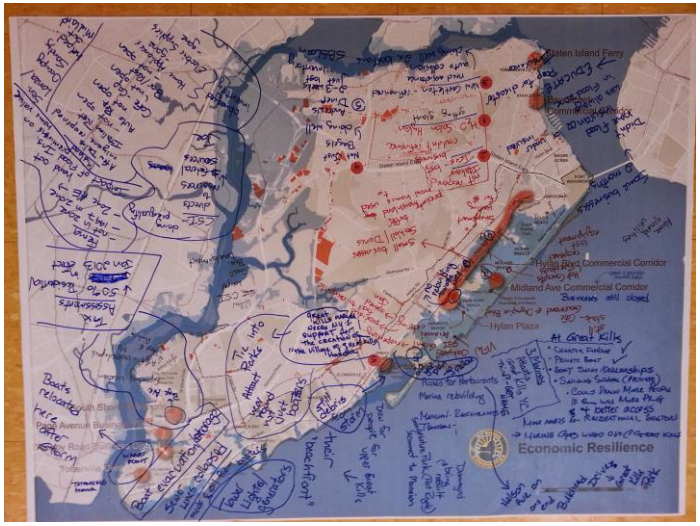
C: Public Engagement Process

Goals and Objectives

The Goals and Objectives of the Community Engagement Strategy complemented the overall goals and objectives of the Community Reconstruction Plan, and successfully delivered a Final Plan that features the support and buy-in of the local communities.

The goals of the program's community engagement were to:

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



Planning Committee

The Staten Island Planning Committee consisted of 29 highly engaged, diverse local community leaders representing civic associations in the most affected areas, as well as higher education, the not-for-profit sector, business leaders, and community activists.

The Planning Committee played a primary role in guiding the community outreach process in order to ensure that a broad and representative and diverse spectrum of Staten Island communities were provided the opportunity to actively participate in, and have input in this process. Due to the significant associations of individual

committee member's penetration into effected committees was paramount. All Staten Island Planning meeting were open to the public and committee members were responsible for extensive outreach efforts.

The work and respective relationships developed by the Planning Committee led to and stimulated additional efforts and associations. Research projects were undertaken by students at the College of Staten Island (CSI), an emergency preparedness fair for special needs residents was developed in cooperation with elected officials, the Jewish Community Center (JCC) of Staten Island and CSI, the Port Richmond CERT Team provided assistance and mentoring to other local groups and the committee assisted other groups in the development of additional resiliency plans and proposals. These outcomes will have an expanding and longstanding effect on future planning efforts and will also serve to stimulate communication at grassroots levels.

Committee meetings were held on the following dates in Staten Island.

Committee Meeting # 1:
Date: September 17, 2013

Time: 7pm – 9pm

Location: Jewish Community Center

1466 Manor Rd.

Staten Island, NY

Committee Meeting # 2:
Date: October 2, 2013

Time: 7pm – 9pm

Location: Staten Island University Hospital

475 Seaview Avenue

Staten Island, NY

Committee Meeting # 3:
Date: October 24, 2013

Time: 7pm – 9pm

Location: CYO Mount Loretto

6581 Hylan Blvd.

Staten Island, NY

Committee Meeting # 4:
Date: December 12, 2013

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

Committee Meeting # 5:
Date: January 29, 2014

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

Committee Meeting # 6:
Date: March 5, 2014

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

Committee Meeting # 7:
Date: March 19, 2014

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

Meetings of the Planning Committee were held approximately once a month. To accommodate the large size of the Staten Island Planning Committee, committee meetings typically included a presentation, followed by breakout group discussions to allow for efficient division of labor. 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 290 members of the public attended public meetings and observed committee meetings. There were 62 individual members of the public that attended two or more meetings.

Public Engagement Events were held on the following dates:

Public Meeting # 1: East Shore
Date: October 9, 2013

Time: 7pm – 9pm

Location: Olympia Activity Center

1126 Olympia Blvd.

(Midland Beach) Staten Island, 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 (in both English and Spanish) at high traffic public places including the Staten Island Ferry Terminal. The total attendance of committee members and the public was 150.

Public Meeting # 1: South Shore
Date: October 10, 2013

Time: 7pm – 9pm

Location: CYO Mount Loretto

6581 Hylan Blvd.

(Prince's Bay) Staten Island, 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 (in both English and Spanish) at high traffic public places including the Staten Island Ferry Terminal. The total attendance of committee members and the public was 41.

Public Meeting # 2
Date: November 14, 2013

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, 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, at local religious services, and through the distribution of flyers (in both English and Spanish) at high traffic public places including the Staten Island Ferry Terminal. Large posters that advertised the event and provided information about the program were posted at local libraries and at the Staten Island Mall. The total attendance of committee members and the public was 108.

Public Meeting # 3
Date: February 12, 2014

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

This meeting was held in an Open House/Town Hall format. Attendees signed-in, received informational materials, and then circulated through ordered stations that presented the Proposed projects and other recommended projects from the Draft NYRCR Plan on display boards. At each station, attendees had the opportunity to talk with a project team member and provide input via comment forms and notepads. The meeting was promoted through the Planning Committee members' organizations, at local religious services, and through the distribution of flyers (in both English and Spanish) at high traffic public places including the Staten Island Ferry Terminal. Posters that advertised the event and provided information about the program were posted at local libraries and at the Staten Island Mall. The total attendance of committee members and the public was 62.

Public Meeting # 4
Date: TBD

Time: 7pm – 9pm

Location: New Dorp High School

465 New Dorp Lane

Staten Island, NY

Stakeholders and Public Groups

The Planning Committee identified stakeholders that should be directly engaged by the Public Outreach process. These stakeholders received notifications and information electronically through email and additional outreach channels including notices in religious services bulletins, targeted outreach to the Spanish and Russian-speaking communities via Planning Committee member representatives. A list of stakeholder organizations and individuals, including email addresses, was created and maintained. This list was used to send out notifications of meetings.

Project Website and Social Media

A New York State sponsored website (http://stormrecovery.ny.gov/nyrcr/community/staten-island) was used to provide information about the development of the plan and to host project documents. Information about the Staten Island Community Reconstruction effort was available on this website, including:

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

Press Engagement, Press Conferences and Related Articles

A press conference was held on September 18, 2013, to publicly kick off the planning process. The press conference featured high-level speakers including Governor Cuomo, Borough President Molinaro, State and Local Representatives, and the Planning Committee Co-Chairs.

Additionally, press releases were issued to announce each of the public meetings and the progress of the Staten Island NYRCR Program. The Planning Committee Co-Chairs and the State Lead met with influential members of the press early in the program progress to ensure that accurate and timely information could be disseminated through Staten Island.

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 Staten Island Ferry Terminal, the Staten Island Mall, and at local libraries. All flyers included a brief description of the program and explained the opportunity to participate. The flyers were translated to Spanish and adapted for the Russian-speaking community.

D: Inventory of Assets

Hazard

Hazards are storms that are typical, and to a degree predictable, for the Staten Island region. Hazards along the East and South Shores fall into four broad categories:

- Frequent, low intensity storm events such as average rainfall, causing stormwater drainage issues and flooding in the 100-year floodplain.
- Infrequent, high intensity storm events, such as above average rainfall, nor'easters or hurricanes, causing storm surge and tidal flooding in the 500-year floodplain.
- High winds, possible in combination with either type of hazard above.
- Long-term hazards posed by bank erosion, land subsidence and sea level rise.

Because the magnitude of storm events increases as the likelihood decreases (i.e., 100 year storms have higher magnitude than 10 year storms), the hazard score increases as the likelihood goes down. The hazard score is defined as follows:

1. Very likely or expected to occur. Low intensity event.	>90% probability of occurring
2. Likely to occur. Moderate intensity event.	66-90%
3. About as likely as not (possible). High intensity event	33-66%
4. Unlikely to occur. Very high intensity event	10-33%
5. Highly unlikely, but conceivable. Extreme intensity event.	1-10%

For the purpose of preparing the NYRCR Plan the design storm event is a 100 year storm (1% annual chance of occurring). According to New York State guidance, the hazard score for a 100-year event is three (3), which is therefore the hazard score noted for all assets in the risk assessment.

Exposure

Exposure is an expression of the local topographic and shoreline conditions that tend to increase or decrease the effects of coastal hazards on assets. Staten Island's shoreline conditions and unique topography contribute to the Island's exposure to the aforementioned hazards. As a whole, assets in the Community are exposed to open waters due to a lack of barrier islands, which existed half a century ago. The Island experiences a southward littoral shift and the long shore drift of sediment in the absence of barrier islands, creating groins along the Eastern Shore and high erosion rates. Several communities on the East Shore are directly exposed to wave energy and storm surge, with narrow beach width and limited protective vegetation or shore defenses to reduce flood and erosion impacts. Topography on the South Shore in the communities of Prince's Bay serves as a protective feature, at a higher elevation with bluffs, however the lower topography in Richmond Valley and Tottenville present similar exposure to the East Shore communities.

Exposure is determined by evaluating landscape attributes for assets. Landscape attributes are features of the landscape that lie between an asset and the source of flood waters, which may reduce the exposure of the assets to flooding. The following landscape attributes were evaluated for each group of assets:

- **Erosion Rate:** Assets located where the long-term average erosion rate is one foot or more per year, or unknown. Storm impacts may increase on shorelines with high erosion rates, as development on an eroding beach can heighten risk from wave impacts and storm surge. No areas in Staten Island are identified as Structural Hazard Areas on the Coastal Erosion Hazard Area (CEHA) maps. Therefore according to New York State guidance, the erosion rate for all assets along the Atlantic Ocean, north of Great Kills (50% of asset inventory) is assumed to be greater than one foot per year, while all assets along Raritan Bay, south of Great Kills (50% of asset inventory) are assumed to have an erosion rate of less than one foot per year (Source: Coastal Erosion Hazard Area Maps, SI 1-14, New York State Department of Environmental Conservation, 1988, rev. c/o NYC Department of Buildings).
- **Beach Width:** Assets located where the water line is frequently in contact with shore defense structures (e.g., bulkheads) or upland vegetation. Wide beaches and shallow water can lessen waves and surge. The 'Limit of Moderate Wave Action' (LMWA) provided by FEMA illustrates areas where property may be adversely affected by waves as low as 1.5 feet high, therefore it is assumed that the waterline is frequently in contact with upland vegetation and shore defense structures within the limit of moderate wave action (40% of asset inventory). The water line is not in frequent contact with shore defense structures or upland vegetation throughout the majority of the Community (60% of asset inventory). In general, the water line frequently meets upland vegetation in the areas of natural and cultural resources assets, such as Mill Creek, Lemon Creek and Conference House Park on the South Shore, and Miller Field on the East Shore. The waterline also meets shore defense structures along the FDR Boardwalk and Father Cappodanno Boulevard (Source: FEMA Limit of Moderate Wave Action, Preliminary Work Maps, 2013; Aerial Photography, Google Earth 2013).
- **Shore Defenses:** Assets that are not protected by shore defenses, or where shore defenses are deteriorating or not constructed to anticipated storm or sea level rise conditions. Shore defenses such as bulkheads, seawalls, breakwaters and revetments may reduce the effects of incoming surge and wave energy on an asset, barring that the asset is above base flood elevation. A seawall was built near Oakwood Beach, but it no longer exists, and the seawall at Atlantic Village is in disrepair. Therefore, adequate shore defenses are assumed to be absent for the all assets (100% of asset inventory) in Staten Island (Source: FEMA; Aerial Photography, Google Earth 2013). See **Error! Reference source not found.**.
- **Vegetation:** Locations where protective vegetation (i.e., dense shrubbery or forested land cover at least 300 feet in depth), wetlands, or intervening structures between asset and flood source are absent. Vegetation can reduce flood and erosion impacts, especially dense vegetation which can influence wind speeds and water flow velocity. This is the case for some areas in Prince's Bay and Oakwood Beach that are protected by wetlands. Conversely, assets built on filled wetlands may experience increased flooding and erosion. Vegetation and intervening structures are present for just over half of the assets in Staten Island (55% of asset inventory), while they are absent for the remaining assets (45% of asset inventory). (Source: Nassau County GIS; Aerial Photography, Google Earth 2013). See **Error! Reference source not found.**.
- **Dunes or Bluffs:** Assets that are not protected by dunes or bluffs because either dunes are absent, below base flood elevation, eroding, discontinuous, or have little vegetation, and bluff slopes are unstable, partially vegetated. Dunes can absorb wave energy, with

continuous vegetated dunes elevated above the base flood elevation having the greatest benefit. Temporary dunes are being constructed by the New York City Department of Parks and Recreation from near Fort Wadsworth to Midland Beach that will protect up to elevation 13,' however few other areas have active dune systems or other structural defenses such as seawalls, breakwaters and revetments. At the time of this analysis, the dunes are still under construction, therefore according to New York State Guidance, it is assumed that the community as a whole has no dunes or bluffs that meet the aforementioned criteria. Therefore all assets (100% of asset inventory) are not protected by dunes or bluffs (Source: Aerial Photography, Google Earth 2013). The risk reduction benefits for these temporary dunes will be factored into the risk reduction impacts for the *Interim East Shore Coastal Protection Measures*, a CDBG-DR Proposed Project.

- **Soils**: Assets that are located on a coastal barrier island or filled wetland. Assets built on filled wetlands may experience increased flooding and erosion, as well as wetland degradation or loss, resulting in diminished ecological services such as habitat, as well as flood and erosion control and water quality protection. When tidal surge rises above Father Capodanno Boulevard, it flows down into the low-lying 'bowl' area. The area's exposure is heightened by development that occurred during the mid-twentieth century on historic wetlands and fill. While only one third of assets (33% of asset inventory) are located on filled wetlands, the majority of these are located on the East Shore in the areas of Oakwood Beach, Midland Beach and South Beach. The remaining assets (67 % of inventory) are not located on filled wetlands (Source: USGS maps, 1900; NOAA maps, 1917 and 1925; Aerial Photography, Google Earth, 2013).

The resulting exposure score for each group of assets considers the risk area in which the asset is located and the landscape attributes that influence the assets' potential for storm impacts, as described above. Assets that are closer and more exposed to hazards are at greater risk than those that are less exposed.

Vulnerability

Vulnerability is an expression of the assets' ability to return to service after a storm. Vulnerability relates to both the assets' material strength relative to the coastal hazard and its regenerative capacity. Based on feedback from committee members and the public during the preparation of the NYRCR Conceptual Plan, a vulnerability score was defined for each group of assets as follows:

1. **Insignificant:** Limited Interruption
2. **Minor**: Service loss of less than 1 week
3. **Moderate:** Service loss 1-4 weeks
4. **Significant:** Service loss greater than 1 month
5. **Major**: Permanent loss

Staten Island's ability to bounce back is limited, considering its material strength and regenerative capacity relative to the coastal hazards above. Therefore, Staten Island has high vulnerability; meaning that the community and assets within do not quickly recover from exposure to hazards without external assistance. Factors that can reduce vulnerability by mitigating storm surge impacts include elevation above base flood elevation, structural reinforcement, and natural protective features. The majority of Staten Island's East and South Shores are below base flood elevation, and the entire shoreline of the Island is categorized by FEMA as a 100 year flood zone; with all of the eastern coastline located in the FEMA 100 year plus storm surge flood zone, and significant areas of Ocean Breeze, Midland Beach, New Dorp Beach and

Oakwood Beach located in the 500 year flood zone. Buildings that are not resilient to storm damage and lack of structural reinforcement exacerbate vulnerability of Staten Island's housing stock. Additional vulnerability results from a sewer system that does not have the capacity to treat stormwater during a storm event, and the Oakwood Beach Sewer Treatment Plan, which can cease operations when inundated and result in sewage backups. Lastly, Staten Island's auto dependence renders the community highly vulnerable in the case of disasters due to flooded roadways and closed bridges that can impede evacuation.

Table 11: Risk of Economic Assets

Economic Asset(s)	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Amazing Deli	High	3	2.50	4	30
Amboy Road Economic Corridor_High	High	3	2.50	4	30
Androvette Street Economic Corridor_High	High	3	3.50	4	42
Arthur Kill Rd/Ellist St/Main St Economic Corridor_Extreme	Extreme	3	4.00	4	48
Arthur Kill Rd/Ellist St/Main St Economic Corridor_High	High	3	2.50	4	30
C G Feeds	High	3	3.50	4	42
Coral Bay	High	3	3.50	4	42
FR Capodanno Blvd Economic Corridor_High	High	3	3.00	4	36
Great Kills Marina	Extreme	3	4.50	4	54
Griff's Place	High	3	2.50	3	23
Hylan Boulevard Economic Corridor_High	High	3	2.50	4	30
King's Material Co Inc	High	3	3.50	3	32
Mansion Avenue Economic Corridor_Extreme	Extreme	3	4.00	4	48
Mansion Avenue Economic Corridor_High	High	3	2.00	4	24
Midland Ave Economic Corridor_High	High	3	2.50	4	30
New Dorp Beach Deli	High	3	2.50	4	30
Nino's Salumeria	High	3	2.50	4	30
Nothing New	High	3	2.50	4	30
Oceanside Ave Plumbing and Heating	High	3	2.50	4	30
Puglia by The Sea	Extreme	3	4.00	5	60

Risas World of Chocolate	High	3	2.50	4	30
Sand Lane Economic Corridor_High	High	3	2.50	4	30
Slater Convenience	High	3	2.50	4	30
Tippy Realty Co.	High	3	2.50	4	30

Table 11: Risk of Health and Social Services Assets

Health and Social Services Asset(s)	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
A Very Special Place, Inc.	High	3	2.50	4	30
Berry House Friendship Club Senior Center	Moderate	3	2.50	1	8
FDNY Fire House ENG 151, LAD 76	None	3	-	1	0
FDNY Fire House ENG 152, BN 21	None	3	-	1	0
FDNY Fire House ENG 153, LAD 77	None	3	-	1	0
FDNY Fire House ENG 155, LAD 78	None	3	-	1	0
FDNY Fire House ENG 159	None	3	-	1	0
FDNY Fire House ENG 162, LAD 82, BN 23	None	3	-	1	0
Great Kills Health and Social Services Assets_High	High	3	2.00	4	24
Hylan Communicare Health Center	High	3	2.50	3	23
Island Medical Specialists	High	3	2.50	3	23
Island Rehabilitative Services	High	3	2.50	3	23
Mt. Loretto Friendship Club Senior Center	Moderate	3	2.50	1	8
NYPD Police Station 120 PRECINCT	None	3	-	1	0
NYPD Police Station 122 PRECINCT, P.B.S.I./S.S. #5	Moderate	3	2.50	2	15
NYPD Police Station 123 PRECINCT	None	3	-	1	0
Oakwood Beach Health and Social Services Assets_High	High	3	2.50	3	23
Old Town-Dongan Hills-South Beach Health and Social Services Assets_High	High	3	2.50	4	30
Our Place School	High	3	2.50	3	23
Primary Care Clinic	High	3	2.50	3	23

PS 38 George Cromwell	High	3	2.50	4	30
Richmond University Medical Center (RUMC)	None	3	-	1	0
Smiles Around US 2	High	3	2.50	4	30
South Beach Psychiatric Center	High	3	2.50	3	23
South Beach Senior Center	Moderate	3	2.50	1	8
South Richmond High School	Moderate	3	2.50	1	8
Special Tees	High	3	2.50	3	23
St. Margaret Mary's School	High	3	2.50	4	30
Staten Island Community Center	High	3	2.50	4	30
Staten Island University Hospital - North Campus	Moderate	3	3.00	2	18
Staten Island University Hospital - South Campus	Moderate	3	2.00	1	6
Tottenville High School	None	3	-	1	0
Wonder Years Preschool	High	3	2.50	4	30

Note: Assets with a value of "–" in the Exposure Score field signify that they are not located in a NYS Risk Area and therefore the Coastal Hazard and Risk Assessment Tool does not generate an Exposure Score. These assets are included in the Asset Inventory because they are considered critical or locally significant.

Table 12: Risk of Housing Assets

Housing Asset(s)	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Annadale-Huguenot-Prince_s Bay-Eltingville Housing Assets_Extreme	Extreme	3	4.00	4	48
Annadale-Huguenot-Prince_s Bay-Eltingville Housing Assets_High	High	3	2.50	4	30
Association for Help of Retarded Children	High	3	2.50	4	30
Charleston-Richmond Valley-Tottenville Housing Assets_Extreme	Extreme	3	4.50	4	54
Charleston-Richmond Valley-Tottenville Housing Assets_High	High	3	2.00	4	24
Community Resources for Developmentally Disabled	High	3	2.50	4	30
Eden II School for Autisitc Children	High	3	3.00	3	27
Grasmere-Arrochar-Ft. Wadsworth Housing Assets_High	High	3	2.50	4	30
Great Kills Housing Assets_Extreme	Extreme	3	3.50	4	42
Great Kills Housing Assets_High	High	3	2.00	4	24

Island Shores Assisted Living	High	3	3.00	4	36
Jesuit Home for Indigent Children, Aged, Homeless	High	3	2.50	3	23
Mission of the Immaculate Virgin	High	3	4.00	3	36
New Broadview Manor Home for Adults	High	3	2.50	3	23
New Dorp-Midland Beach Housing Asset_High	High	3	2.50	4	30
Oakwood Beach Housing Assets_Extreme	Extreme	3	4.00	4	48
Oakwood Beach Housing Assets_High	High	3	2.50	4	30
Old Town-Dongan Hills-South Beach Housing Assets_High	High	3	2.50	4	30
On Your Mark, Inc.	High	3	2.50	3	23
Staten Island Developmental Disabilities Services Office	Extreme	3	4.00	4	48
United Cerebal Palsy	High	3	2.50	3	23

Table 13: Risk of Infrastructure Systems Assets

Infrastructure Systems Asset(s)	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Amboy Road_High	High	3	3.00	4	36
Antenna - Mount Loretto Service Road	Extreme	3	4.00	4	48
Antenna - Richmond Valley Road	High	3	2.50	3	23
Arthur Kill Road_Extreme	Extreme	3	4.50	3	41
Arthur Kill Road_High	High	3	2.50	4	30
Atlantic Ave Power Supply	High	3	2.50	3	23
Atlantic SIR Station	Moderate	3	2.00	2	12
Barrier for Column of Verrazano-Narrows Bridge	Extreme	3	4.00	4	48
Cell Tower - Roma Avemie	Extreme	3	4.00	4	48
Charleston-Richmond Valley-Tottenville Infrastructure Systems Assets_Extreme	Extreme	3	4.50	4	54
Charleston-Richmond Valley-Tottenville Infrastructure Systems Assets_High	High	3	2.00	3	18
Citgo at Slater Boulevard	High	3	2.50	4	30

ConEd Power Substation (Manila Place)	High	3	2.50	4	30
ConEdison Substation (Arthur Kill Rd)	High	3	2.00	3	18
Cozzens Blvd Footbridge_High	High	3	3.00	4	36
Donjon Recycling	High	3	3.50	4	42
DOT Right of Way	High	3	2.50	4	30
FDR Boardwalk Bike Path_Extreme	Extreme	3	4.50	4	54
FDR Boardwalk Bike Path_High	High	3	4.00	4	48
Fr Capodanno Blvd_High	High	3	3.50	4	42
Fuel Tanks - Ellis Road	Moderate	3	2.00	2	12
Fuel Tanks - Mill Road	Moderate	3	2.50	2	15
Gravel Road Esplanade	High	3	3.00	4	36
Great Kills Infrastructure Systems Assets_Extreme	Extreme	3	4.00	4	48
Great Kills Infrastructure Systems Assets_High	High	3	3.00	4	36
Hylan Blvd_High	High	3	3.00	4	36
Jefferson Ave Commercial Waste Carter Garage	High	3	2.50	4	30
Main Street Footbridge_High	High	3	2.50	3	23
Microwave Tower - Midland Avenue	High	3	3.50	4	42
Midland Avenue_High	High	3	3.00	4	36
Mobil at Midland Ave	High	3	2.50	4	30
Mobil Oil Corp., Port Mobil Barge Berths Nos. 5, 6, 7, and 8.	Moderate	3	2.50	4	30
Mobil Oil Corp., Port Mobil Tanker Wharf Berth No. 1A.	Moderate	3	2.50	4	30
Mobil Oil Corp., Port Mobil Tanker Wharf Berths Nos. 1, 2, 3, and 4.	Moderate	3	2.50	4	30
Nassau SIR Station	Moderate	3	1.50	2	9
Oakwood Beach Sewage Treatment Plant	High	3	3.00	3	27
Old Town-Dongan Hills-South Beach Infrastructure Systems Assets_High	High	3	2.50	4	30
Perciballi Container Services Inc	High	3	2.50	3	23
Pier - Chemical Ln	Extreme	3	4.00	4	48
Pier - E Mansion Ave	Extreme	3	4.50	4	54

Pier - Ellis St	Extreme	3	4.00	3	36
Pier - FDR Boardwalk	Extreme	3	4.50	4	54
Pier - Great Kills Park	Extreme	3	4.50	4	54
Pier - Oceanic Ave	Extreme	3	3.00	4	36
Pier - S Buffalo St	Extreme	3	4.50	4	54
Pier - W Mansion Ave	Extreme	3	4.00	4	48
Pier - Ft Wadsworth	Extreme	3	4.50	4	54
Pier - Harbour Ct	Extreme	3	4.00	4	48
Pier - Hopping Ave	Extreme	3	4.00	3	36
Richmond Valley SIR Station	High	3	3.00	3	27
Roads_Extreme	Extreme	3	5.00	4	60
Roads_High	High	3	3.00	4	36
Seaview Avenue_High	High	3	3.00	4	36
Staten Island Railway Line_High	High	3	3.00	4	36
Tottenville SIR Station	High	3	3.00	3	27
Tracy Avenue Footbridge	High	3	2.50	3	23

Note: Assets with a value of "–" in the Exposure Score field signify that they are not located in a NYS Risk Area and therefore the Coastal Hazard and Risk Assessment Tool does not generate an Exposure Score. These assets are included in the Asset Inventory because they are considered critical or locally significant.

Table 14: Risk of Natural and Cultural Resources Assets

Natural and Cultural Resources Asset(s)	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Annadale-Huguenot-Prince_s Bay-Eltingville Natural and Cultural Resources Assets_Extreme	Extreme	3	4.00	4	48
Annadale-Huguenot-Prince_s Bay-Eltingville Natural and Cultural Resources Assets_High	High	3	2.50	4	30
Arbutus Creek	High	3	2.50	4	30
Arthur Kill	Extreme	3	3.50	4	42
Blue Heron Main Branch_Extreme	Extreme	3	3.50	4	42
Blue Heron Main Branch_High	High	3	2.50	4	30

Butler Manor	High	3	3.00	4	36
Charleston-Richmond Valley-Tottenville Natural and Cultural Resources Assets_Extreme	Extreme	3	4.00	4	48
Charleston-Richmond Valley-Tottenville Natural and Cultural Resources Assets_High	High	3	2.50	3	23
Denise Tributary	High	3	2.00	4	24
FDR Boardwalk_Extreme	Extreme	3	5.00	4	60
Gateway Nat'l Rec Area (Fort Wads-Great Kills)	Extreme	3	4.50	4	54
Gerat Kills Natural and Cultural Resources Assets_Extreme	Extreme	3	4.00	4	48
Gerat Kills Natural and Cultural Resources Assets_High	High	3	3.00	4	36
Lemon Creek_Extreme	Extreme	3	4.00	4	48
Lemon Creek_High	High	3	2.50	3	23
Mill Creek Tributary_High	High	3	2.50	4	30
Mill Creek_Extreme	Extreme	3	4.00	4	48
Mill Creek_High	High	3	3.00	4	36
Miller Field/ Gateway Nat'l Rec Area	High	3	3.50	4	42
New Dorp-Midland Beach Natural and Cultural Resources Assets_Extreme	Extreme	3	4.50	4	54
New Dorp-Midland Beach Natural and Cultural Resources Assets_High	High	3	2.50	4	30
Oakwood Beach Natural and Cultural Resources Assets_Extreme	Extreme	3	4.00	4	48
Oakwood Beach Natural and Cultural Resources Assets_High	High	3	3.00	4	36
Old Town-Dongan Hills-South Beach Natural and Cultural Resources Assets_Extreme	Extreme	3	4.50	4	54
Old Town-Dongan Hills-South Beach Natural and Cultural Resources Assets_High	High	3	2.50	4	30
Pond in Great Kills Park	High	3	3.50	3	32
Pond in Last Chance Pond Park	High	3	3.00	4	36
Pond in Ocean Breeze Park	High	3	3.50	3	32
Pond near Oakwood Beach	Extreme	3	4.50	4	54
Pond near Sharrott's Shoreline	High	3	2.50	3	23
River near Oakwood Beach	Extreme	3	4.50	4	54
South Beach Wetlands	High	3	3.00	4	36
Staten Island Jewish Community Center	None	3	-	1	0
Stream from Arthur Kill 1	Extreme	3	-	3	0
Stream from Arthur Kill 2_Extreme	Extreme	3	-	3	0

Stream from Arthur Kill 2_High	High	3	2.50	3	23
Stream in Last Chance Pond Park	High	3	3.00	4	36
Stream near Great Kills Park	Extreme	3	4.50	4	54
Stream near Sharrott's Shoreline _High	High	3	3.00	3	27
Stream near Sharrott's Shoreline_Extreme	Extreme	3	-	3	0
Wolfe's Pond_Extreme	High	3	3.50	4	42
Wolfe's Pond_High	High	3	3.50	3	32

Table 15: Risk of Assets that Serve Socially Vulnerable Populations

Asset(s) that serve Socially Vulnerable Populations	NYS Risk Area	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
A Very Special Place, Inc.	High	3	2.50	4	30
Annadale-Huguenot-Prince_s Bay-Eltingville Housing Assets_Extreme	Extreme	3	4.00	4	48
Annadale-Huguenot-Prince_s Bay-Eltingville Housing Assets_High	High	3	2.50	4	30
Association for Help of Retarded Children	High	3	2.50	4	30
Berry House Friendship Club Senior Center	Moderate	3	2.50	1	8
Charleston-Richmond Valley-Tottenville Housing Assets_High	High	3	2.00	4	24
Community Resources for Developmentally Disabled	High	3	2.50	4	30
Eden II School for Autisitc Children	High	3	3.00	3	27
Grasmere-Arrochar-Ft. Wadsworth Housing Assets_High	High	3	2.50	4	30
Great Kills Housing Assets_Extreme	Extreme	3	3.50	4	42
Hylan Communicare Health Center	High	3	2.50	3	23
Island Medical Specialists	High	3	2.50	3	23
Island Rehabilitative Services	High	3	2.50	3	23
Island Shores Assisted Living	High	3	3.00	4	36
Jesuit Home for Indigent Children, Aged, Homeless	High	3	2.50	3	23
Mission of the Immaculate Virgin	High	3	4.00	3	36

Mt. Loretto Friendship Club Senior Center	Moderate	3	2.50	1	8
New Broadview Manor Home for Adults	High	3	2.50	3	23
New Dorp-Midland Beach Housing Asset_High	High	3	2.50	4	30
Oakwood Beach Health and Social Services Assets_High	High	3	2.50	3	23
Oakwood Beach Housing Assets_Extreme	Extreme	3	4.00	4	48
Oakwood Beach Housing Assets_High	High	3	2.50	4	30
Old Town-Dongan Hills-South Beach Health and Social Services Assets_High	High	3	2.50	4	30
Old Town-Dongan Hills-South Beach Housing Assets_High	High	3	2.50	4	30
On Your Mark, Inc.	High	3	2.50	3	23
Our Place School	High	3	2.50	3	23
Primary Care Clinic	High	3	2.50	3	23
PS 38 George Cromwell	High	3	2.50	4	30
Richmond University Medical Center (RUMC)	None	3	-	1	0
Smiles Around US 2	High	3	2.50	4	30
South Beach Psychiatric Center	High	3	2.50	3	23
South Beach Senior Center	Moderate	3	2.50	1	8
South Richmond High School	Moderate	3	2.50	1	8
Special Tees	High	3	2.50	3	23
St. Margaret Mary's School	High	3	2.50	4	30
Staten Island Community Center	High	3	2.50	4	30
Staten Island Developmental Disabilities Services Office	Extreme	3	4.00	4	48
Staten Island Jewish Community Center	None	3	-	1	0
Staten Island University Hospital - North Campus	Moderate	3	3.00	2	18
Staten Island University Hospital - South Campus	Moderate	3	2.00	1	6
Tottenville High School	None	3	-	1	0
United Cerebal Palsy	High	3	2.50	3	23
Wonder Years Preschool	High	3	2.50	4	30

E: Economic Profile

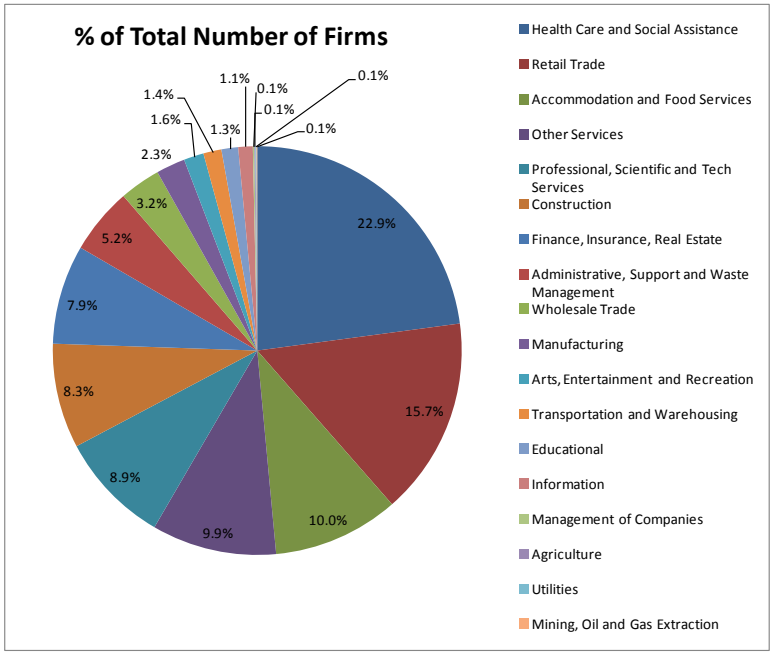
East and South Shore Businesses

The business community in the Community is mostly comprised of small businesses that serve the surrounding residential community, yet in total these small businesses generate significant jobs and taxable revenue.[i] According to Claritas, there are approximately 3,500 businesses in the Community that employ 25,000 individuals, generating revenues of over $6.5 billion annually. Most of these businesses are small scale, with a median of 3 employees per business and only 1.3% of companies have more than 50 workers. These companies are fairly well-established, reporting being open for eight years on average, illustrating a high level of market support within the community. Geographically, most businesses are concentrated along Hylan Boulevard between Rosebank and Oakwood. There are smaller concentrations of businesses located along Amboy Road, Ellis Street, Mansion Avenue, Father Capodanno Boulevard, Seaview Avenue, Midland Avenue, and Sand Lane.

The Staten Island University Hospital (SIUH) is one of the largest employers in the Community and a generator of significant economic activity. According to the "HANY Community Benefits Reports, January 2013," the two hospitals generate nearly $1.3 billion in direct and indirect economic impact and employ 5,824 Staten Island residents. Further discussion of SIUH has been excluded from this analysis since it and other large health care institutions such as the South Beach Psychiatric Center are discussed in the *Health and Social Services* section of this report. The many businesses that support and are supported by the Hospital include doctor's offices located outside the hospital, including primary care physicians, dentists, and psychiatrists, which are considered below as they are significant contributors to the local business community.

The Community can be characterized as a fairly mature residential community with a large number of Health Care and Social Assistance (23%), Retail Trade (16%), and Accommodation and Food Services (10%) businesses. These sectors represent nearly half of all businesses located in the Community. The remaining businesses are fairly well diversified and represent a number of sectors, including Other Services (auto repair shops, hair salons, appliance repair shops, etc.); Professional, Scientific and Tech Services; Construction; and Finance, Insurance and Real Estate ("FIRE").

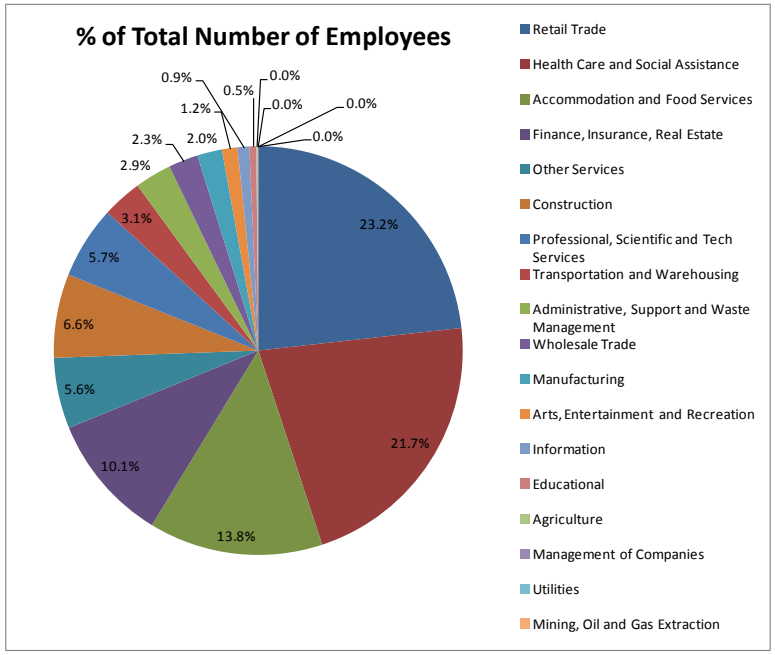
Figure 35: East and South Shore Businesses - Percentage of Total Number of Firms



Source: Claritas

Business sectors were also ranked to identify the largest employers in the Community. The following chart presents the employment sectors for Community businesses by number of employees.

Figure 36: East and South Shore Businesses - Percentage of Total Number of Employees



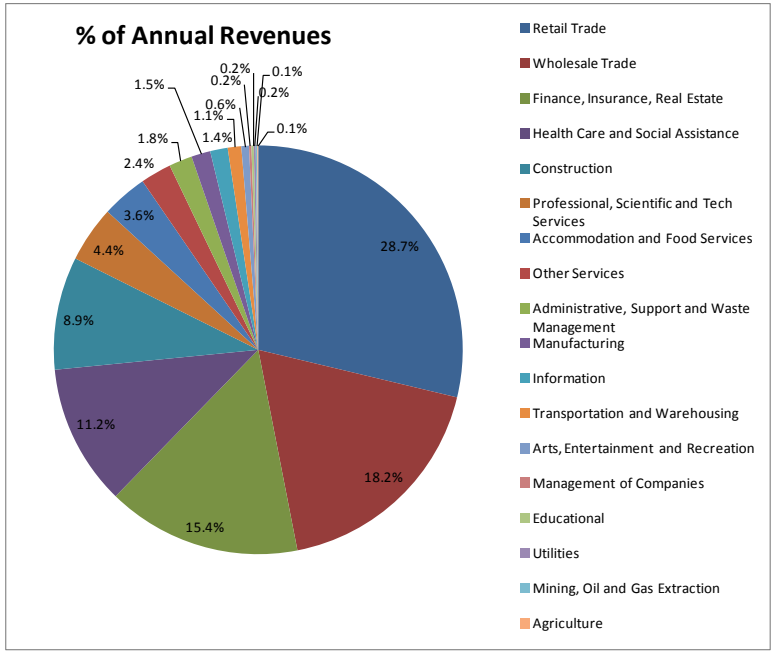
Source: Claritas

Retail businesses in the Community have the highest total number of employees with the Health Care and Social Assistance sector employing the second highest number of employees. The Accommodation and Food Services sector is also a major employer. Combined, these three sectors represent nearly 60% of the private sector jobs in the Community. Given typical compensation levels for employees working at retail stores, restaurants and for unskilled positions in medical offices, these jobs often result in incomes below levels necessary to afford local housing options. For example, the average annual wages for Richmond County Retail Trade, Accommodation and Food Service,

and Health Care workers were $25,345, $16,023, $44,975, respectively, in 2012.

These statistics reinforce the findings in the *Housing Needs Assessment* section of this plan, which analyzed the challenges of housing affordability in the Community. While many of the residents purchased their homes when they were affordable and have been long time residents, if they do not have access to low- or no-cost funds to repair damage caused by Superstorm Sandy, there may be few affordable options for relocating within the community. For those that remain, local jobs do not provide concentrations of higher- income employment opportunities. Due to this constraint, it is imperative that there is effective, reliable and more-resilient transportation between the Community and concentrations of higher-paying jobs in the region or elsewhere on Staten Island.

Figure 37: East and South Shore Businesses - Percentage of Total Revenues



Source: Claritas

In terms of annual revenues generated by the businesses in the Community, the Other Services, Wholesale Trade and FIRE businesses in the Community each generate over $1 billion each, with Retail Trade businesses totaling nearly $1.9 billion in annual revenue.

Although the Health Care and Social Services and Accommodation and Food Services sectors represent a significant number of businesses (23%) and generate a high number of private sector jobs (21%), annual revenues per business for these businesses are significantly lower than for some of the other sectors (11%), implying relatively low paying jobs. For the Accommodation and Food Services sector, this likely reflects the high number of convenience and low-priced restaurants located in the Community, and the relatively few upscale dining facilities.
Business Segmentation, Employment and Revenues

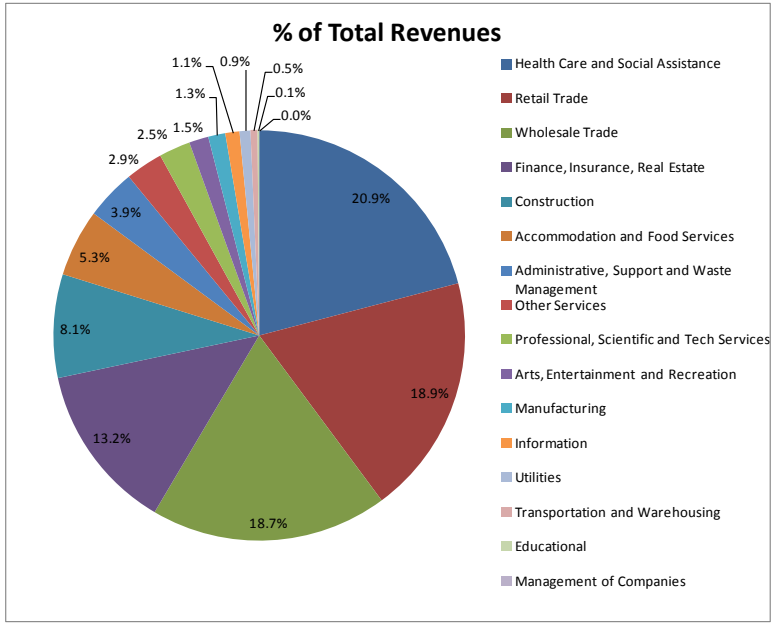
The segmentation by business for the Extreme and High Risk Areas is similar to those for the overall Community, with the Health Care and Social Assistance; Retail Trade; Accommodation and Food Services; and Other Services sectors representing the highest ratio of total businesses and total number of employees. However, the higher risk areas have an even greater concentration of these business types and are therefore less diversified economically. In part, the high concentration of Health Care and Social Assistance businesses in the higher risk areas likely results from the presence of SIUH.

There are some significant differences in terms of annual revenues by sector for the riskier areas compared with the overall Community. Health Care and Social Assistance businesses generate the largest aggregate annual revenues due to the relatively higher concentration of Health Care related businesses in the higher risk areas.

As in the Community, Accommodation and Food Services businesses in the higher risk areas generate relatively lower revenues despite representing a large number of businesses and employees.

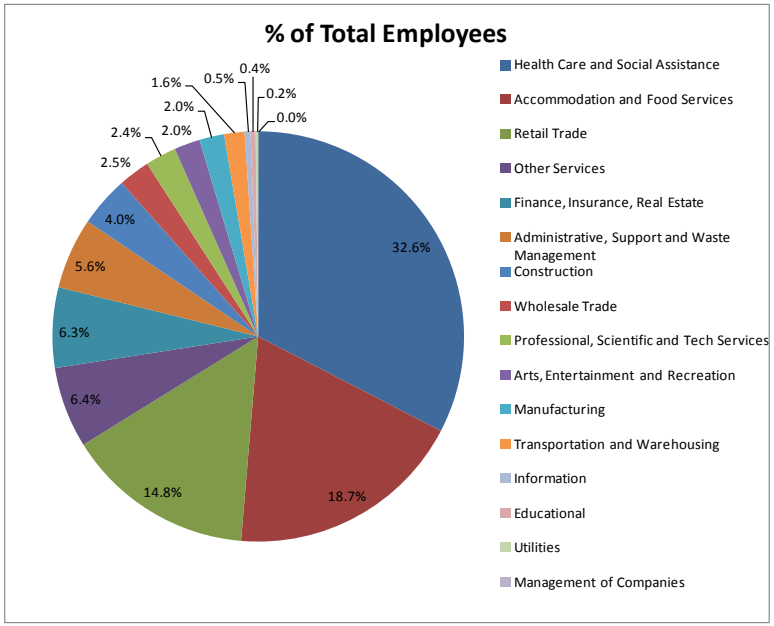
Businesses in the High and Extreme Flood Risk areas are heavily concentrated in the Health Care and Social Services and Accommodation and Food Service sectors. Access to health care and food is essential for any residential community and ensuring the resilience of these businesses from future storms is paramount. Without strategies to protect the existing businesses and encourage growth of existing and new businesses, the State, City and local community will experience a decreased level of services available to its residents, fewer jobs, and decreased real estate and retail tax revenues.

Figure 38: High and Extreme Flood Risk Areas - Percentage of Total Number of Businesses



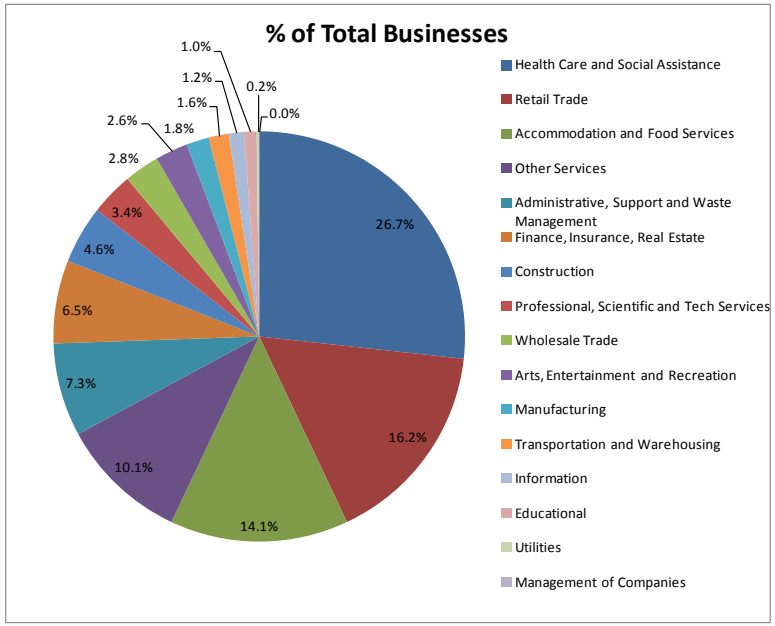
Source: Claritas

Figure 39: High and Extreme Flood Risk Areas - Percentage of Total Number of Employees



Source: Claritas

Figure 40: High and Extreme Flood Risk Areas - Percentage of Total Number of Businesses



Source: Claritas

F: Housing Profile

The following tables represent the historic and projected trends in population and households for the Community.

Table 16: Population and Household Trends

Statistic	US Census 2000	US Census 2010	Claritas 2012	Claritas 2017	CAGR 2000-2012	CAGR 2012-2017
Population	127,536	138,563	139,557	141,216	0.8%	0.2%
Population by Age						
Under 15 Years	25,868	25,033	24,463	23,709	-0.5%	-0.6%
15-17 Years	4,874	5,664	5,474	5,252	1.0%	-0.8%
18-24 Years	9,851	12,084	12,281	12,087	1.9%	-0.3%
25-34 Years	18,268	16,782	17,030	17,822	-0.6%	0.9%
35-44 Years	22,200	20,132	19,004	17,448	-1.3%	-1.7%
45-54 Years	17,888	22,645	22,186	20,772	1.8%	-1.3%
55-64 Years	11,982	17,454	18,590	20,398	3.7%	1.9%
65 Years and Older	16,605	18,769	20,529	23,728	1.8%	2.9%
Statistic	**US Census 2000**	**US Census 2010**	**Claritas 2012**	**Claritas 2017**	**CAGR 2000-2012**	**CAGR 2012-2017**
Households	45,892	49,888	50,176	50,742	0.7%	0.2%
Average HH Size	2.78	2.78	2.78	2.78	0.0%	0.0%

The data presented in above may not fully reflect the impact of Superstorm Sandy, but does provide a context for the future of the local business community. Although the Community is experiencing a rate of population growth that is higher than some areas of New York City, and new residential development has occurred in the Community in the last ten years, it remains primarily a mature residential neighborhood. As such, significant market demand supporting revenue growth for local businesses will likely result from attracting new shoppers to the area rather than from growth within these neighborhoods. Given the impact of New York State's NY Rising Buyout Program,

it is possible that residential populations within the High and Extreme Risk Areas could decrease, resulting in a more challenging environment for existing businesses.

East and South Shore Demographic Profile

Population and Households

Trends in population and households provide an essential context for an analysis of the Community's housing inventory. The following table presents population statistics for 2000 and 2010 from the U.S. Census with estimates from Claritas for 2012 and 2017. Given the lead-time required by companies that collect demographic data to prepare their forecasts, it is unlikely that the 2012 and 2017 estimates fully consider the impact of Superstorm Sandy. However, these data points provide an indication of what normalized growth for the area would be.

Table 17: East and South Shore Population Trends

Statistic	US Census 2000	US Census 2010	Claritas 2012	Claritas 2017	CAGR 2000-2012	CAGR 2012-2017
Population	127,536	138,563	139,557	141,216	0.8%	0.2%
Population by Age						
Under 15 Years	25,868	25,033	24,463	23,709	-0.5%	-0.6%
15-17 Years	4,874	5,664	5,474	5,252	1.0%	-0.8%
18-24 Years	9,851	12,084	12,281	12,087	1.9%	-0.3%
25-34 Years	18,268	16,782	17,030	17,822	-0.6%	0.9%
35-44 Years	22,200	20,132	19,004	17,448	-1.3%	-1.7%
45-54 Years	17,888	22,645	22,186	20,772	1.8%	-1.3%
55-64 Years	11,982	17,454	18,590	20,398	3.7%	1.9%
65 Years and Older	16,605	18,769	20,529	23,728	1.8%	2.9%

Source: Claritas

The Community includes mature residential neighborhoods that have historically experienced steady growth since 2000. Prior to Sandy, the area was forecast to experience a reduced rate of growth between 2012 and 2017, with increases in population of 25 to 34 years old, and 55 years and older age segments. These forecasts suggest increasing future demand for age-restricted, active senior, assisted living and nursing home residences.

It is of particular note that the 65-years-and-older age segment is anticipated to be the fastest growing between 2012 and 2017, adding nearly 3,200 older residents during this period. This data suggests that the fastest growing population segment—those over the age of 65 - are also one of the most vulnerable.

Table 18: East and South Shore Household Trends

Statistic	US Census 2000	US Census 2010	Claritas 2012	Claritas 2017	CAGR 2000-2012	CAGR 2012-2017
Households	45,892	49,888	50,176	50,742	0.7%	0.2%
Average HH Size	2.78	2.78	2.78	2.78	0.0%	0.0%

Source: Claritas

Trends in households mirror changes in population for the Community and also reflect a mature residential community. The average household size has remained consistent throughout the historical period and is anticipated to remain at this level through 2017. This stability in household size illustrates the Community's continuing appeal to families and suggests that, at minimum, two-bedroom residences would be most supported by potential market demand.

Household Incomes

The following table presents household income data for the Community. Here, 2011 data from the American Community Survey is presented instead of the 2010 US Census.

Table 20: East and South Shore Median Household Income

Statistic	US Census 2000	2011 ACS 5Yr	Claritas 2012	Claritas 2017	CAGR 2000-2012	CAGR 2012-2017
Median HH Income (2010 based on ACS 2011 inflation adjusted dollars)	$ 76,495	$ 75,718	$ 75,731	$ 84,547	-0.1%	2.2%

Source: Claritas

Household incomes have declined slightly in the Community since 2000, but remain much higher than City-wide averages. Although incomes were forecast to recover between 2012 and 2017, this data likely does not consider the impact of Superstorm Sandy. Given the decline in revenues experienced by local businesses and that some of these employers have reduced staff over the past year, as well the on-going challenges faced by the regional economy, household incomes may have declined for many local residents.

The household income data was also compared to the annual wages by sector for businesses located in the Community. According to the Bureau of Labor Statistic's *Quarterly Census of Employment and Wages*, the annual wages for the Retail, Healthcare, and Accommodations and Food Services sectors (the three largest in terms of employment) were $25,345, $44,975 and $16,023, respectively, in 2012. This wage data is well below the 2012 median household incomes, implying that many area residents commute outside their neighborhoods for work and that most households have two incomes or more.

The percent of the population living below the poverty level was also analyzed, and is presented below.

Table 9: East and South Shore Poverty Status

Statistic	US Census 2000	US Census 2010	Claritas 2012	Claritas 2017	CAGR 2000-2012	CAGR 2012-2017
Poverty Status						
Population Living Below Poverty Level	6.4%	6.9%	6.4%	6.5%	0.0%	0.3%

Source: Claritas

Unlike the population by age data, which suggests strong growth in a potentially vulnerable population, poverty status for the Community is expected to remain stable during the forecast period, with no large increase in this vulnerable population expected in the near term. Again, these forecasts may not fully reflect the impact of Sandy on local employers, so it is likely that the population living below the poverty level has increased.

Combined, data on household income levels and available poverty status reveal that the Community is a middle-class community, with higher incomes and lower poverty rates than for the City overall. Data limitations of demographic forecasts hinder a complete understanding of trends in at-risk populations, but at least one population group (residents 65 years and older) is anticipated to grow at a fast rate.

East and South Shore Housing Inventory

Information on the local housing inventory was obtained from the U.S. Census for 2000 and 2010, and from Claritas for 2012 and 2017. Again, it is likely that the Claritas estimates do not fully reflect the impact of Superstorm Sandy, given the lead time required by demographic forecasting firms.

According to Claritas, the median Year Built for housing units in the Community as of 2012 was 1972, and was expected to increase to 1974 by 2017, indicating that the East and South Shores of Staten Island are mature neighborhoods.

The table below presents other housing unit statistics for the Community's housing inventory.

Table 22: East and South Shore Housing Unit Statistics

Statistic	US Census 2000	% of Total	US Census 2010	% of Total	Claritas 2012	% of Total	Claritas 2017	% of Total	CAGR 2000-2012	CAGR 2012-2017
Total Housing Units	48,142	100%	53,120	100%	53,412	100%	54,007	100%	0.9%	0.2%
Occupied Units	45,892	95%	49,888	94%	50,176	94%	50,742	94%	0.7%	0.2%
Owner Occupied	30,792	64%	33,831	64%	34,053	64%	34,453	64%	0.8%	0.2%
Renter Occupied	15,100	31%	16,057	30%	16,123	30%	16,289	30%	0.5%	0.2%
Vacant Units	2,250	5%	3,232	6%	3,236	6%	3,265	6%	3.1%	0.2%

Source: Claritas

Trends in the Community's housing inventory were similar to trends in population, with slight growth during the historic period that is anticipated to slow in the upcoming five years.

The housing inventory in the East and South Shores is atypical for New York City and more reflective of a middle class neighborhood in the outlying suburbs. Nearly two thirds of the housing units in the Community are owner occupied, with less than one third of residents renting their homes.

Vacancy rates are relatively low, but are slightly higher than city-wide averages. However, with a 6% housing vacancy level, there is little available supply to accommodate homeowners and renters if a storm damages a significant portion of the housing stock. As indicated below, approximately 14% of the Community's housing units are located in High and Extreme Flood Risk Areas - the locations that experienced significant flooding and damage during Sandy. If the housing inventory is significantly reduced in a weather event, it is likely that displaced residences will have to relocate outside of their neighborhoods, at minimum, on a temporary basis.

The relatively low vacancy level also impacts the Community's ability to accommodate volunteers, who relocate on a very short-term basis and provide immediate "boots on the ground" relief in distressed areas. Public meetings indicated that housing these volunteers was problematic in the days and weeks after the storm, which supports the findings of limited availability.

Given that home owners represent nearly two of every three residents in the Community, they will likely have a higher financial and emotional commitment to their homes and neighborhoods. While renters typically have a minimal financial investment in their homes and can relocate more easily, homes are often an owner's primary financial investment.

Conversely, one in three residents in the Community is a renter and there is little assistance directed toward them. If the proportion of renters in the Community increases significantly (see the Affordability Analysis below), the need for renter-oriented assistance programs will grow.

G: Regional Plans

Regulatory

The New York State Coastal Management Program Document (Coastal Management Zone, National Oceanic and Atmospheric Administration, 2006)

New York City Local Waterfront Revitalization Program (Coastal Zone Management, US National Oceanic and Atmospheric Administration, 2002)

Rebuilding After Hurricane Sandy: A Guide to New Code and Zoning Standards - For Industry professionals (New York City Department of Buildings, June 10, 2013)

New York City Community Development Block Grant- Disaster Recovery Action Plan (New York City, May 10, 2013)

New York State Community Development Block Grant Action Plan (New York State Homes and Community Renewal Office of Community Renewal, April 2013)

Staten Island Bluebelt Program (New York City Department of Environmental Protection)

Advisory

Governor's 2100 commission report: "Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure" (NYS 2100, 2012)

A Stronger, More Resilient New York (SIRR) (NYC Special Initiative for Rebuilding and Resiliency, June 2013)

Coastal Climate Resilience: Urban Waterfront Adaptive Strategies (New York City, Department of City Planning for the New York and Connecticut Sustainable Communities Consortium, June 2013)

Coastal Climate Resilience: Designing for Flood Risk (New York City, Department of City Planning, June 2013)

Hurricane Sandy: After Action (New York City Mayor's Office, May 2013)

Proposed Flood Resilience Text Amendments (New York City Department of City Planning, May 20, 2013)

Staten Island Damage Assessment – US Federal Emergency Management Agency (CUNY HPC Social Policy Simulation Center)

Hurricane Sandy Rebuilding Strategy (U.S., Hurricane Sandy Rebuilding Task Force, 2012)

Gateway National Recreation Area: Draft General Management Plan Environmental Impact Statement (National Park Service, US Department of the Interior, July 2013)

Climate Change Adaptation in New York City: Building a Risk Management Response (New York City Panel on Climate Change, 2010)

Superstorm Sandy Forum: A Serious Conversation about the Future of Staten Island Opening Remarks (Dr. William J. Fritz, College of Staten Island, January 16, 2013)

Five Points to Protect Staten Island from Future Storm Surges (William J. Fritz, February 11, 2013)

Staten Island Damage Assessment (Katherine Brigandi, The College of Staten Island, January 18, 2013)

Global Sea Level Rise Scenarios for the United States National Climate Assessment (National Oceanic and Atmospheric

Administration, Army Corps of Engineers, United States Geographical Survey, SERDP, 2012)

Timeline of Regional Transportation Recovery immediately post-Sandy (Afrona Kaziu, CSI)

REVIEW PLAN: South Shore of Staten Island, NY Storm Damage Reduction Study (US Army Corps of Engineers, New York District, November 2012)

Geomorphic Impact of Hurricane Sandy on Staten Island, NY (Alan I. Benimoff, CSI, March 20, 2013)

Impacts of Superstorm Sandy: Coastal Adaptation for Affected Parks and Revegetation Staten Island Unit, Gateway NRA NY

National Park Service — Department of the Interior (Rutgers University c/o National Park Service, June 27, 2013)

Hurricane Sandy Destruction, Recovery, Mitigation, Resilience and Sustainability (Millennium Strategies, LLC, March 13, 2013)

US Army Corps of Engineers Regional Comprehensive Study (NACCS) (US Army Corps of Engineers, August 15, 2013)

New York City Comprehensive Waterfront Plan - Vision 2020 (New York City, Department of City Planning, March 2011)

Waterfront Vision and Enhancement Strategy (WAVES) (New York City Mayor's Office, March 2011)

PlaNYC (New York City, April 2011)

PlaNYC Progress Report 2012 (PlaNYC, 2012)

Flood-Resilient Waterfront Development in New York City: Bridging Flood Insurance, Building Codes, and Flood Zoning (Institute for Environmental Studies, Vrije Universiteit, Amsterdam, the Netherlands, June 2011)

Cost estimates for flood resilience and protection strategies in New York City (Institute for Environmental Studies, Vrije Universiteit, Amsterdam, the Netherlands, 2013)

Preliminary Survey of Wetland Areas (PlaNYC, 2010)

Sustainable Stormwater Management Plan (PlaNYC, 2012)

Climate Risk Information (NYC Panel on Climate Change, 2009)

Storm Surge Model for NY, CT, and Northern Waters of NJ with special emphasis on New York Harbor, Paper No, 156-27 (Alan I. Benimoff, CSI, November 6, 2012)

Protecting New York as an Ecosystem (Dr. Franco Monalto, PE, January 16, 2013)

H: End Notes

[1] 2010 U.S. Census.

[2] U.S. Census American Community Survey 2011 5-year data.

[3] U.S. Census American Community Survey 2011 5-year data.

[4] A Stronger, More Resilient New York, 2013.

[5] Staten Island Advance, Con Ed, National Grid response to Hurricane Sandy on Staten Island was poor, January 23, 2013.

[6] New York City Department of Environmental Protection, New York City's Wastewater Treatment System: http://www.nyc.gov/html/dep/html/wastewater/wwsystem-plants.shtml

[7] http://www.whitehouse.gov/blog/2012/11/15/president-obama-meets-sandy-survivors-staten-island

[8] http://www.nycgovparks.org/parks/wolfespondpark/highlights/12304

[9] The study uses a low income threshold of $35,000 per household. To actuate the analysis the American Community Survey (ACS, 2007-2011) was used to estimate the households making a low percentage of the median income, typically used as standard thresholds for income definitions for federal assistance. Since the ACS uses tranches (for instance between 0 and $10,000 Household Income) the analysis required to accept the first two tranches of $0-$35,000 to define the household income. This then provides a percentage estimation of the total household population making less than 36% of the Median Household Income. This figure is based on a percentage of the overall Nassau County Median Household Income of $97,000. Various Federal organizations define income thresholds in terms of Household Median Income at the 20%, 50%, and 80% thresholds. As this analysis wanted to identify households making below 50% this metric was assumed the most appropriate.

[10] U.S. Census American Community Survey 2011 5-year data.

[11] U.S. Census American Community Survey 2011 5-year data.

[12] *Local Multi-Hazard Mitigation Guidance*, FEMA, July 1, 2008, pp. 42-43

[13] http://new.mta.info/news-staten-island-new-york-city-transit-railway-station-tottenville-arthur-kill/2013/10/18

[14] U.S. Census American Community Survey 2011 5-year data.

[15]http://www.nyc.gov/html/oem/html/planning_response/planning_hazard_mitigation_2014.shtml

[16] U.S. Census.

[17] http://www.silive.com/news/index.ssf/2013/12/post_632.html

[18] Claritas.

[19] PLUTO.

[20] To estimate the potential sales tax at risk in the High and Extreme Risk Flood Areas, annual revenues for businesses in the Retail Trade; Arts, Entertainment and Recreation; Accommodation and Food Services; and Other Services sectors paying retail taxes were added and an 8.875% sales tax rate was applied. While this is only a high-level estimate (does not exclude apparel under $110 and does not include other applicable sales tax items),

[21]http://www.silive.com/news/index.ssf/2013/12/city_agencies_give_us_ideas_fo.html

[22] https://www.nationalgridus.com/aboutus/a3-1_news2.asp?document=7563

[23] 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. Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009, EXECUTIVE OFFICE OF THE PRESIDENT COUNCIL OF ECONOMIC ADVISERS, May 2009.

[24] Claritas

I: Glossary

Base Flood Elevation (BFE)
Water surface elevation corresponding to a flood having a one percent probability of being equaled or exceeded in a given year (100-year floodplain).

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.

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 Development Block Grant-Disaster Recovery (CDBG-DR)
HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. CDBG-DR is a type of funding appropriated by congress to help rebuild and provide seed money for recovery activities. Further information on CDBG-DR funds and other disaster recovery grants is available at http://portal.hud.gov/.

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.

NYRCR Committee
The NYRCR Planning Committee is composed of local civically minded residents and was established to help develop a plan that accurately reflect's 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 allocation 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.

Recovery Support Functions
The Recovery Support Functions (RSFs) comprise the National Disaster Recovery Framework's (NDRF's) coordinating structure for key functional areas of assistance. Their purpose is to support local governments by facilitating problem solving, improving access to resources and by fostering coordination among State and Federal agencies, nongovernmental partners and stakeholders.

The six RSFs are: "Community Planning and Capacity Building," "Economic Development," "Health and Social Services," "Housing," "Infrastructure," and "Natural and Cultural Resources."

Risk Reduction Benefits
A qualitative analysis of reduction in risk to assets that results from implementation of each potential NYRCR project was

prepared for each project. Three factors contribute to risk: hazard, exposure and vulnerability. The Coastal Hazard and Risk Assessment Tool was utilized, where applicable, to quantify risk reduction benefits. The Tool was assumed to apply to implementation projects within the theme 'Coastal Protection,' as it is intended to measure the risk for coastal communities and test whether various projects would reduce the risk to those assets. In this case, a snapshot of reduction in the risk score to assets is provided. Where the Coastal Hazard and Risk Assessment Tool do not apply, Risk Reduction benefits were described in terms of the qualitative mitigation of hazard, exposure and vulnerability.

Risk reduction benefits consider the population positively impacted by the project, either directly or indirectly. This population can be local or regional, ranging from a discrete street to the NYRCR Community or the entire community of Bay Park/East Rockaway. While this plan evaluates the potential risk reduction benefits, actual benefits may vary depending on project design and circumstances arising during implementation; the Final NYRCR Plan does not provide a guarantee of risk reduction, but rather a projected, and intended, benefit to minimizing risk for a given population.

Risk Reduction Benefits resulting from the proposed project were qualitatively evaluated using ESRI Community Analyst. Population data was gathered at the census tract or block group level depending on the size of the project. If the project was expected to have very localized effects in an area that was much smaller than a block group, a polygon was drawn manually in ESRI to serve as the study area and the data corresponding to that polygon was used instead. The size of the study area was determined based on the project description. The specific data set used was from the Demographic and Income Profile (DANDI) ESRI Forecasts for 2013 based on US Census Bureau 2010 Census data.

Some projects, such as select capacity building or economic development projects, may not directly reduce risk, however they provide other significant benefits to the Bay Park/East Rockaway Community in the categories below.

Economic Benefits: Economic benefits considered for the purpose of the NYRCR Plan include estimated permanent and temporary jobs secured or added, contribution to a Regional Economic Development Plan, estimated potential increase in economic activity (as applicable), and net effect on local government expenditures for disaster recovery (such as reduced emergency and recovery costs).

In estimating the job-years created by direct government spending, the NYRCR Plan utilizes the simple rule provided by the Office of the President Council of Economic Advisors that $92,000 creates one job-year. This procedure is somewhat crude and does not take into account the obvious differences in wages and other costs across different types of projects and across different parts of the country. It does; however, take into account the key difference between tax changes or state fiscal relief, and direct government investment spending. The rule's key virtue is its simplicity and conservatism. Because it is derived to be consistent with the macroeconomic jobs estimates, it minimizes discrepancies between the aggregate jobs estimates across the various geographies.

Environmental Benefits: Environmental Benefits of potential NYRCR projects include the environmental assets secured by the potential project, as well as the environmental remediation or cleanup provided by the project and open space created by the project. Each project was evaluated for its impacts on high-priority habitat defined as a habitat type with unique or significant value to one or more species, threatened and endangered species, migration or habitat connectivity. Benefits to environmental quality were also noted, such as improving air, surface and ground water quality.

Health and Social Benefits: Health and Social Benefits resulting from the proposed project were qualitatively evaluated using ESRI Community Analyst. Population data was gathered at the census tract or block group level depending on the size of the project. If the project was expected to have very localized effects in an area that was much smaller than a block group, a polygon was drawn manually in ESRI to serve as the study area and the data corresponding to that polygon was used instead. The size of the study area was determined based on the project description. The specific data set used was from the Demographic and Income Profile (DANDI) ESRI Forecasts for 2013 based on US Census Bureau 2010 Census data.

Projects were evaluated for their health and social services benefits to the community by considering the following benefit types:

1. "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.
2. "Type and population size of socially vulnerable population secured" was evaluated across four categories of socially vulnerable populations:
   - poverty/low income (annual household income less than $35,000)
   - elderly population (over age 65 years)
   - minority population
3. "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).

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).