

Priorities from Public Engagement in the East and South Shores of Staten Island

Since the Special Initiative for Rebuilding and Resiliency (SIRR) was launched in December 2012, the input of local stakeholders has helped shape an understanding of what happened during Sandy; what risks the East and South Shores face in relation to climate change and what approaches make sense to address these risks.

The East and South Shores are represented by a wide array of elected officials at the Federal, State, and local levels. They also are represented by three Community Boards. The area is served further by a large number of community-based organizations, civic groups, faith-based organizations, and other neighborhood stakeholders. All played an important role in relief and recovery efforts after Sandy. Throughout the process of developing this plan, SIRR staff benefited from numerous working sessions—both formal and informal—with these groups and individuals, including, in the East and South Shores, two task forces that met regularly.

SIRR also held two public workshops in March of 2013 in Staten Island, part of a series of such workshops held citywide in which over 1,000 New Yorkers participated to discuss issues affecting their neighborhoods and communicate their priorities for the future of their homes and communities. On the East and South Shores, attendees expressed concern that programs designed to work in other boroughs of the city may not work in these communities. Generally, the on-the-ground insights provided at these public workshops helped SIRR staff to develop a deeper understanding of the specific priorities of, and challenges facing, the communities of the East and South Shores.



East and South Shores of Staten Island community outreach workshop

Task Force	Briefing Frequency	# of Stakeholders from the East and South Shores
Elected Officials	Monthly	<ul style="list-style-type: none"> • ~13 City, State, Federal elected officials
Community-based Organizations	4 - 6 weeks	<ul style="list-style-type: none"> • 3 community boards • 20+ faith-based, business, and community organizations

Overall, out of the various task force and other meetings and public workshops attended by SIRR staff since January, several priorities for the East and South Shores and the SIRR effort at large clearly emerged:

- Developing coastal/shoreline protections, while still ensuring public access to the waterfront;
- Protecting low-lying areas, by exploring more effective drainage systems, including the

accelerated build-out and ultimate completion of Bluebelts;





- Developing programs to address the financial and physical challenges of rebuilding homes;
- Revitalizing local business corridors and waterfronts and marinas; and
- Preserving neighborhood character and affordability during neighborhood recovery and rebuilding



















East and South Shores of Staten Island community outreach workshop

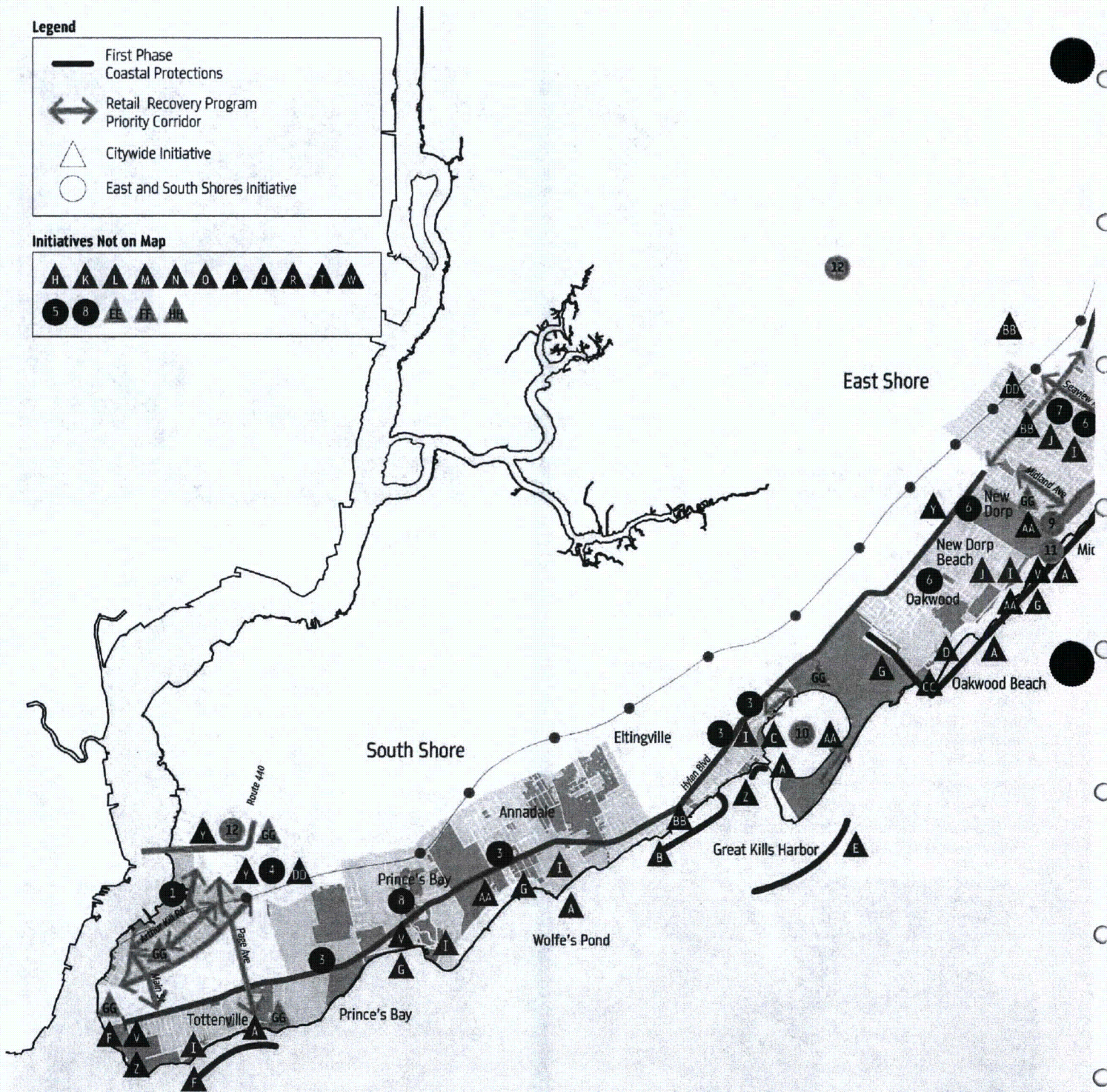
EAST AND SOUTH SHORES STATEN ISLAND | Initiative Summary

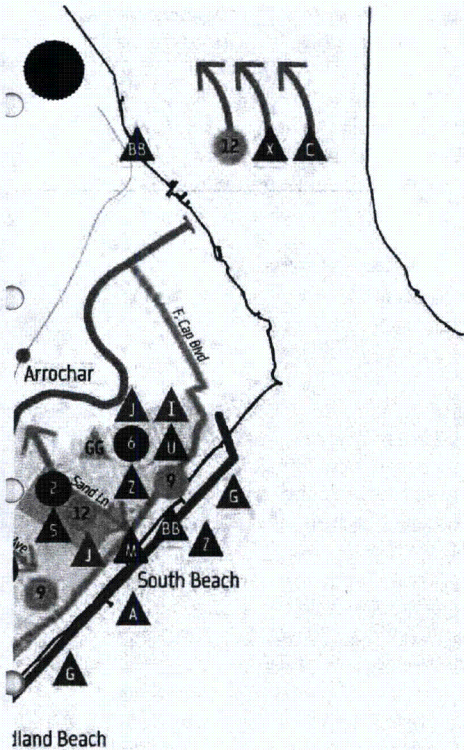
Legend

-  First Phase Coastal Protections
-  Retail Recovery Program Priority Corridor
-  Citywide Initiative
-  East and South Shores Initiative

Initiatives Not on Map

-  H
-  K
-  L
-  M
-  N
-  O
-  P
-  Q
-  R
-  T
-  W
-  5
-  8
-  EE
-  FF
-  HH





Coastal Protection

- Selected Citywide Measures**
- A** Complete short-term beach nourishment, dune construction, and shoreline protection on Staten Island
 - B** Install armor stone shoreline protection (revetments) on Staten Island
 - C** Raise bulkheads in low-lying neighborhoods to minimize inland tidal flooding
 - D** Call on and work with the USACE to complete emergency floodgate repairs at Oakwood Beach
 - E** Call on and work with the USACE to develop an implementation plan for the installation of offshore breakwaters adjacent to and south of Great Kills Harbor
 - F** Call on and work with the USACE to develop an implementation plan for, and install, living shorelines for wave attenuation in Tottenville.
 - G** Call on and work with the USACE to complete existing studies on Staten Island and implement coastal protection projects
- * For additional Coastal Protection initiatives, see Coastal Protection section of Community Plan

- 1** Call on and work with the USACE to study the construction of a floodgate at Mill Creek

Buildings

- Selected Citywide Measures**
- H** Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain
 - I** Rebuild and repair housing units destroyed and substantially damaged by Sandy
 - J** Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain
 - K** Amend Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings
 - L** Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate
 - M** Launch a sales tax abatement program for flood resiliency in industrial buildings
 - N** Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain
 - O** Amend the building code to improve wind resiliency for existing buildings and complete studies of potential retrofits
- * For additional Buildings initiatives, see Buildings section of Community Plan

Critical Infrastructure

- Selected Citywide Measures**
- P** Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding
 - Q** Work with utilities and the PSC to harden vulnerable overhead lines against winds
 - R** Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding
 - S** Require the retrofitting of existing hospitals in floodplains
 - T** Require retrofitting of nursing homes in floodplains
 - U** Require retrofitting of adult care facilities in floodplains
 - V** Reconstruct and resurface streets damaged by Sandy
 - W** Elevate traffic signals and provide backup electrical power
 - X** Protect Staten Island Ferry and private ferry terminals from climate change-related threats
 - Y** Call on non-City agencies to implement strategies to address climate change threats
 - Z** Restore city beaches
 - AA** Harden or otherwise modify shoreline parks to protect adjacent communities
 - AB** Harden pumping stations
 - AC** Harden wastewater treatment plants
 - AD** Continue to implement and accelerate investments in Bluebelts across the city
- * For additional Critical Infrastructure initiatives, see Critical Infrastructure sections of Community Plan

- 2** Assist Staten Island University Hospital in applying for hazard mitigation funding
- 3** Implement and expedite roadway and sewer capital projects along Hylan Boulevard, especially in vulnerable South Shore areas
- 4** Call on and work with the MTA to create an implementation plan for the relocation of Richmond Valley SIR station to Page Avenue
- 5** Study potential new ferry routes serving Staten Island and issue Request for Expression of Interest to gauge market interest
- 6** Secure available Federal funding to implement the Community Wildfire Protection Plan for fire-prone areas on the East Shore
- 7** Launch the first capital project for the Mid-Island Bluebelt in Midland Beach
- 8** Explore expansion of the City's mitigation banking pilot as a funding mechanism to facilitate the construction of the Mid-Island and South Shore Bluebelts

Community & Economic Recovery

- Selected Citywide Measures**
- EE** Launch business recovery and resiliency programs
 - FF** Launch the Neighborhood Game-Changer Competition
- Call for Neighborhood Retail Recovery Program**
- Great Kills Harbor (Full length of Mansion Avenue; portion of Buffalo Street adjoining Nichols Marina)
 - Hylan Boulevard (between Seaver Ave and New Dorp Lane); Main Street Tottenville (between Ellis Street and Amboy Road)
 - Main Street Tottenville (between Ellis Street and Amboy Road)
 - Midland Avenue (between Mason Avenue and Father Capodanno Blvd.)
 - Page Avenue Corridor (all streets between Arthur Kill Road, Nassau Place/Bethel Avenue, Amboy Road, Page Avenue, and Route 440)
 - Sand Lane (Sand Lane, between McClean Avenue and Father Capodanno Blvd., and Robin Road, between Arthur Avenue and Sand Lane)
 - Seaview Avenue (between Hylan Boulevard and Patterson Avenue)
- GG** Support local merchants in improving and promoting local commercial corridors
 - HH** Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods

- 9** Issue a Request for Expression of Interest (RFEI) for new concessions and services at City-controlled beaches in the East Shore
- 10** Create a comprehensive revitalization plan for Great Kills Harbor to increase resiliency and to draw additional investment
- 11** Create a strategic plan for public recreational land, including the beachfront recreation areas and open space
- 12** Implement planned and on-going investments by the City and private partners
 - Ocean Breeze Track and Field Athletic Complex
 - Charleston Mixed-Use Development
 - New Stapleton Waterfront (Homeport) Redevelopment
 - St. George Waterfront Redevelopment
 - Former Coast Guard Site Development
 - Brielle Avenue Municipal Site

This chapter contains a series of initiatives that are designed to mitigate the impacts of climate change on the East and South Shores of Staten Island. In many cases, these initiatives are both ready to proceed and have identified funding sources assigned to cover their costs. With respect to these initiatives, the City intends to proceed with them as quickly as practicable, upon the receipt of identified funding.

Meanwhile, in the case of certain other initiatives described in this chapter, though these initiatives may be ready to proceed, they still do not have specific sources of funding assigned to them. In Chapter 19 (*Funding*), the City describes additional funding sources, which, if secured, would be sufficient to fund the full first phase of projects and programs described in this document over a 10-year period. The City will work aggressively on securing this funding and any necessary third-party approvals required in connection therewith (i.e., from the Federal or State governments). However, until such time as these sources are secured, the City will only proceed with those initiatives for which it has adequate funding.

East and South Shores Community Rebuilding and Resiliency Plan

The East and South Shores offer unparalleled access to beautiful beaches, the waterfront, and a network of public parks. Not surprisingly, this area inspires deep feelings of pride, community, and identity among area residents.

The following is a multilayered plan for the East and South Shores that not only applies citywide strategies to the area but also provides strategies designed to address specific local needs and vulnerabilities. In anticipation of future climate change-related risks, this plan proposes ways that East and South Shore neighborhoods can adapt by: Addressing inundation along the entire coastline; providing opportunities to retrofit the area's most vulnerable housing stock; protecting and improving critical infrastructure; and focusing investments in strategic areas, such as the beachfront, to advance a long-term and sustainable recovery.

Coastal Protection

As Sandy illustrated, the greatest extreme weather-related risks faced by New York City is storm surge, the effects of which are likely to increase given current projections of sea level rise. Going forward, it is anticipated that climate change will render coastal regions of the city, including the East and South Shores, even more vulnerable to these risks.

While it is impossible to eliminate the chance of flooding in coastal areas, the City will seek to reduce its frequency and effects—mitigating the impacts of sea level rise, storm waves and erosion, and inundation on the coastline of the city generally and the East and South Shores in particular. Among the strategies that the City will use to achieve these goals will be the following: Increasing coastal edge elevations; minimizing upland wave zones; protecting against storm surge; and improving coastal design and governance. When evaluating coastal protection, other priorities including navigation, ongoing efforts to improve water quality and natural habitats, will also be considered prior to implementation, where appropriate.

The initiatives described below provide important examples of how the City intends to advance its coastal protection agenda citywide. These initiatives will have a significant impact on the residents, businesses, and nonprofits of the East and South Shores. Taken together, when completed, the first seven coastal protection initiatives described below would provide

enhanced protection for over 9,300 buildings representing over 10,000 housing units as well as many businesses and much of the critical infrastructure in the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's comprehensive coastal protection plan, please refer to Chapter 3 (*Coastal Protection*).

Coastal Protection Initiative 3 Complete short-term beach nourishment, dune construction, and shoreline protection on Staten Island

The loss of sand from Staten Island's beaches has left several neighborhoods exposed and vulnerable to future storms. The City, therefore, will complete beach nourishment and short-term dune improvements along these beaches, including a beach nourishment project encompassing South Beach, Crescent Beach, and Tottenville; dune construction from New Dorp Beach to Oakwood Beach; and shoreline stabilization to close the breach at Wolfe's Pond Park. This work will make effective use of existing Federal appropriations and will enhance protection concurrent with the upcoming hurricane season and beyond. DPR will oversee these efforts.

Coastal Protection Initiative 5 Install armor stone shoreline protection (revetments) on Staten Island

As a result of erosion that occurred during Sandy, the South Shore's beaches and bluffs are more exposed to erosion and damage. To address this risk, subject to available funding, the City will install a first phase of revetments (shoreline protection constructed with armor stone) in vulnerable locations along the coastline of neighborhoods such as Annadale, south of Great Kills Harbor. This project will increase the area's resiliency and demonstrate the effectiveness of such shoreline erosion control. The Mayor's Office of Long Term Planning and Sustainability (OLTPS), working with NYCEDC, will design this shoreline protection to mitigate erosion of vulnerable coastal edges and flooding in low-lying areas during lesser storms. The goal is to begin design work in 2013 and complete within three years.

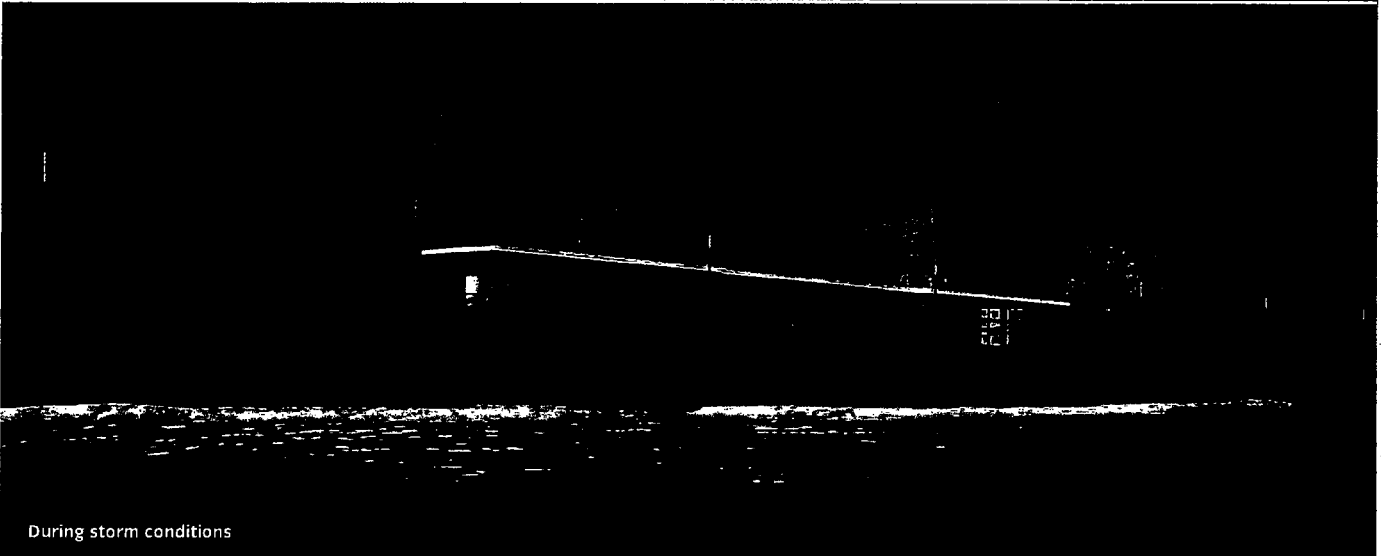
Coastal Protection Initiative 6 Raise bulkheads in low-lying neighborhoods to minimize inland tidal flooding

Bulkheads provide the first line of defense against flooding in many neighborhoods, including Great Kills, and in North Shore neighborhoods such as Stapleton and St. George, but throughout the city many bulkheads are built to

Buried Levee at South Beach



Non-storm conditions



During storm conditions

an elevation that may be insufficient given the latest projections of sea level rise by 2050. Subject to available funding, the City, therefore, will launch a program to raise bulkheads and other shoreline structures across the five boroughs in low-lying areas most at risk of daily or weekly tidal flooding, a phenomenon that could impact approximately 2 miles of the East and South Shores' coastlines by the 2050s. OLTPS will work with NYCEDC to manage this program, to begin implementation in 2013, in conjunction with the new citywide waterfront inspections program described in Chapter 3.

Coastal Protection Initiative 9 Continue to work with the USACE to complete emergency floodgate repairs at Oakwood Beach

The failure of a floodgate in Oakwood Beach has left the neighborhood and surrounding areas vulnerable to future storms. The City, therefore, will call upon the US Army Corps of

Engineers (USACE) to complete floodgate repairs at this location. This work will begin in June 2013 and end by December 2013, providing protection during the 2013 hurricane season and beyond.

Coastal Protection Initiative 13 Call on and work with the USACE to study and install offshore breakwaters adjacent to and south of Great Kills Harbor

Marinas, businesses, and multiple residential communities adjacent to and south of Great Kills Harbor face an increasing risk of wave action and erosion during extreme weather events that could undermine shoreline bluffs and damage homes. To address this risk, subject to available funding, the City will call on the USACE to develop an implementation plan for off-shore breakwaters that provide cost-effective wave attenuation. This offshore breakwater project will be designed to mitigate waves

before they act upon the shoreline, minimizing their destructive forces in vulnerable neighborhoods. The goal is to complete this project within four years of completing a USACE study.

Coastal Protection Initiative 15 Call on and work with the USACE to study and install living shorelines for wave attenuation in Tottenville

Tottenville, the southernmost community in Staten Island, was hard-hit by Sandy's flooding and wave action. To address this community's vulnerability, the City will call on the USACE to develop and implement a living shoreline project to protect the neighborhood and to demonstrate the effectiveness of this approach to wave attenuation on the open Lower Bay. Based on this plan, DPR will design and install this living shoreline project—likely to consist of oyster reef breakwaters, beach nourishment, and maritime forest enhancements—in areas adjacent to Conference House Park in

Tottenville. If this project is demonstrated to be effective, other neighborhoods along the South Shore could be protected by future phases of work. The goal is to complete this project within four years of completing a USACE study.

Coastal Protection Initiative 24 Continue to work with the USACE to complete existing studies on Staten Island and implement coastal protection projects

Without additional protection, the East and South Shores remain vulnerable to storm surge and flooding. The City will, therefore, call upon the USACE to complete a longstanding study of flood risk reduction on the East and South Shores on an expedited basis and then to implement the recommended actions, as soon as practicable. This work will make effective use of existing Federal appropriations to advance meaningful flood protection projects. It is expected that the first phase of this study will be completed in 2014, which should lead to the construction of robust protections such as floodwalls and levees in front of the existing boardwalk on the East Shore from Fort Wadsworth to Great Kills. The City will work with the USACE to determine the approach and specific locations for these protections. If a local match for Phase 1 measures is required by the USACE, the City will work to secure the necessary resources. As part of this initiative, the City and the USACE will develop a plan for ongoing beach nourishment to restore sand rapidly after extreme weather events. The second phase of this study is expected to be completed in 2016. This should lead to additional flood protection projects between Great Kills and Tottenville on the South Shore. Two City agencies, DEP and DPR, will oversee these efforts. *(See renderings: Buried Levee at South Beach)*

Beyond the priority coastal protection projects described in Chapter 3, including those summarized briefly above, the City is proposing an additional coastal protection initiative specific to the vulnerabilities of the East and South Shores.

East and South Shore Initiative 1 Call on and work with the USACE to study the construction of a floodgate at Mill Creek

The South Shore's creeks and tributaries are vulnerable to inundation and flooding and will become more so in the future. To address this vulnerability, the City will call for the study of a floodgate at the mouth of Mill Creek, an effort that potentially could be incorporated into the

existing USACE study of the South Shore's coastline. Floodgates allow storm water to flow out of waterways while preventing seawater backflow from inundating these waterways in reverse. Such an investment would provide protection against the potential flooding of important assets such as the SIR. It also could serve to demonstrate the viability of a potential mitigation strategy for other vulnerable waterways along the South Shore, including Lemon Creek.

Buildings

The city's buildings give physical form to New York. As Sandy demonstrated, however, the building stock citywide, including in the East and South Shores, is highly vulnerable to extreme weather events—a vulnerability that is expected to increase in the future. While the coastal protection measures outlined above are designed to reduce the effects of sea level rise, storm surge, and wave action on the city and the East and South Shores, these measures will not completely eliminate those risks. They also will take time to design, fund, and build. It is equally important, therefore, to supplement these measures by pursuing resiliency at the building level.

To achieve building-level resiliency, the City will seek to protect structures in the East and South Shores and throughout the five boroughs against a spectrum of climate risks, including not only flooding but also high winds and other extreme events. Among the strategies that the City will use to achieve these goals will be to construct new buildings to the highest resiliency standards and retrofit as many existing buildings as possible so that they will be significantly better prepared to handle the impacts of extreme weather events.

The initiatives described below provide important examples of how the City intends to advance building resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough building resiliency plan, please refer to Chapter 4 (*Buildings*).

Buildings Initiative 1 Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain

Though buildings constructed to modern Construction Codes generally performed well during Sandy, given the increasing risk of flooding that is likely with climate change, modifications are warranted. The City, therefore, will seek to

amend the Construction Codes and Zoning Resolution to provide for strengthened requirements that will, among other things, improve the design of new buildings through the application of appropriate resiliency measures that are calibrated to the best floodplain data available over time and help ensure that critical building systems are better-protected from flood risks. In 2013, the City, through OLTPS, will seek to implement these code changes and the Department of City Planning (DCP) will continue to take zoning changes through the public review process, with the goal of adoption before the end of the year. If adopted, they will improve resiliency for the significant amount of mixed-use development likely to take place within the 100-year floodplain over time throughout the East and South Shores.

Buildings Initiative 2 Rebuild and repair housing units destroyed and substantially damaged by Sandy

Roughly 23,000 private residential buildings encompassing nearly 70,000 housing units were damaged or destroyed during Sandy. Subject to available funding, the City, therefore, through the Mayor's Office of Housing Recovery Operations (HRO), will provide financial and other assistance to owners of residential properties that were destroyed or substantially damaged during Sandy, including to approximately 380 residential buildings encompassing approximately 500 housing units in the East and South Shores. To address the damages sustained and to more effectively prepare these significantly damaged buildings for future storm events, the City either will assist owners or, in limited cases meeting City criteria, will facilitate the acquisition of properties by new owners whom it will assist, in rebuilding and substantially improving these properties based on the best floodplain data available over time. Additionally, the City is seeking to incorporate resiliency measures into approximately 500 to 600 multifamily properties that sustained minor damage including many publicly assisted properties such as those developed pursuant to the Mitchell-Lama program and other affordable housing programs. The City, therefore, will support the retrofit of these publicly-assisted buildings, such as those developed pursuant to Mitchell-Lama and other affordable housing programs.

Buildings Initiative 3 Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain

The City, through DCP, will undertake a series of citywide and neighborhood-specific land use

studies to address key planning issues in severely affected and vulnerable communities. As part of these studies, the City will identify ways to facilitate the voluntary construction of new, more resilient building stock, and to encourage voluntary retrofits of existing vulnerable buildings over time. To be undertaken in close consultation with local residents, elected officials, and other community stakeholders, these land use studies will focus on the challenges posed by the combination of flood exposure of the applicable neighborhoods; the vulnerability of the building types that are found in these neighborhoods (e.g., older, 1-story bungalows); and site conditions in these areas (e.g., narrow lots) that can make elevation or retrofit of vulnerable buildings expensive or complicated. These studies will be coordinated with other area studies, including those examining beachfront revitalization, Bluebelt expansion and open space and transportation.

DCP will examine neighborhoods including East Shore communities that were severely damaged during Sandy and previous storms. In neighborhoods like Midland Beach, zoning changes may include mechanisms to accommodate or even encourage retrofits of buildings on existing lots, and the voluntary construction of resilient housing through the combination of smaller lots. Any new development in these neighborhoods would be consistent with the area's low density character and would be required to include resiliency measures. Other communities that may also be studied include South Beach and New Dorp Beach.

Subject to consultation with local elected officials and community members, DCP will also examine the need for resilient housing and measures in the beachfront communities of the East Shore, along Father Capodanno Boulevard. Oceanfront developments that performed well during Sandy and other extreme weather events, such as Arverne By The Sea in the Rockaways, and new coastal designs on Staten Island, such as the proposed Homeport development in Stapleton, would be studied as best practice. All studies will also analyze ways in which retrofits and rebuilding can help to revitalize local commercial corridors and the beachfront as a whole, along the East Shore.

Subject to available funding, the goal is for DCP to commence study in 2013. Thereafter, DCP would move to implement changes, if any, that it deems to be appropriate based on the results.

Buildings Initiative 4 Launch a competition to encourage development of new, cost-effective housing types to replace vulnerable stock

Subject to available funding, the City, through the Department of Housing Preservation and Development (HPD), will launch an international competition called the Resilient Housing Design Competition. This competition will offer prizes to private-sector developers who design and develop new, high-quality housing prototypes that offer owners of vulnerable building types (e.g., older, 1-story bungalows) a cost-effective path that is consistent with city building and zoning requirements and meets the highest resiliency standards. In addition to cash prizes, the winners of this competition will be given the opportunity to put these structures into service in connection with a City-sponsored development project. Prototypes will have applicability throughout the five boroughs, including in sections of the East and South Shores, such as Midland Beach and other vulnerable low-density communities. The goal is for HPD to launch this competition in 2013.

Buildings Initiative 5 Work with New York State to identify eligible communities for the New York Smart Home Buyout Program

The City will evaluate opportunities for collaboration with the State in connection with its home buyout program, using an objective set of criteria developed by the City, including extreme vulnerability, consensus among a critical mass of contiguous local residents, and other relevant factors. It is anticipated that these criteria will be met in a limited number of areas citywide. As of the writing of this report, the City had expressed support for buyout negotiations under this program that were ongoing between a group of Oakwood Beach homeowners and the staff of New York State Homes and Community Renewal.

Buildings Initiative 6 Amend the Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings

As noted above, buildings constructed to modern Building Code standards generally performed well during Sandy. Sandy, however, brought relatively weak winds, compared to other hurricanes. Given the possibility of more frequent or intense wind events in the future, modifications to the Building Code are warranted. The City, therefore, through OLTPS

will seek to amend the Building Code to provide for strengthened requirements so that new buildings citywide can meet enhanced standards for wind resiliency. The City will further study whether additional wind resiliency standards should be required going forward. The amendments will be submitted to the City Council for adoption, and the study will commence, in 2013.

Buildings Initiative 7 Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate

Even if every structure destroyed or damaged by Sandy were rebuilt to the highest resiliency standards, this would still leave tens of thousands of existing structures in the 100-year floodplain vulnerable—with more becoming vulnerable as the climate changes. Subject to available funding, the City, therefore, will launch a \$1.2 billion program to provide incentives to owners of existing buildings in the 100-year floodplain to encourage them to make resiliency investments in those buildings. Of the up to \$1.2 billion available through the program, the City will reserve up to \$100 million for 1- to 3-family homes, up to \$500 million for distribution across the five boroughs based on each borough's share of vulnerable buildings citywide, and \$100 million for affordable housing developments.

The City also will mandate that large buildings (those with seven or more stories that are more than 300,000 square feet in size) undertake certain flood resiliency investments by 2030. If the City consistently achieves its stated goal of encouraging significant resiliency retrofit investments for the vast majority of the built floor area in the 100-year floodplain in the five boroughs, nearly 7,500 housing units encompassing approximately 12 million square feet of built space in the East and South Shores would, over time, be made meaningfully less vulnerable. The goal is to launch these programs in 2013.

Buildings Initiative 8 Establish Community Design Centers to assist property owners in developing design solutions for reconstruction and retrofitting, and connect them to available City programs

The City, through HRO, will establish Community Design Centers in neighborhoods across the city, potentially including the East and South Shores, to assist property owners in developing design solutions for reconstruction and retrofitting, and connect them to available City

programs. The Centers would be managed by the City—through agencies such as HRO, HPD, DOB, DCP, and NYCEDC—with support from local partners.

Buildings Initiative 10

Launch a sales tax abatement program for flood resiliency in industrial buildings

As Sandy demonstrated, many industrial buildings are vulnerable to extreme weather, with more likely to become vulnerable as the climate changes. However, many industrial buildings operate on thin margins making it challenging to invest in resiliency. The City, through the New York City Industrial Development Agency (NYCIDA), therefore, will launch a \$10 million program to provide incentives to owners of industrial buildings to encourage them to make resiliency investments in those buildings. The program will prioritize 1- to 2-story buildings with more than four feet between their actual ground elevation and the applicable BFE. In the East and South Shores, seven industrial buildings with over 68,000 square feet of floor area will be eligible for this program. This program will be launched in 2013.

Buildings Initiative 11

Launch a competition to increase flood resiliency in building systems

Many existing strategies for improving resiliency in buildings are either imperfect, expensive, or a combination of both. The City, through NYCEDC, therefore, will launch an approximately \$40 million Resiliency Technologies Competition using allocated Community Development Block Grant (CDBG) funding to encourage the development, deployment, and testing of new resiliency technologies for building systems. In the East and South Shores, approximately 9,730 buildings will be eligible to benefit from this competition. The program will be launched in 2013.

Buildings Initiative 12

Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain

The City, through the Landmarks Preservation Commission (LPC) will clarify the Commission's regulations to assist owners of landmarked buildings and properties in landmarked districts in the 100-year floodplain who are contemplating retrofit projects. Currently in the East and South Shores, there are a total of seven landmarked buildings, with two in the floodplain shown in FEMA's PWMs. The Commission will issue its clarifying regulations in 2013.

Buildings Initiative 13

Amend the building code to improve wind resiliency for existing buildings and complete studies of potential retrofits

As noted above, given the possibility for more frequent intense wind events in the future, modifications to the Building Code are warranted. The City therefore, through OLTPS, will seek to amend the Building Code and expand the existing DOB Façade Inspection Safety Program for high-rise buildings to include rooftop structures and equipment. The City will further study whether additional wind resiliency standards are required going forward. These amendments will be submitted to the City Council for adoption, and the study will commence, in 2013.

Insurance

Insurance can help provide residents and businesses with financial protection against losses from climate change and other types of risks. Sandy not only highlighted the importance of insurance, it also revealed that many New Yorkers are exposed to flood losses, which are not covered in standard homeowners or small business property insurance policies. Citywide, 95 percent of homeowners carry homeowners insurance, but when Sandy struck less than 50 percent of residential buildings in the effective 100-year floodplain had coverage through the National Flood Insurance Program (NFIP), a federal program administered by FEMA that provides flood insurance to properties in participating communities like New York City. While larger properties, in particular large commercial properties, tend to purchase flood insurance through the private market, NFIP is the primary source of flood insurance for homeowners throughout the country. The City estimates that, in areas of the East and South Shores inundated by Sandy, less than 35 percent of residential properties typically insured under the NFIP, including 1- and 2-family homes, amongst others, actually had policies in force during Sandy. Furthermore, Sandy drew attention to the significant cost increases in flood insurance that many New Yorkers will soon face, resulting from recent reforms to the NFIP as required by the Biggert-Waters Flood Insurance Reform Act.

The City will use several strategies to encourage more New Yorkers to seek coverage and to help ensure the NFIP meets the needs of policyholders citywide. Specifically, the City will work to: Address affordability issues for the most financially vulnerable policyholders; define mitigation measures that are feasible in

an urban environment, such as East and South Shore communities, and create commensurate premium credits to lower the cost of insurance for property owners who invest in these measures; encourage the NFIP to expand pricing options (including options for higher deductibles) to give potential policyholders more flexibility to make choices about coverage; and launch efforts to improve consumer awareness, to help policyholders make informed choices. The initiatives described below are important examples of how the City will advance these strategies. These initiatives will have a major impact on the residents, small businesses and nonprofits in the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough insurance reform plan, please refer to Chapter 5 (*Insurance*).

Insurance Initiative 1

Support Federal efforts to address affordability issues related to reform of the NFIP

The City will call on FEMA to work with the National Academy of Sciences to complete the study of flood insurance affordability, as required under the Biggert-Waters Act. The City will urge its Federal government partners to comply with this provision of the Act and take swift action to enact the recommendations.

Insurance Initiative 4

Call on FEMA to develop mitigation credits for resiliency measures

The NFIP provides few incentives for property owners to protect their buildings from flood damage and reduce their premiums, other than by elevating their buildings—actually lifting structures above flood elevation levels. In an urban environment such as the East and South Shores, for a variety of reasons, elevation can be impractical, undesirable, and/or economically infeasible. Fortunately, other mitigation options are available. The City, therefore, will call upon FEMA to provide appropriate premium credits for mitigation measures other than elevation.

Insurance Initiative 6

Call on FEMA to allow residential policyholders to select higher deductibles

Flexible pricing options can encourage more people, especially those not required to carry insurance, to purchase insurance coverage that suits their needs. A higher-deductible option can substantially reduce premium costs to policyholders while remaining truly risk-based. Currently under the NFIP, deductibles up to \$50,000 are allowed for commercial policies,

but residential policies are limited to a maximum deductible of \$5,000. The City, therefore, will call upon FEMA to allow homeowners that are not required to carry NFIP policies to purchase high-deductible policies, protecting them from catastrophic loss. Initial estimates indicate that doing so could reduce insurance premiums by about half.

Critical Infrastructure

A resilient New York requires protection of its critical services and systems from extreme weather events and the impacts of climate change. This infrastructure includes the city's utilities and liquid fuel system, its hospitals and other healthcare facilities, telecommunications network, transportation system, parks, wastewater treatment and drainage systems, as well as other critical networks—all vital to keeping the city, including the East and South Shores, running.

Utilities

The city's electric, natural gas, and steam systems are essential to everyday life in areas throughout the five boroughs, including the East and South Shores. As Sandy proved, however, these systems are highly vulnerable to extreme weather events, with 800,000 customers losing electricity and 80,000 customers losing natural gas service during Sandy across the city, including approximately 180,000 that lost electricity in the borough of Staten Island. This vulnerability will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Call for risk-based analysis of low-probability but high-impact weather events to be incorporated into utility regulation and investment decision-making; call for capital investments that harden energy infrastructure and make systems more flexible in responding to disruptions and managing demand; and better diversify the city's sources of energy. The initiatives described below provide important examples of how the City intends to advance utilities resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough utilities resiliency plan, please refer to Chapter 6 (*Utilities*).

Utilities Initiative 5

Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding

Various transmission substations, distribution substations, utility tunnels, and underground equipment in the city are at risk of flooding during extreme weather. For example, 40 percent of transmission substations are in the 100-year floodplain today, and 67 percent are likely to be in the 100-year floodplain by the 2050s. The City, through OLTPS, will work with Con Edison and the Long Island Power Authority (LIPA) to prioritize these assets based on their roles in system reliability and to harden them as appropriate. This effort will begin in 2013.

Utilities Initiative 6

Work with utilities and the PSC to harden vulnerable overhead lines against winds

During extreme weather events, high winds and downed trees threaten overhead electric poles, transformers, and cables. The City, through OLTPS, will work with Con Edison and LIPA to manage the risk of wind and downed-tree damage through tree maintenance, line strengthening, and a line-relocation program. In some limited cases, rerouting lines underground may also be warranted, depending on the outcome of a cost-benefit analysis to be performed in partnership with the utilities. This effort will begin in 2013.

Utilities Initiative 7

Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding

Although the city's high-pressure gas transmission system performed relatively well during Sandy, there were instances where remote operation of parts of the system failed. Additionally, the distribution system had localized outages due to water infiltration. Seeking to limit the compromising effects of future floods on both the system's backbone and the ability of Con Edison and National Grid to control and monitor the system, the City, through OLTPS, will work with the PSC, Con Edison, and National Grid to harden control equipment against flooding. In addition, the City will call upon Con Edison and National Grid to take steps to prevent water from infiltrating its gas pipes. This effort will begin in 2013.

Utilities Initiative 21

Work with public and private partners to scale up distributed generation (DG), including microgrids

The city's DG systems, including microgrids, have the potential for significant expansion—but are constrained by regulations, financing challenges, and lack of information. The City, through OLTPS and the New York City Distributed Generation Collaborative—a stakeholder group convened by the City in 2012—will continue efforts to achieve a PlaNYC goal of installing 800 megawatts of DG citywide by 2030. These efforts will include reform of PSC tariffs and other regulatory changes, expansion of low-cost financing, and provision of technical assistance to property owners and developers. This ongoing effort will continue in 2013.

Liquid Fuels

The liquid fuels supply chain is essential for everyday life throughout the five boroughs, including in the East and South Shores. Sandy demonstrated the vulnerability of this system to extreme weather events. In the aftermath of Sandy, citywide—and particularly in the East and South Shores—there were long lines at gas stations and other challenges for drivers, including emergency responders. The vulnerability of this system will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Develop a strategy for the hardening of liquid fuel infrastructure along the supply chain; increase redundancy and fuel supply flexibility; and increase supply availability for vehicles critical to the city's infrastructure, safety, and recovery from significant weather events. The initiatives described below provide important examples of how the City intends to advance its liquid fuel resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough liquid fuels resiliency plan, please refer to Chapter 7 (*Liquid Fuels*).

Liquid Fuels Initiative 1

Call on the Federal government to convene a regional working group to develop a fuel infrastructure hardening strategy

The fuel supply shortage after Sandy was caused mainly by damage to infrastructure in New Jersey, where the City and State of New

York have no regulatory or legislative authority or oversight. The City, through OLTPS, will call on the Federal Hurricane Sandy Rebuilding Task Force and the United States Department of Energy to convene regional stakeholders to develop a strategy for hardening key infrastructure against future extreme weather. This effort will be launched in 2013.

Liquid Fuels Initiative 4

Work with New York State to provide incentives for the hardening of gas stations to withstand extreme weather events

New York State's 2013-2014 budget required that certain retail fuel stations invest in equipment that would allow them to connect generators quickly in the event of a power loss, and enter into supply contracts for emergency generators. The City, through OLTPS, will support the State in the design and implementation of this generator program, an effort that will include working with the New York State Energy Research and Development Authority (NYSERDA) to develop an incentive program to minimize the financial impact of the requirements on the businesses involved. In addition, OLTPS will work with the State to develop incentives to encourage retail fuel stations to implement resiliency measures other than backup power capability. This effort will be launched in 2013.

Liquid Fuels Initiative 5

Enable a subset of gas stations and terminals to have access to backup generators in case of widespread power outages

Gas stations are vulnerable to widespread power outages resulting from extreme weather events, which could prevent them from dispensing fuel. In New York State's 2013-2014 budget, NYSERDA was directed to develop a generator pool program for gas stations. The City, through its Office of Emergency Management (OEM), will work with NYSERDA, FEMA, and the USACE in 2013 and beyond to develop such a pool and to create a pre-event positioning plan to enable the ready deployment of generators to impacted areas in the wake of a disaster.

Liquid Fuels Initiative 8

Develop a package of City, State, and Federal regulatory actions to address liquid fuel shortages during emergencies

Various regulations relating to the transportation and consumption of fuels in New York City limit the flexibility of the market to respond to disruptions, including following extreme weather events. The City, through OEM, will

work with the State and Federal governments to prepare an "off-the-shelf" package of regulatory measures for use in the event of a liquid fuels shortage to allow supply-demand imbalances in the fuel supply to be mitigated more quickly. This effort will be launched in 2013.

Liquid Fuels Initiative 9

Harden municipal fueling stations and enhance mobile fueling capability to support both City government and critical fleets

The City must be able to respond quickly to a fuel supply disruption, providing continuous fueling to vehicles that are critical for emergency response, infrastructure rebuilding, and disaster relief. The City, through the Department of Citywide Administrative Services (DCAS), will procure fuel trucks, generators, light towers, forklifts, and water pumps to permit the City to put in place emergency fueling operations immediately following a disruption in the fuel supply chain. DCAS also will issue a Request for Expressions of Interest (RFEI) to potential suppliers of liquid fuels to evaluate options for sourcing such fuel during emergencies. The procurement effort will be launched in 2013, with the RFEI to follow in 2014.

Healthcare

The city's healthcare sector is critical to the well-being of New Yorkers throughout the five boroughs, including in the East and South Shores. It is also a major economic engine for the city as a whole. The East and South Shores feature a network of outpatient and community healthcare providers, thousands of residents employed in the healthcare sector, and SIUH, the largest Staten Island-based employer. Sandy exposed this system's vulnerabilities, which are expected to grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Build new hospitals, nursing homes, and adult care facilities to higher resiliency standards and harden existing facilities to protect critical systems; seek to keep lines of communication open between patients and providers, even during extreme weather events; and enable community-based providers to reopen quickly after a disaster. The initiatives described below provide important examples of how the City intends to advance its healthcare resiliency agenda citywide. These initiatives will have a positive impact on the residents and healthcare providers of the East and South Shores. For a full explanation of the

following initiatives and a complete description of the City's five-borough healthcare resiliency plan, please refer to Chapter 8 (*Healthcare*).

Healthcare Initiative 2

Require the retrofitting of existing hospitals in floodplains

Many existing hospital buildings in the floodplain remain vulnerable to the impact of storm surge, with more likely to become vulnerable as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Code to require existing hospital buildings in the 500-year floodplain—including SIUH—to meet by 2030 a subset of the Construction Code standards for flood-resistant design. To minimize the risk of emergency evacuations and extended closures, these hospitals will be required to protect their electrical equipment, emergency power system, and domestic water pumps to the 500-year flood elevation. These hospitals also will be required to install backup air-conditioning service for inpatient care areas in case of utility outages, pre-connections for temporary boilers and chillers if primary equipment is not elevated, and pre-connections for external generators as a backup power source. SIUH already has begun exploring a number of these and other flood mitigation measures as part of its post-Sandy rebuilding process. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 4

Improve design and construction of new nursing homes and adult care facilities

New nursing homes and adult care facilities are at risk of power failures due to storm surge, which could result in patient evacuations. The City, through OLTPS, therefore, will seek to amend the Construction Codes to require that new facilities are constructed with additional resiliency measures for their emergency power systems. New nursing homes also will be required to have emergency generators and electrical pre-connections for external stand-by generators. Adult care facilities will be required to install either emergency generators that are adequately protected or pre-connections to external stand-by generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 5

Require retrofitting of nursing homes in floodplains

Many existing nursing home facilities in the five boroughs are vulnerable to storm surge—a vulnerability that will only grow as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Codes to

require nursing homes in the 100-year floodplain to meet standards for the protection of electrical equipment, emergency power systems, and domestic water pumps (if applicable) by 2030. These systems will be protected to the 100-year flood elevation, in accordance with specifications already in the Construction Codes, and will help enable patients to shelter in place safely or reoccupy quickly after a storm. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 6 **Require retrofitting of adult care facilities in floodplains**

Nineteen adult care facilities in the city are vulnerable to storm surge, including one in the East Shore (New Broadview Manor Home for Adults). The City, through OLTPS, will seek to amend the Construction Codes to require existing adult care facilities located in the floodplain to elevate or protect their electrical equipment to the 100-year flood elevation by 2030, in accordance with the specifications in the Construction Codes. In addition, the City will seek to require these providers to have either emergency generators that are adequately protected or electrical pre-connections to external generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 7 **Support nursing homes and adult care facilities with mitigation grants and loans**

The primary challenge for most nursing homes and adult care facilities in implementing mitigation measures is obtaining financing. Subject to available funding, the City, through NYCEDC and the New York City Department of Health and Mental Hygiene (DOHMH), therefore, will administer competitive grants and subsidized loans to assist providers with mandated retrofit projects. The goal is to launch the program when proposed Construction Code amendments applicable to nursing homes and adult care facilities proposed in this report go into effect, likely in 2013.

Healthcare Initiative 8 **Increase the air conditioning capacity of nursing homes and adult care facilities**

Nursing homes and adult care facilities typically do not have enough emergency power capacity to run their air conditioning systems following the loss of power. This could cause some providers to evacuate during power outages that occur during hot summer months. The City will offer sales tax waivers totaling \$3 million citywide to assist eligible nursing homes and

adult care facilities that install emergency power solutions for air conditioning systems.

Healthcare Initiative 9 **Harden primary care and mental health clinics**

In communities such as the East and South Shores that are at risk of extensive flooding during extreme weather events, primary care and mental health services may be compromised for weeks after a disaster due to extended facility closures. Subject to available funding, the City, through DOHMH and a fiscal intermediary, therefore, will administer a competitive financing program to harden large clinics providing primary care and mental health services in the East and South Shores and other high-need communities. The program will include grants and interest-free loans for capital investments that enable faster recovery of services—for example, installation of emergency power systems, protection of other critical building systems, and wet flood-proofing of facilities. The goal would be for this effort to be launched in late 2013 or early 2014.

Healthcare Initiative 10 **Improve pharmacies' power resiliency**

Pharmacies dispense life-saving medicines essential for those with chronic conditions. However, without power, pharmacists cannot access the necessary patient records or insurance information to dispense these medicines. The City, through DOHMH, will work with pharmacies to improve their ability to leverage generators for power resiliency and address their other emergency preparedness needs including the launch of an emergency preparedness website for pharmacies. This effort already has begun and will continue throughout 2013.

Healthcare Initiative 11 **Encourage telecommunications resiliency in the healthcare system**

In the aftermath of a disaster, it is important that New Yorkers be able to speak to their doctors for guidance on needed medical care. The City, through DOHMH, therefore, will develop a best practice guide and outreach plan to help community-based providers understand the importance of telecommunications resiliency. Resiliency solutions could include using backup phone systems (such as a remote answering service that would not be affected by local weather hazards), Voice over Internet Protocol (VoIP) technology that allows office phone lines to be used off-site, and pre-disaster planning to inform patients of available emergency phone numbers. This effort will begin in 2013.

Healthcare Initiative 12 **Encourage electronic health record-keeping**

Doctors rely on patients' medical records to provide and track care, but paper records may be compromised or destroyed due to extreme weather events. The City, through existing DOHMH programs, therefore, will call upon community-based providers located in the 100-year floodplain and other disaster-prone areas to implement electronic health records (EHR) systems for resiliency. DOHMH's Primary Care Information Project will sponsor initiatives to provide primary care and mental health providers citywide with EHR technical assistance. This effort will begin in 2013.

Beyond the priority healthcare resiliency projects described in Chapter 8, including those summarized briefly above, the City is proposing an additional healthcare resiliency initiative that is specific to the vulnerabilities of the East and South Shores. This initiative is described below.

East and South Shore Initiative 2 **Assist Staten Island University Hospital in applying for hazard mitigation funding**

SIUH, which is home to the largest emergency room in Staten Island and accounts for over one-third of the borough's in-patient beds, has two campuses that are located in areas that are vulnerable to flooding. The City will, therefore, provide technical and other support to SIUH as it seeks to secure FEMA Hazard Mitigation Grant Program funding through the State-administered allocation process. This funding would allow SIUH to implement important flood resiliency measures, as described, in-part, in a needs assessment released by the Staten Island Borough President's Office. The City will consider providing similar assistance to other regional hospitals, as well.

Telecommunications

The city's telecommunications system is essential to individuals and businesses throughout the five boroughs, including in the East and South Shores. While this is true at all times, it is especially true during emergencies. As Sandy demonstrated, however, this system is highly vulnerable to extreme weather events—precisely when telecommunications are most needed. Citywide and in the East and South Shores, Sandy resulted in outages to landlines and mobile service, as well as to data service. The vulnerability of this system likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents, businesses and nonprofits of the East and South Shores and other parts of the city will be to: increase accountability among providers to promote resiliency; use strengthened City regulatory powers and stronger relationships with providers to enable rapid recovery after extreme weather events; encourage hardening of facilities to reduce weather-related impacts; and increase redundancy to reduce the impact of outages. The initiatives described below provide important examples of how the City intends to advance its telecommunications resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough telecommunications resiliency plan, please refer to Chapter 9 (*Telecommunications*).

Telecommunications Initiative 1
Establish an office within the Department of Information Technology and Telecommunications (DoITT) to focus on telecommunications regulation and resiliency planning

While the City has regulatory authority over some aspects of telecommunications service, it has no entity focused broadly on ensuring the resiliency of the public communications networks. The City, therefore, will form within DoITT a new Planning and Resiliency Office (PRO) that will have the resources needed to develop, monitor, and enforce resiliency standards, in close cooperation with State and Federal regulators and providers. DoITT will launch the new office in 2013.

Telecommunications Initiative 2
Establish new resiliency requirements for providers using scheduled renewals of the City's franchise agreements

Flooding caused outages during Sandy in facilities that did not follow the Federal Communication Commission's recommended best practices for resiliency, including flood protection measures. The City, through DoITT, therefore, will encourage and enforce resiliency standards for cable TV providers through the franchise renewal process, and explore options to increase conduit infrastructure redundancy and resiliency. The City will also seek to require standardized outage reporting and publishing. DoITT will launch this effort in 2014, in advance of 2020 franchise renewals.

Transportation

Without the city's expansive transportation system, New York would grind to a halt. This was illustrated starkly during Sandy when outages occurred across the system during and immediately following the storm. These outages severely impacted the residents of the East and South Shores, who found themselves isolated by the shutdown of the Staten Island Ferry, other public transit systems and all Staten Island bridges, as well as by flooding on arterial and secondary roads. The vulnerability of this system will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Make the system more flexible and more resilient; protect critical elements of the system from damage; and seek to maintain system operations during extreme weather events; and, following extreme events, to enable quick recovery, while also putting in place plans for backup transportation options until regular service can be restored. The initiatives described below provide important examples of how the City intends to advance its transportation resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough transportation resiliency plan, please refer to Chapter 10 (*Transportation*).

Transportation Initiative 1
Reconstruct and resurface key streets damaged by Sandy

Sandy's waves and flooding caused significant damage to area roadways. The City, through NYCDOT will reconstruct 60 lane-miles of streets that were damaged severely, and will repave approximately 500 lane-miles of streets with damaged surfaces. In the East and South Shores, this will include approximately 3 linear-miles of reconstructed streets, including Father Capodanno Boulevard from Sand Lane to Seaview Avenue, and 12 linear-miles resurfaced, including multiple east-west streets in the South Shore, such as Holton and Page Avenues, south of Hylan Boulevard. Wherever feasible, the reconstructed streets also will include resiliency features to prevent future damage. NYCDOT will launch this initiative in 2013 with funding from Federal and City sources.

Transportation Initiative 3
Elevate traffic signals and provide backup electrical power

New York's traffic signals—and particularly the controllers that operate these signals and communicate with the NYCDOT Traffic Management Center—are vulnerable to damage from flooding, as well as to power loss from various extreme weather events. Accordingly, the City, through NYCDOT, will raise controllers at approximately 500 intersections in flood-vulnerable locations across the city, including in the East and South Shores. In tandem with this effort to place electrical hardware above the 100-year floodplain elevation, NYCDOT also will install power inverters in approximately 500 NYPD vehicles to allow these vehicles to provide backup electrical power to critical traffic signals. This effort will begin in 2013.

Transportation Initiative 6
Protect Staten Island Ferry and private ferry terminals from climate change-related threats

To allow for quicker restoration of service on the Staten Island Ferry, the East River Ferry, and other ferry services, the City will use Federal Transit Administration Emergency Relief funds to construct physical improvements to the floating infrastructure, loading bridges/gangways, pilings, and piers at both the Whitehall and St. George ferry terminals and at additional ferry landings around the city. NYCDOT will launch this investment immediately.

Transportation Initiative 8
Call on non-City transportation agencies to implement strategies to address climate change threats

Many non-City agencies that own and operate critical portions of New York City's transportation system have already announced resiliency and protection initiatives appropriate to their system. Without such action, the critical facilities managed by these agencies will remain vulnerable to damage and disruption from future weather-related events. The City, therefore, will call on these agencies to implement the initiatives they announced and take additional steps to protect their major transportation assets from climate change threats and prepare for quick restoration following an extreme weather event. Assets that may require hardening and/or preparation measures in the East and South Shores include: Maintenance and operations facilities of the SIR, SIR stations in current or potentially future flood zones, park-and-ride facilities, and approaches to Staten Island bridges. The City will work with these agencies to advance these plans in 2013.

Transportation Initiative 9

Plan for temporary transit services in the event of subway system suspensions

When major portions of the subway system are out of service, there simply is not sufficient capacity in the rest of the transit network or the roadway system to carry the increased volume of commuters and other travelers. The City, through NYCDOT, therefore, will work with the MTA and other transportation partners to develop and regularly update formal plans to provide temporary transportation services in such an event, including following extreme weather. These services could take the form of temporary point-to-point ferry service, as, for example, the City put in place following Sandy, connecting Great Kills Harbor and Lower Manhattan. This planning effort will begin in 2013.

Transportation Initiative 10

Identify critical transportation network elements and improve transportation responses to major events through regular resiliency planning exercises

Many of the facilities critical to the City's ability to respond effectively to a disaster are vulnerable to disruption and damage during extreme weather events, potentially impairing delivery of emergency services and supplies, as well as impairing the restoration of critical non-transportation infrastructure and economic activity. This vulnerability is expected to increase as the climate changes. To respond better to a variety of different possible transportation outage and restoration scenarios, the City, through NYCDOT, will work with transportation agencies around the region to identify the critical elements of the surface transportation network that need to be available quickly following different types of events. The key tool to identify these networks will be an ongoing series of detailed and multi-disciplinary resiliency planning exercises that will allow NYCDOT and its partners to understand where resources need to be focused before, during, and after an event. This effort will begin in 2013.

Beyond the priority transportation resiliency projects described in Chapter 10, including those summarized briefly above, the City is proposing additional transportation resiliency initiatives specific to the vulnerabilities of the East and South Shores. These initiatives are described below.

East and South Shore Initiative 3

Implement and expedite roadway and sewer capital projects along Hylan Boulevard, especially in vulnerable South Shore areas

Hylan Boulevard, a critical transit and roadway asset for East and South Shore communities, will remain flood-prone in low-lying areas even after proposed coastal protection measures are put in-place. The City, therefore, will move forward with capital projects to improve stormwater management and traffic-flow along Hylan Boulevard and in close proximity to the corridor. These projects will include: Three roadway projects paired with the installation of sewers and catch basins by DEP (planned from Butler Boulevard to Mount Loretto, from Cornelia Avenue to Poillon Avenue and from Robinson Avenue to Wiman Avenue); intersection improvement projects at Cleveland and Armstrong Avenues that will bring new paving and sewer and bus pad upgrades; and NYCDOT paving projects in the South Shore, encompassing, among other areas, locations around Great Kills Harbor. The three roadway projects are anticipated to begin between November 2014 and January 2016, the Cleveland-Armstrong project is anticipated to be completed by the end of 2013 and the South Shore projects are anticipated to begin in the summer of 2014.

East and South Shore Initiative 4

Call on and work with the MTA to create an implementation plan for the relocation of Richmond Valley SIR station to Page Avenue

The Richmond Valley SIR Station already experiences chronic flooding and lacks sufficient commuter parking. Meanwhile, the closing of the Atlantic and Nassau stations in Tottenville left the Page Avenue commercial area without direct SIR service. To aid recovery on the South Shore, subject to available funding, the City will work with the MTA to study the relocation of the Richmond Valley SIR station to Page Avenue to create a rail and bus hub. The study also will assess the feasibility of a park-and-ride facility at the new location. The City, acting through NYCEDC, will work with the MTA to identify funding for the study and, depending on the study's outcome, any proposals resulting therefrom. The goals of the study will be: To create a more resilient SIR station at higher elevation; to support retail recovery along the Page Avenue commercial corridor; to maximize access to public transportation on the South Shore; and to encourage transit ridership more broadly. The study will take approximately six months to complete after funding is secured.

East and South Shore Initiative 5

Study potential new ferry routes serving Staten Island and issue a Request for Expressions of Interest (RFEI) to gauge market interest

Many neighborhoods on the East and South Shores lack fast public transit access to Manhattan. In addition, during extreme weather events, the public and other transit options to which these areas do have access is subject to disruption. As part of its update of its Comprehensive Citywide Ferry Study, which is to provide analyses of options for inter-borough commuter and recreational ferry service citywide, the City will assess the feasibility of additional service on Staten Island. The update, which is fully funded, will analyze possible future service corridors, review possible funding sources, and assess issues of governance and oversight. A public outreach process will aid in the determination of which potential Staten Island landing sites to include in the study. NYCEDC will, in partnership with NYCDOT, lead this study, which is expected to take six to nine months to complete.

Parks

During Sandy, it became clear was that, in addition to serving as neighborhood front yards and recreation centers, in many places, including the East and South Shores, the City's parks literally serve as the city's front line of defense when extreme weather events hit, buffering adjacent neighborhoods. As the climate changes, it will be even more critical that the City's parks be able to play all of these roles.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and elsewhere in the city will be to: Strengthen the city's parks so that they are able to survive weather-related events more effectively and can act as stronger buffers for adjacent communities; and pursue technologies and approaches that will enable the City to monitor, analyze, and prepare the parks system for its many roles in an era of increasing change. The initiatives described below provide important examples of how the City intends to advance its parks resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough parks resiliency plan, please refer to Chapter 11 (*Parks*).

Parks Initiative 1 **Restore city beaches**

Beaches play an important recreational role in the East and South Shores and also are a vital component of the area's coastal defenses, but they cannot protect adjacent areas without being "renourished" (replenished with new sand to replace that lost to erosion) from time to time. Subject to available funding, the City, through DPR, will collaborate with Federal and State partners—including the USACE—to implement plans quickly to restore sand lost after extreme storm events and to conduct regular nourishment of beaches and regular monitoring to detect the early signs of erosion. This effort will focus on key beaches, including those on the East and South Shores, such as South Beach, Crescent Beach, and in Tottenville. The goal is to begin this effort in 2013.

To restore the beaches following Sandy, the City, in cooperation with many other City, State and Federal partners, conducted an expedited program of projects to provide new and elevated lifeguard stations and public bathrooms and improvements to other beachfront amenities in advance of Memorial Day 2013. This impressive achievement comprised the first phase of restoring the city's beaches. In the coming months and years, DPR will continue its efforts to provide emergency sand nourishment and to expedite planning, evaluation, and design work for long-term plans to restore the beaches, boardwalks, and other beachfront amenities of the East and South Shores.

Parks Initiative 2 **Harden or otherwise modify shoreline parks to protect adjacent communities**

About 24 percent of DPR properties (by acreage) are today in the city's 100-year floodplain, and that percentage is expected to grow as sea levels rise—including in areas where the city's parks front residential and commercial districts. Subject to available funding, the City, through DPR, therefore, will study cost-effective ways to use its parks system to protect particularly vulnerable adjacent neighborhoods, ideally identifying mitigation strategies that also protect the parks themselves. Immediate target sites in the East and South Shores include the beaches from New Dorp Beach to Oakwood Beach, as well as at Wolfe's Pond Park, as outlined above under Coastal Protections. The goal is to complete this study in 2014.

Parks Initiative 11 **Improve the health and resiliency of the city's urban forest**

The city's forests and trees provide an array of health and environmental benefits, but are vulnerable to a variety of climate change-related impacts, including storm surge, wind, and even changes in average temperatures. Subject to available funding, the City, through DPR, will undertake a variety of efforts to protect trees—whether located in natural areas and parks, or along streets. This would include adding forest management crews, identifying locations in which to expand tree beds, and modifying regular tree inspection and pruning efforts to prioritize trees in areas vulnerable to extreme weather events. The goal is for DPR to launch this effort in 2013.

Beyond the priority parks resiliency projects described in Chapter 10, including those summarized briefly above, the City is proposing an additional parks resiliency initiative that is specific to the vulnerabilities of the East and South Shores. This initiative is described below.

East and South Shore Initiative 6 **Secure available Federal funding to implement the Community Wildfire Protection Plan for fire-prone areas on the East Shore**

Homes, essential infrastructure and the area's residents themselves are at substantial risk of catastrophic wildfires within an area of the East Shore that has been designed as a Wildlife Urban Interface Zone by the federal government. This zone covers the majority of the East Shore, including sections of Oakwood Beach, New Dorp Beach, Midland Beach, and South Beach.

To address this risk, the City, through DPR, will pursue funding for priority wildfire management measures within the Community Wildfire Protection Plan that was created and approved by a variety of City agencies, the National Park Service (NPS), and New York State Department of Environmental Conservation (NYSDEC) in 2012. This approval makes the City eligible to receive Federal funding for certain anti-wildfire pilot initiatives associated with the plan. Pilot initiatives will include: A program to control the population of the invasive and flammable reed *Phragmites*; and a program to create or maintain necessary buffer areas between fire hazard areas and existing residential areas. If the pilot initiatives prove successful, these techniques could be deployed throughout high-risk zones in the East Shore, subject to the identification

of additional funding. Implementation of the pilot measures would begin immediately upon the securing of funding.

Water and Wastewater

The city's water and wastewater system is one of the most complex in the world, not only supplying millions of New Yorkers with safe drinking water in all conditions, but also treating wastewater to enable the area's waterways to remain clean, while draining rainwater to minimize flooding. What happened during Sandy demonstrated the system's vulnerability to a whole host of weather-related threats, ranging from surge and sea level rise, to heavy downpours—threats that are expected to worsen as the climate changes.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Protect wastewater treatment facilities from storm surge; improve and expand drainage infrastructure; and promote redundancy and flexibility to make available a constant supply of high-quality drinking water. The initiatives described below provide important examples of how the City intends to advance its water and wastewater resiliency agenda city-wide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough water and wastewater resiliency plan, please refer to Chapter 12 (*Water and Wastewater*).

Water and Wastewater Initiative 1 **Adopt a wastewater facility design standard for storm surge and sea level rise**

Sandy damaged wastewater treatment plants and pumping stations even though the design of City wastewater facilities typically has taken into account the highest historically recorded water height of nearby water bodies or the BFEs identified in FEMA maps. The City, therefore, will adopt an increased level of protection for design and construction of all wastewater facilities based on the latest FEMA maps, modified to reflect sea level rise projections for the 2050s. DEP will adopt the new design guidelines in 2013.

Water and Wastewater Initiative 2 **Harden pumping stations**

Many of the city's pumping stations are located in low-lying areas and are necessary to convey wastewater and stormwater out of communities; however, their location also increases their

vulnerability to storm surge. Therefore, subject to available funding, the City, through DEP, will retrofit these pumping stations to improve their resiliency. These retrofits will include raising or flood-proofing critical equipment, constructing barriers, and installing backup power supplies. Preliminary estimates indicate that there are currently 58 at-risk pumping stations, of which several are already scheduled for capital improvements. Subject to available funding, DEP will pursue implementation of resiliency projects in conjunction with repairs and planned capital work, and as appropriate based on the level of risk, historical flooding, and potential community impacts, among other criteria. Among the pumping stations to be considered are 3 in the East and South Shores. The goal is to begin implementation in 2014.

Water and Wastewater Initiative 3 Harden wastewater treatment plants

All 14 of the City's wastewater treatment facilities are located along the waterfront and are therefore at risk in the event of a coastal storm. Subject to available funding, the City, through DEP, will protect these critical treatment facilities by raising or flood-proofing assets that are critical to the treatment process, constructing barriers, improving waterfront infrastructure, or implementing redundancy measures to avoid failure of these critical treatment systems. DEP will initially target facilities that have been identified as either most at-risk, or most likely to have impact on adjacent communities and waterways, based on the findings of an in-depth study by DEP. These facilities include the Oakwood Beach Wastewater Treatment Plant. The goal is for DEP to begin implementation of adaptation measures for these and other facilities in 2014 as part of repairs and other planned capital projects.

Water and Wastewater Initiative 8 Reduce combined sewer overflows (CSOs) with Green Infrastructure

As climate change brings increasing rainfall volume to the New York area, the city may also experience shifts in the frequency and volume of CSOs. The City will continue to implement its Green Infrastructure Plan and CSO Long-Term Control Plans (LTCPs) to reduce such CSOs. For this purpose, DEP, working with DPR and NYCDOT, will continue to pursue its plan to capture the first inch of runoff in 10 percent of impervious surfaces citywide by 2030. At the same time, DEP also will continue to develop LTCPs to evaluate long-term solutions to reduce CSOs and improve water quality in New York City's waterways. DEP will issue an LTCP for Alley Creek in Queens in 2013, with nine additional waterbody-specific LTCPs and one citywide LTCP to follow through 2017.

Water and Wastewater Initiative 10 Continue to implement and accelerate investments in Bluebelts across the city

Some areas of the city—including parts of the East and South Shores—lack a fully built-out storm sewer system. Street flooding can occur, therefore, even during minimal rain events in these areas. The City, through DEP, will, therefore, continue to implement and accelerate its innovative Bluebelt drainage program in areas where opportunities exist to preserve and enhance natural areas including streams, ponds, and other wetlands that remove pollutants before stormwater enters waterways. Through the next decade, DEP will substantially complete the South Richmond Bluebelt in Staten Island and begin to construct a new Bluebelt system on the East Shore of Staten Island. Subject to available funding and environmental review, DEP will also accelerate planning of improvements to Last Chance Pond on the East Shore.

Beyond the priority water and wastewater resiliency projects described in Chapter 12, including those summarized briefly above, the City is proposing additional water and wastewater resiliency initiatives that are specific to the vulnerabilities of the East and South Shores. These initiatives are described below.

East and South Shore Initiative 7 Launch the first capital project for the Mid-Island Bluebelt in Midland Beach

Low-lying East Shore communities regularly experience flooding of streets and private property, a challenge that likely will become greater with climate change. A drainage system for these areas, which would include a Bluebelt, would help with recovery from extreme weather events, as well as general stormwater management. The City, therefore, will launch the first capital project relating to the creation of a new Mid-Island Bluebelt, which is planned for the New Creek West Branch, located in the Midland Beach neighborhood—a neighborhood that was impacted severely by Sandy and has been impacted previously by other extreme weather events. To allow this project to commence in 2013, the City will work with non-city agencies to finalize the applicable Environmental Impact Statement, obtain all necessary permits, and begin proceedings and explore additional programs to acquire necessary property.

East and South Shore Initiative 8 Explore expansion of the City's mitigation banking pilot as a funding mechanism to facilitate the construction of the Mid-Island and South Shore Bluebelts

As described above, Bluebelts have been proven to help mitigate a variety of climate change-related risks. However, their construction is also expensive. To facilitate and accelerate the launch of Bluebelt initiatives citywide, including in the East and South Shores, the City will explore opportunities to develop a freshwater wetland mitigation banking program. Since the early 1990s, more than 900 mitigation banks have been created in 28 states across the country. A mitigation bank in New York could help fund an estimated 50 acres of planned wetland enhancement projects in the Mid-Island Bluebelt and another 11 acres of wetland restoration associated with the South Shore Bluebelt. The development of a pilot mitigation bank will be advanced by NYCEDC in 2014.

Other Critical Networks: Food Supply

Though the food supply chain generally emerged intact following Sandy, in certain local areas, residents found themselves without access to basic sustenance after the storm. In addition, had Sandy played out just a little differently, it is possible that significant links in the food supply chain—including the food distribution center in Hunts Point in the Bronx—could have been seriously threatened. As the climate changes, it is likely that risks such as these will grow.

Although initiatives outlined in several other sections above are important contributors to the overall resiliency of the food supply network (including especially those addressing utilities, liquid fuels, and transportation), the City also will pursue food-specific strategies to meet this goal for the benefit of residents of the East and South Shores and other parts of the city. These strategies will involve calling for resiliency investments at the most significant food wholesaling and distribution centers in the city and addressing issues relating to retail access in the event of extreme weather. The initiatives in Chapter 13 describe how the City intends to advance its food supply resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and non-profits of the East and South Shores. For a complete description of the City's five-borough food supply resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

**Other Critical Networks:
Solid Waste**

On a daily basis, the solid waste collection system in New York disposes of more than 12,000 tons of waste and recycling in a safe and sanitary fashion. Unlike many other critical City systems, during Sandy this one proved remarkably resilient, resuming many of its normal functions almost immediately after the storm. In fact, thanks to the efforts of the City's Department of Sanitation, even as the agency was dealing with its own storm-related challenges, it was able to assist with the recovery of the East and South Shores and the larger city by collecting the debris left by the storm in an organized and efficient manner.

However, the system does face real issues. For example, during Sandy, the city's solid waste disposal system experienced interruptions that interfered with its ability to convey refuse out of the city to its ultimate destination. Additionally, as the climate changes, it is likely that this system will become more vulnerable to extreme weather.

Among the strategies that the City will use to address these challenges for residents of the East and South Shores and other parts of the city will be to: Harden critical City-owned solid waste assets to protect them from extreme weather-related impacts; and seek to improve the resiliency of the broader solid waste network—both City- and third-party-owned—enabling it to resume operation quickly should disruptions occur. The initiatives in Chapter 13 describe how the City intends to advance its solid waste resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a complete description of the City's five-borough solid waste resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

**Environmental Protection
and Remediation**

Sandy showed that extreme weather events—which are likely to increase in severity with climate change—not only have the potential to impact the city's people, built environment, and critical systems, they also can have a deleterious impact on the natural environment. To help minimize the impact of future extreme weather on the environment, the City will advance a range of initiatives to protect open and enclosed industrial sites containing hazardous substances in an economically feasible way, and to encourage the cost effective remediation and redevelopment of brownfields in a re-

silient fashion. These initiatives will have a positive impact on the residents, businesses and nonprofits of the East and South Shores, which is home to 674 industrial businesses, and on the city as a whole. For a complete description of the City's five-borough environmental protection and remediation plan, please refer to *Environmental Protection and Remediation*.

**Community and Economic
Recovery**

New York is a city of neighborhoods, and these neighborhoods vary widely in size and nature. Notwithstanding this variety, successful neighborhoods across the city tend to share certain traits. Two of these are: a formal and informal network of community members who help and support one another in good times and bad; and vibrant commercial and nonprofit sectors that employ and provide goods and services to the people of the community.

As Sandy demonstrated, however, both the network of community-based organizations and the commercial and nonprofit sectors in New York's neighborhoods can be sorely tested when extreme weather hits. During these times (when contributions from these networks and sectors are desperately needed) these organizations and businesses themselves are frequently coping with the same set of challenges that the community at large is—a circumstance that can push even the most well-run organization or business to the breaking point. Even with these pressures, during and in the immediate aftermath of Sandy, New York's commercial and nonprofit sectors overcame many of their own difficulties, playing a critical role in the recovery of neighborhoods across the city, including the East and South Shores. However, as the climate changes, difficulties such as these will likely arise more frequently, testing institutions mightily.

Among the strategies that the City will use to achieve the goal of making its neighborhoods and their critical institutions more resilient will be to: Help build grassroots capacity and foster community leadership; help businesses and nonprofits impacted by Sandy to recover; help businesses and nonprofits in vulnerable locations to make resiliency investments that will better prepare them for future extreme weather; and bring new economic activity to neighborhoods recovering from the impacts of Sandy to enable these neighborhoods to come back even stronger than before.

The initiatives described below provide important examples of how the City intends to advance its community and economic recovery agenda citywide. These initiatives will have a

positive impact on the residents, businesses, and nonprofits of the East and South Shores. For a full explanation of the following initiatives and a complete description of the City's five-borough community and economic recovery plan, please refer to *Community and Economic Recovery*.

**Community Preparedness
Initiative 1**

**Identify and address gaps in
community capacity**

The capacity of a community to organize to aid businesses and residents after an extreme weather event or other disaster is a strong predictor of the success of that community's recovery. To improve the capacity of vulnerable communities OEM, working with the NYC Center for Economic Opportunity (CEO), will undertake a pilot assessment of the strengths and weaknesses of a Sandy-impacted community—which could be neighborhoods in the East and South Shores—to inform the creation of a plan to address needs uncovered by the assessment. Subject to available funding, OEM and CEO will choose a pilot community and begin their study in 2013.

**Community Preparedness
Initiative 2**

**Continue and expand OEM's Community
Emergency Response Teams**

OEM currently trains 54 teams of 1,500 volunteers across the city, which staff Community Emergency Response Teams (CERTs). Before, during, and after disasters, including extreme weather events, members of these teams help to organize community disaster preparedness and participate in emergency response and recovery. Going forward, OEM will work with communities to create additional teams, ensuring that these volunteers are as representative as possible of the communities that they serve. OEM, working with CEO, will identify low-income young adults to be trained to lead their communities in disaster preparedness. OEM and CEO will launch this program by 2014.

Economic Recovery Initiative 1

**Launch business recovery and
resiliency programs**

During Sandy, over 27,000 businesses citywide, including approximately 1,300 in the East and South Shores, were inundated by the storm. For many, recovery has been challenging. To assist with this recovery, immediately after the storm, the City launched the series of programs (described in *Community and Economic Recovery*), including a \$25 million loan and grant program and a \$25 million sales tax waiver program de-

signed to help businesses get back on their feet. Building on the momentum of these programs, which have assisted over 2,500 businesses as of the writing of this report, the City, through NYCEDC, will launch the CDBG-funded Business Resiliency Investment Program of up to \$100 million to help vulnerable businesses throughout the city make resiliency investments in their buildings and equipment, and the Business Loan and Grant Program of up to \$80 million will assist businesses with recovery and rebuilding efforts. NYCEDC will launch these programs in 2013.

Economic Recovery Initiative 2 Launch the Neighborhood Game Changer Competition

The recovery of many of the communities impacted by Sandy, including the East and South Shores, has been hampered by a lack of opportunities for economic advancement and employment among significant populations that were impacted by the storm. In many cases, these challenges existed even before Sandy, but have been exacerbated by the impacts of the storm. To address this, the City, through NYCEDC, will launch the CDBG-funded Neighborhood Game Changer Competition to invest up to \$20 million in public money in each of the five communities on which this report focuses, including the East and South Shores. This funding will be available on a competitive basis to help finance transformational projects. To win the competition, a project will have to spur incremental economic activity, generate new employment opportunities, and match public funding with significant private capital. Projects that would be eligible to be funded in the East and South Shores through this competition could include new attractions bringing new visitors, significant new operations of a major business or nonprofit, the revitalization of important commercial corridors, the expansion of an existing neighborhood institution, or a major new transportation option. NYCEDC will launch this program in 2013.

Economic Recovery Initiative 3 Launch Neighborhood Retail Recovery Program

At the core of many Sandy-impacted neighborhoods are the local commercial corridors that provide employment opportunities and services to those who live and work around them. They include local retailers, institutions, and service providers—such as food markets, pharmacies, social service organizations, laundromats, and others. In many cases, though, these corridors were devastated by the storm. To address this, the City will call on the PSC and Con Edison to amend the preferential Business Incentive Rate (BIR) program, which offers a dis-

count on Con Edison's electric delivery charges, to allow it to be extended to impacted small businesses in the five communities on which this report focuses, including the East and South Shores. Businesses and nonprofits with 10 or fewer employees that have received support from City-sponsored loan and grant programs will be eligible for the discount for five years up to a maximum discount of \$50,000 per business or nonprofit. The goal is for NYCEDC to launch this effort in 2013. The maximum aggregate benefit available across the East and South Shores will be \$1 million. Among the corridors where the benefit will be available in the East and South Shores include:

- Great Kills Harbor (full length of Mansion Avenue; portion of Buffalo Street, adjoining Nichols Marina);
- Hylan Boulevard (between Seaver Ave and New Dorp Lane);
- Main Street Tottenville (between Ellis Street and Amboy Road);
- Midland Avenue (between Mason Avenue and Father Capodanno Boulevard);
- Page Avenue Corridor (all streets between Arthur Kill Road, Nassau Place/Bethel Avenue, Amboy Road, Page Avenue, and Route 440);
- Sand Lane (between McClean Avenue and Father Capodanno Boulevard) and Robin Road (between Arthur Avenue and Sand Lane); and
- Seaview Avenue (between Hylan Boulevard and Patterson Avenue).

Economic Recovery Initiative 4 Support local merchants in improving and promoting local commercial corridors

As mentioned above, Sandy highlighted the important role played by local commercial corridors in many communities impacted by the storm. The City, through the Department of Small Business Services (SBS), will provide financial and/or technical assistance to area business improvement districts (BIDs), merchant associations, and other groups that work to improve, market, maintain, and otherwise promote primary commercial corridors. Subject to review of applications received, SBS will prioritize Sandy-impacted commercial corridors in allocating its resources, including its CDBG funding. Such funding could be used for a variety of purposes, including capacity building, façade improvement programs, streetscape improvements, and business recruitment and marketing efforts. In the East and South Shores, corridors that could receive this additional assistance include corridors in South Beach, Midland Beach, and Tottenville. SBS will provide this assistance beginning in 2013.

Economic Recovery Initiative 5 Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods

Even before Sandy, the residents of many communities impacted by Sandy, including parts of the East and South Shores, lacked adequate access to fresh fruits, vegetables, and other healthy foods. Noting this challenge, especially in underprivileged areas of the city, in 2009, the City launched the FRESH (Food Retail Expansion to Support Health) program, a series of zoning and financial incentives available to supermarkets to fill this gap in neighborhoods underserved by grocery retail. To promote the recovery of commercial corridors in these areas, the City will continue to support the FRESH program, with a particular focus on Sandy-impacted neighborhoods, including those in the East and South Shores.

Economic Recovery Initiative 6 Reassess commercial properties citywide to reflect post-Sandy market values

After Sandy, many commercial properties were worth less than before the storm. To reflect this fact and to help with recovery from the storm, the City has reassessed more than 88,000 properties impacted by the storm citywide. Overall, these reassessments have lowered the tax burden on Sandy-impacted properties—including both commercial and residential properties—by over \$90 million, with commercial properties in neighborhoods impacted by Sandy receiving a reduction, on average, of approximately 10 percent off of their pre-storm assessed values.

In addition to the measures described above, the City will advance the following initiatives to address the community and economic recovery needs of the East and South Shores.

East and South Shore Initiative 9 Issue a Request for Expressions of Interest (RFEI) for new concessions and services at City-controlled beaches in the East Shore

Damage inflicted by Sandy was particularly devastating to the East Shore's public beachfront, affecting the economic recovery of nearby commercial corridors and communities. In response, the City will issue an RFEI to help these public areas reemerge as resident and visitor destinations. The RFEI will call for ideas to activate select, strategic locations within publicly-owned lands between the FDR Boardwalk, the promenade, and Father Capodanno Boulevard.

This could include locations across from Ocean Breeze Park, at the Midland Beach Entrance Plaza, on the southern end of Midland Beach, and at New Dorp Beach. An activated beachfront would help to support local retail and business recovery, encourage private investment and development in nearby communities, provide jobs and services for local residents, and support current and planned DPR investments in the beachfront and adjacent areas. A wide range of amenities and services will be considered, including but not limited to: Eating and drinking establishments; concessions; and recreational facilities (such as bicycle rental facilities; kayak rental facilities; beach volleyball facilities; and outdoor fitness facilities). NYCEDC and DPR will issue this RFEI in 2013.

East and South Shore Initiative 10
Create a comprehensive revitalization plan for Great Kills Harbor to increase resiliency and to draw additional investment

Most of the six marinas and waterfront restaurants along Great Kills Harbor suffered significant damage from Sandy. Subject to available funding, the City, therefore, will launch a study that will seek to improve both the resiliency of the Harbor and the quality of life for the surrounding community. Even before Sandy, the Harbor held untapped economic and recreational potential. With the help of residents, business owners and other stakeholders, the City, through NYCEDC, will generate strategies to: Help Great Kills Harbor to rebuild; identify design improvements to protect the surrounding residential neighborhoods in future storms; explore partnerships between Federal, City and private recreation organizations; attract new commercial activity; and identify physical, circulation, parking, and design improvements for the area. The strategies developed as part of this plan could also be applicable to other marinas on the South Shore, such as Lemon Creek Marina. The goal is to complete this study within approximately six months after funding is secured.

East and South Shore Initiative 11
Create a strategic plan for public recreational land, including the beachfront recreation areas and open space

In many parts of the East and South Shores, there is poor access to and connections between national parkland, City parkland, and the beachfront on the East and South Shores, handicapping the potential of these assets to improve quality of life and contribute to the recovery of local communities. Subject to available funding, the City, through NYCEDC and DPR, therefore, will study the feasibility of ameliorating this situation, through investments that could include: a completed and improved greenway (that may incorporate the Amundsen Trailway) along the beachfront with a link to Great Kills Park; improved coordination between the City and the National Park Service; the creation of view corridors in natural areas; and the creation of public/private partnerships to operate and maintain these connections. The goal would be to complete this effort within approximately six months after funding is secured.

East and South Shore Initiative 12
Implement planned and ongoing investments by the City and private partners

Preservation and revitalization of neighborhoods most significantly impacted by Sandy will be hampered if the momentum of planned investments is lost. The City, therefore, will continue to pursue and execute on public and private investments that had been planned prior to Sandy in the East and South Shores and adjacent communities. Such projects include but are not limited to:

Parks and Open Space Projects

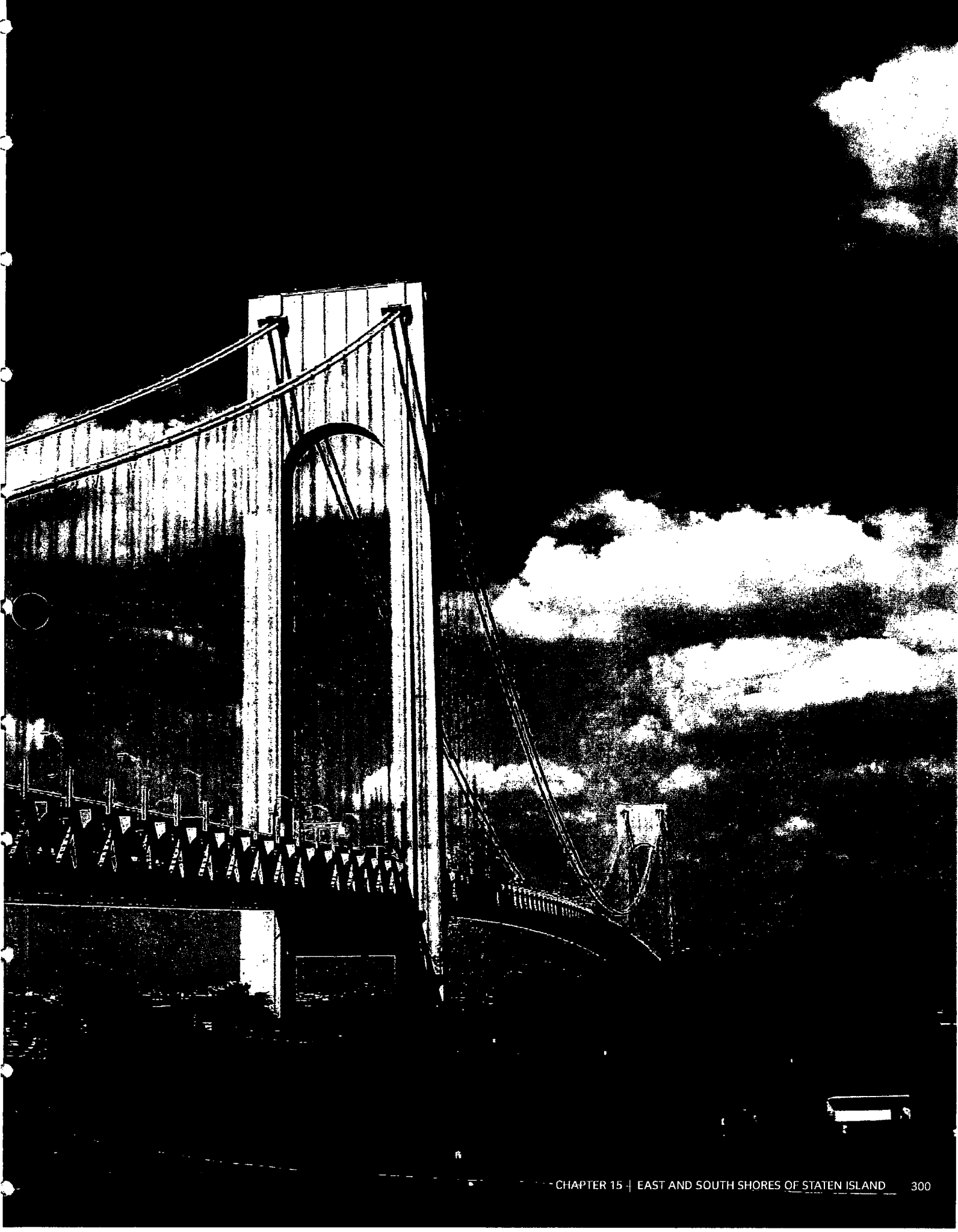
- *Ocean Breeze Track and Field Athletic Complex*, a 2,500-seat, state-of-the-art indoor track and field facility, funded with \$72.7 million in City capital.

Community Facility Projects

- *Charleston Mixed-Use Development*, an approximately 60-acre City-owned property that is to be redeveloped into a new park, senior housing, a public school, a public library branch, and new retail space.

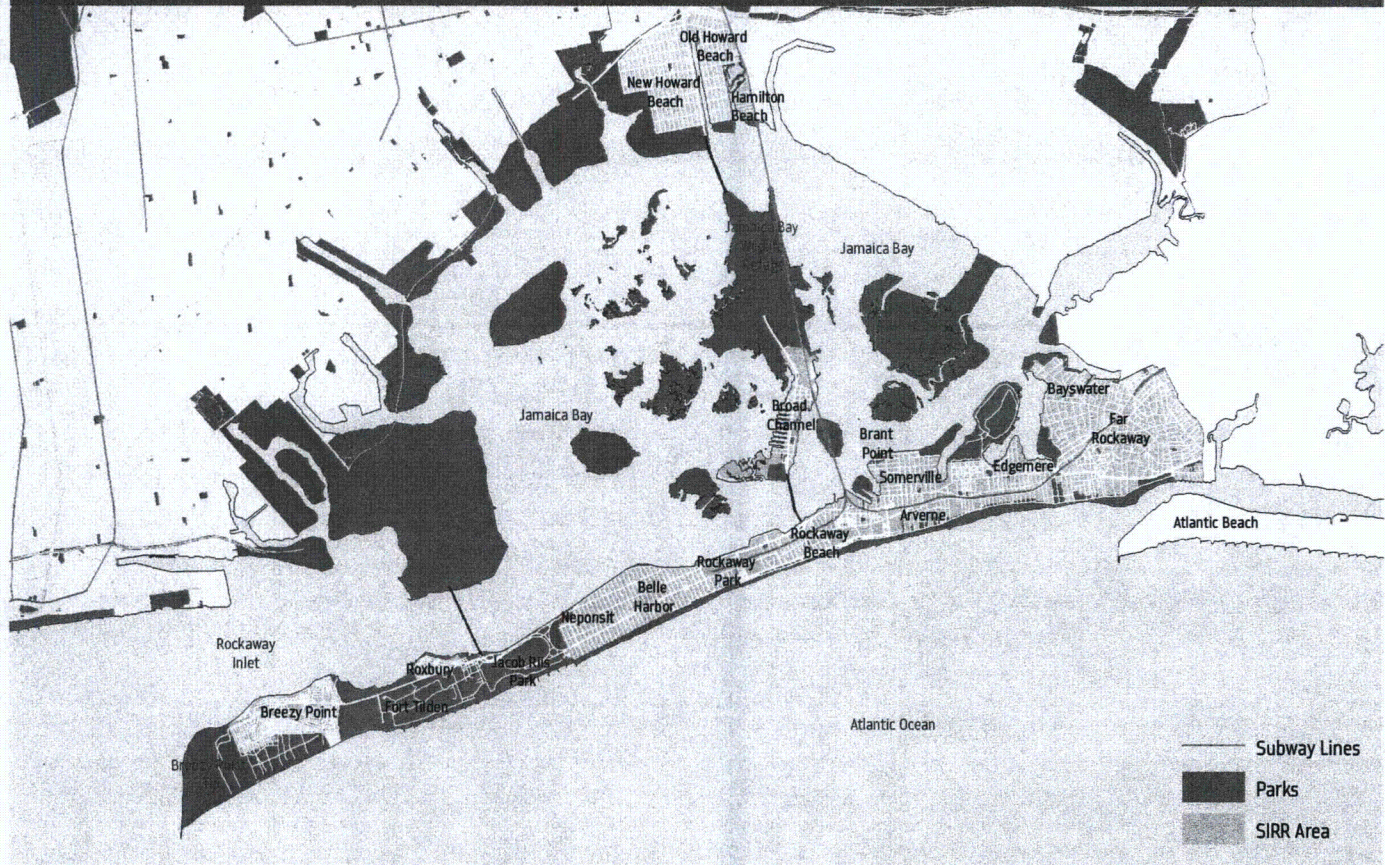
Economic Development

- *New Stapleton Waterfront (Homeport) Redevelopment*, a 35-acre decommissioned naval base that is to be transformed into a vibrant waterfront community, the first \$140 million phase of which transformation is expected to break ground in summer 2013 and is to include two new residential buildings with 27,000 square feet of retail space and \$33 million in City-funded infrastructure and open space improvements.
- *St. George Waterfront Redevelopment*, which is to include the world's tallest Observation Wheel and a high-end outlet retail complex and hotel that, together, will attract \$480 million in private investment to St. George.
- *Former Coast Guard Site Development*, a \$250 million development plan for an abandoned Coast Guard site in St. George, with a first phase that is to consist of 53,000 square feet of retail space.
- *Brielle Avenue Municipal Site*, a 46-acre, City-owned site, formerly known as Farm Colony, in connection with which the City is, as of the date of this report, reviewing RFP responses for redevelopment.



South Queens

Neighborhoods of South Queens



At the southernmost point of Queens lies the only unobstructed coastline in all of New York City, the 11-mile-long Rockaway Peninsula. Behind it are the 31 square miles of water that comprise Jamaica Bay. On the Peninsula and around the Bay are many neighborhoods that, at first glance, may seem to have little in common.

Far Rockaway, for example, sits at the eastern end of the Rockaway Peninsula, with sturdy brick high rises and tiny bungalows along the Atlantic Ocean and the A train rumbling on elevated tracks.

By contrast, Belle Harbor, which is farther west along the Peninsula, contains many large single-family houses dating from the 1920s, with tidy lawns, lining quiet streets.

Broad Channel's residents, meanwhile, occupy a skinny, mile-long island right in the middle of Jamaica Bay—an island they share with hundreds of species of birds that inhabit the Jamaica Bay Wildlife Refuge, which is also found there.

Yet, despite their differences, these three communities, along with the other neighborhoods on the Peninsula and ringing Jamaica Bay—including New Howard Beach, Old Howard

Beach, and Hamilton Beach on the Bay's north side—are alike in certain very profound ways.

All of these neighborhoods—collectively referred to in this chapter as “South Queens”—share a common geomorphology. This entire area was once comprised of barrier islands and marshland, all made of the soft soil left behind by the glacier that covered, and helped form, New York City some 22,000 years ago. The area has the lowest elevation of any in the city—in

places almost at sea level—making parts of it susceptible to flooding from even the regular movement of the tides.

And the area continues to evolve. In fact, the natural movement of sediment from east to west along the Rockaway Peninsula over the course of the 20th century formed what is today the community of Breezy Point—an area built on land that literally did not exist just a short time ago. As these changes in the Rockaway Penin-



Credit: Daniel Avila/NYC Parks

sula have added land, they also have taken land away. The Peninsula, which acts as a barrier shielding the areas lying inland from it, once itself was partially shielded by smaller barrier islands to the south. Over time, though, those smaller islands disappeared, leaving the Peninsula completely exposed to the ocean and making its coastline significantly more vulnerable. (See map: *The Shoreline: Then and Now*)

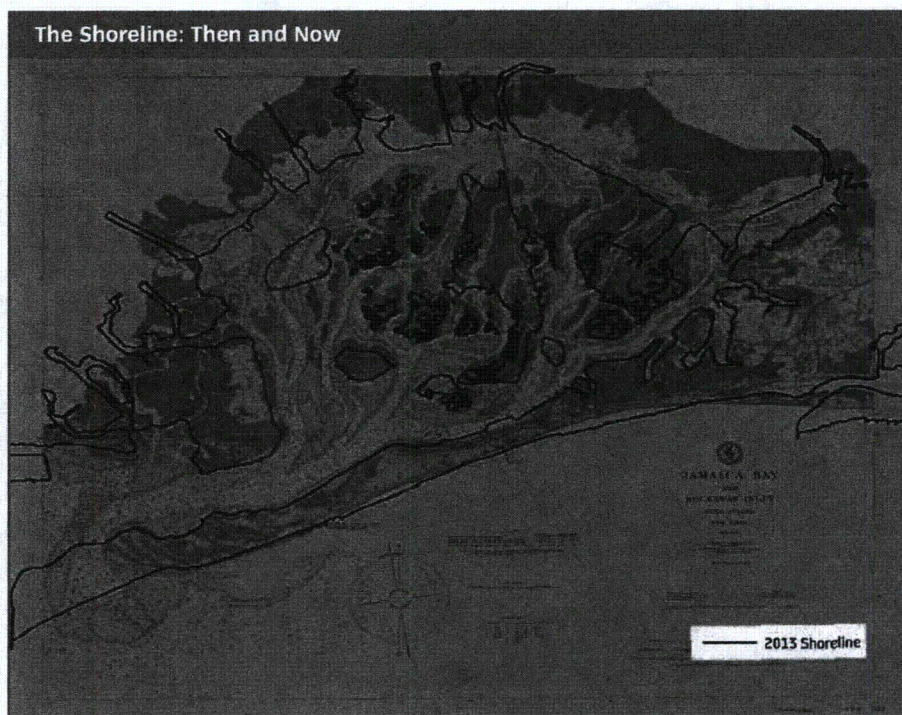
Just as the neighborhoods of South Queens possess a common geomorphology, they also share a history of development. Generally, they first sprang up in the 19th century as seasonal recreational destinations, with pockets of small summer homes and bungalows spread throughout the Peninsula, New Howard Beach, Old Howard Beach, and Hamilton Beach, and more stately homes and hotels lining the Peninsula's oceanfront. This early development was spurred by the advent of a rail line to the Rockaways—the forerunner of the right-of-way that today carries the A train across Jamaica Bay.

After the construction of Cross Bay Boulevard in 1923, the area's neighborhoods began to attract year-round residents. This accelerated with the end of World War II, when property owners and government entities began paving over marshland, hardening shorelines with bulkheads and seawalls, and building new houses, some on landfill.

In the 1950s, a new wave of development began, this time focused primarily on the Peninsula. There, the public sector and private developers began constructing nursing homes, public housing developments, and affordable housing projects under the Mitchell-Lama program. This trend continued through the 1960s and 1970s, resulting in high concentrations of disadvantaged populations in certain parts of South Queens.

In recent decades, the neighborhoods of South Queens have continued to develop and flourish, with new residents, attracted by the desirability of living at or near the city's oceanfront, joining those who have lived in these areas for generations. Both newcomers and long-standing area residents value the area's tranquil atmosphere, scenic locale, and strong sense of community.

On October 29, 2012, a new chapter in the common history of South Queens was written with the arrival of Sandy. Waves struck the Peninsula's coastline, smashing houses, splintering large sections of boardwalk, causing widespread flooding, and washing away or thrusting onto neighborhood streets and properties at least 1.5 million cubic yards of beach sand. The storm surge pushed through Rockaway Inlet, overtopping bulkheads and seawalls



Source: Coast and Geodetic Survey, October 1903

throughout the Bay and bringing significant inundation to many Bay-lining neighborhoods. Though the storm brought hardship to many parts of New York, it was particularly devastating for this area.

Compounding the destruction caused by floodwaters, serious fires also broke out along the Peninsula in Breezy Point, Belle Harbor, and Rockaway Park. In most cases, these fires were caused by the interaction of salt water and electrical equipment. Due to the severe flooding in these areas, fire trucks were simply unable to reach affected homes and businesses. As a result, flames spread and fires

burned uncontrolled for significant periods. In total, some 175 homes and businesses were destroyed.

Although rebuilding in South Queens is well underway as of the writing of this report, it is clear that simply restoring what existed in these neighborhoods before Sandy's arrival is not enough. As the climate changes, this area's vulnerabilities will only grow.

Entirely new layers of protection are needed for South Queens. This plan—which reflects the overarching goals of this report, namely to limit the effects of extreme weather, while enabling

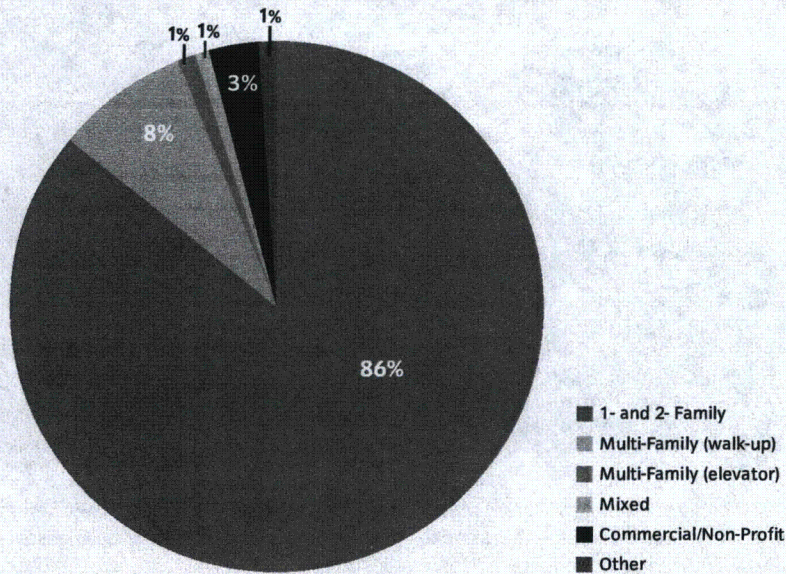


New York and its neighborhoods to bounce back quickly when those impacts cannot be prevented—proposes such protections. It addresses the area's most significant risks—its vulnerability to storm surge and rising sea levels—seeking to limit oceanfront and bayside

exposures to floodwaters, facilitate the rebuilding and retrofitting of buildings in a more resilient fashion, and protect vital infrastructure more effectively. It also addresses other threats, including the increasing frequency of heavy downpours, heat waves, and high winds,

by drawing on both citywide and locally tailored initiatives. Finally, the plan will build on the area's natural assets, local economic strengths, and community spirit to encourage reinvestment in its waterfront neighborhoods. This plan will ensure that South Queens is able to come back stronger after Sandy, and better prepared to confront a future of growing risks.

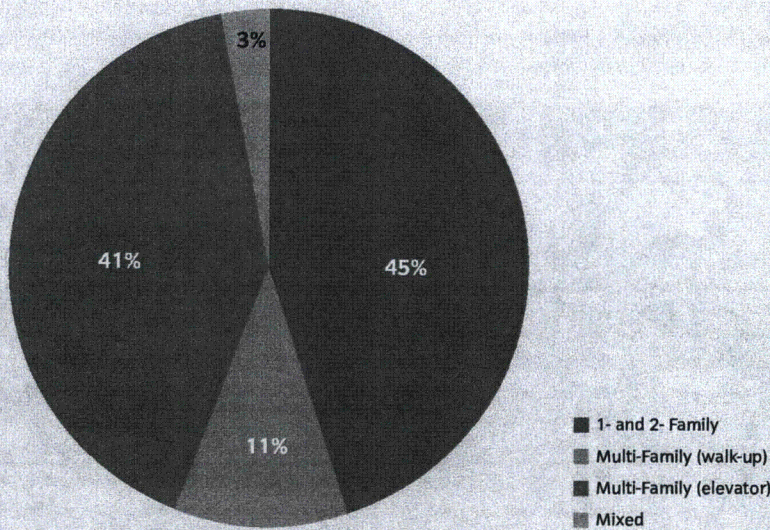
Area Buildings Characterized by Building Type



Total = 24,200 Buildings

Source: DCP PLUTO

Area Housing Units Characterized by Building Type



Total = 53,000 Housing Units

Source: DCP PLUTO

Area Characteristics

South Queens is predominantly residential, home to 130,000 people who inhabit some 15 different neighborhoods. Most businesses and nonprofits in the area are small, occupying commercial corridors that cater to local residents and summer visitors. However, there are some major employers in the area, especially in the healthcare sector. There is also significant infrastructure underpinning the everyday activities of those who live, work, and play in the area.

However, what truly sets South Queens apart is its unmatched recreational resources that serve not only the local communities, but the entire city. South Queens is one of New York's great summertime playgrounds.

Public beaches line nearly the entire stretch of the Rockaway Peninsula—adding up to the largest urban beach in America, lined, along five miles, with a boardwalk. While the Department of Parks & Recreation (DPR) manages approximately seven miles of beachfront in the Rockaways, an additional four miles, curving around the western end of the Peninsula, are under the jurisdiction of the National Park Service (NPS), part of the Gateway National Recreation Area.

In the Rockaways, the properties managed by NPS include the Robert Moses-designed Jacob Riis Park, which attracts visitors who mostly arrive by car or bus, lured not only by the beach but also by the famous Art Deco bathhouse that hosts ranger-led programs and history exhibits. Next door at Fort Tilden, a decommissioned military base, NPS maintains natural areas such as a maritime forest and freshwater ponds. Finally, there is Breezy Point Tip, an isolated NPS beach fronting Jamaica Bay.

Jamaica Bay itself is another precious natural resource in the area, containing a variety of native habitats including the city's largest remaining natural marshlands. Based on concerns about the accelerated loss of marshland within the Bay over the last century, governmental efforts were put in place to preserve and restore the Bay's ecology. As a result, today much of the Bay is surrounded by parkland, some controlled by NPS and some by the City. After working inde-

pendently for decades, in 2012, the City formalized a partnership with NPS to allow coordinated management of a total of 10,000 acres of parkland, with a focus on enhancing recreational amenities and the resiliency of the Bay and its surrounding neighborhoods.

Neighborhoods and Residential Development

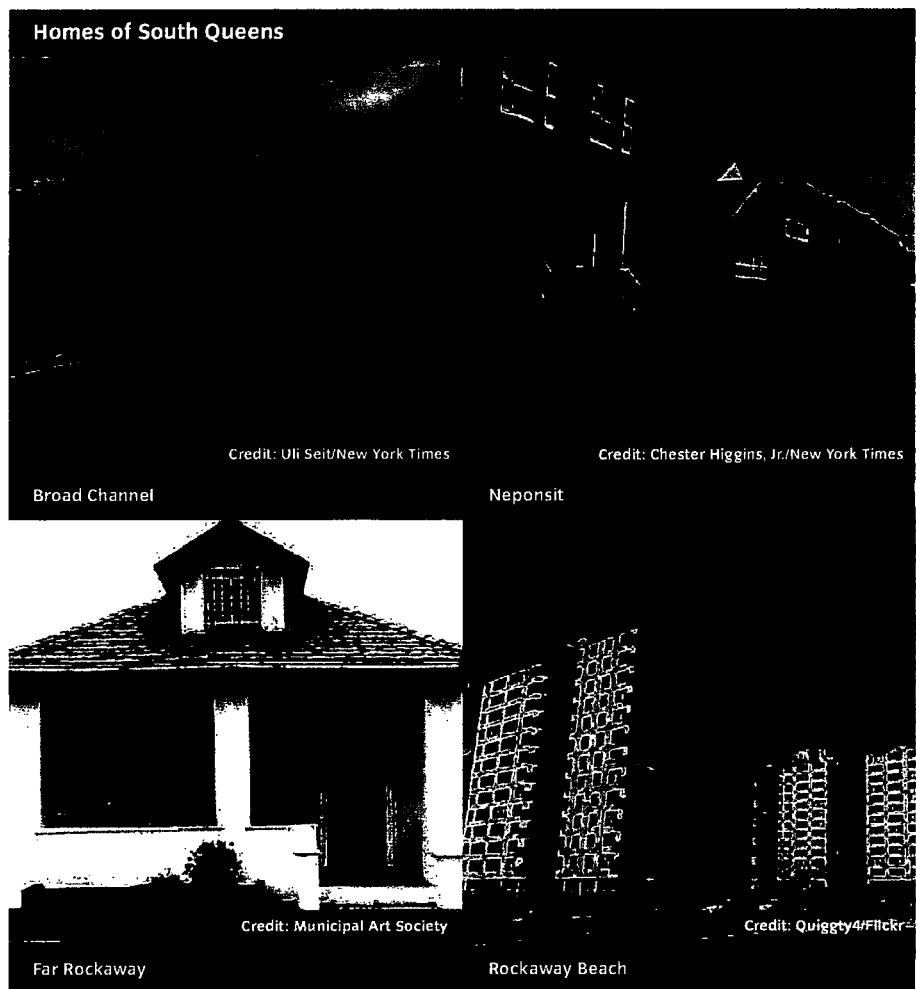
Despite their bountiful amenities, as mentioned previously, the neighborhoods of South Queens are, first and foremost, residential, containing a mix of housing types that range from bungalows to multi-family elevator buildings. Most residential buildings (86 percent) are 1- or 2-family homes, and 78 percent of the residential buildings in the area were constructed prior to 1961, when modern construction standards were adopted. These buildings (“combustible structures,” in the City’s nomenclature) tend to be constructed of lighter structural components such as wood. Though most buildings in South Queens are 1- or 2-family homes, more than half of all housing units (55 percent) are located in multi-family buildings. These multi-family buildings include six public housing developments operated by the New York City Housing Authority (NYCHA) and seven Mitchell-Lama developments. (See chart: *Area Buildings Characterized by Building Type*; see chart: *Area Housing Units characterized by Building Type*)

Rockaway Peninsula Neighborhoods:

On the easternmost end of the Rockaway Peninsula are found the neighborhoods of Bayswater and Far Rockaway, jointly referred to in this chapter as “Far Rockaway.” Much denser than the other neighborhoods on the Peninsula, Far Rockaway is home to 54,000 residents—42 percent of South Queens’s total population. Unlike the other neighborhoods of South Queens, Far Rockaway is built on land that is slightly elevated, making it less prone to flooding. This part of the Peninsula is also partially protected by groins and a portion of the Long Beach barrier island that is a part of Nassau County.

To the west of Far Rockaway are five neighborhoods that together are referred to here as “Rockaway.” These neighborhoods are Arverne, Somerville, Edgemere, Rockaway Park, and Rockaway Beach. This area, with a population of 49,100, is the second most densely populated part of South Queens, owing in part to five NYCHA developments containing over 3,400 units and seven Mitchell-Lama buildings.

Particularly noteworthy in the Rockaway area is the neighborhood of Arverne. This community historically consisted of bungalow housing that was cleared as part of an urban renewal project in the 1960’s. After laying fallow for many decades, the area began to spring back to life



in recent decades with the construction of Arverne By The Sea, a 117-acre mixed-use development between Beach 62nd and 80th Streets, which opened in 2008. The City not only required that the new development be constructed on an elevated site, it also called for a wide planted dune system facing the ocean—design features that would serve the community well during Sandy. Additional urban renewal land east of Arverne By The Sea remains undeveloped.

North of Arverne, fronting Jamaica Bay, are the neighborhoods of Somerville and Edgemere. There, older bungalows and single-family homes built of “combustible” materials predominate. The area also contains newer affordable homeownership and rental units developed by the Housing Partnership, the primary City-sponsored developer of affordable housing units in the five boroughs. Between Somerville and Jamaica Bay lies Brant Point Wildlife Sanctuary, which is mostly undeveloped marshland that preserves natural habitat and helps protect neighboring areas from floodwaters.

To the west of Arverne, Somerville and Edgemere are Rockaway Park and Rockaway Beach. These areas have a mix of high- and low-rise buildings, ranging from multi-family complexes to clusters of bungalows. Fronting Rockaway Beach (as well as Arverne) are the first legal surfing beaches in New York City, which increasingly attract surfers from all five boroughs.

Farther west are Neponsit and Belle Harbor, neighborhoods that together have 5,500 residents who primarily inhabit larger single-family homes. They sit directly next to Jacob Riis and Fort Tilden National Parks.

At the westernmost tip of the Peninsula, lies a distinct area composed of the private communities of Roxbury and Breezy Point. Part of Breezy Point faces the ocean and another part, like Roxbury, fronts Rockaway Inlet. Nearly 4,100 residents live in 3,400 single-family homes and bungalows in these communities on land owned by the Breezy Point Cooperative. The Cooperative maintains its own infrastructure, controls access to its beachfront, and sets its own rules governing the construction and maintenance of properties.

Jamaica Bay Neighborhoods:

On the Jamaica Bay island of Broad Channel, residents live on the southern portion of the island while the Jamaica Bay Wildlife Refuge occupies the northern end. The community's 2,400 residents dwell in approximately 1,000 single-family homes, some on stilts—with many lining narrow channels on the island's western shore.

Finally, on the far side of the Bay, north of Broad Channel are New Howard Beach, Old Howard Beach, and Hamilton Beach. Together these areas have a population of 14,700. Old Howard Beach and Hamilton Beaches generally contain smaller "combustible" single-family houses, including bungalows dating to the early twentieth century. New Howard Beach, meanwhile, tends to contain homes that are larger and newer, most sitting at slightly higher elevations. These neighborhoods

contain numerous narrow basins providing access to small docks for recreational boating.

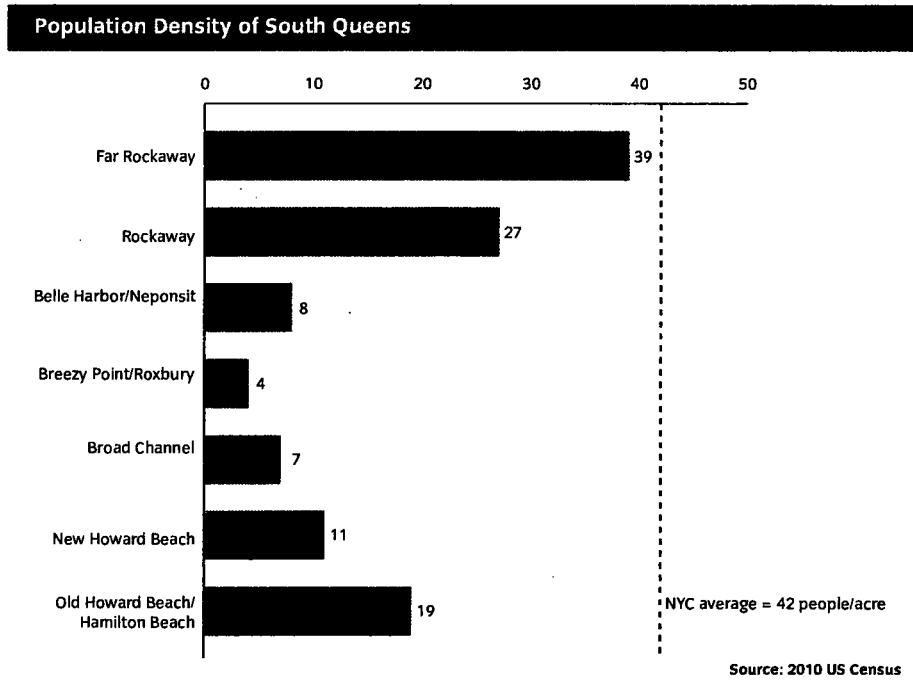
Socioeconomic Characteristics

The socioeconomic makeup of South Queens as a whole is roughly comparable to the city as a whole, with, for example, an average poverty rate of 18 percent in South Queens, that mirrors the rate across the five boroughs. Median household income across South Queens, meanwhile, is slightly higher (\$55,000) than the citywide average (\$51,300). The same is true of the rate of home ownership, which is about one third higher than the citywide average of 33 percent.

However, there are dramatic socioeconomic differences from neighborhood to neighborhood in South Queens. For example, in Broad Channel the poverty rate is only 1 percent, while the rates for Rockaway and Far Rockaway are 21 percent and 22 percent, respectively. Similarly, whereas the rate of homeownership in New Howard Beach and Breezy Point are both at 95 percent, the average rate for Rockaway and Far Rockaway is around 32 percent. (See table: Socioeconomic Characteristics)

Businesses, Nonprofits, and the Local Economy

Generally speaking, businesses and nonprofits in South Queens tend to be small enterprises, with over 80 percent of businesses in the area employing fewer than 10 people. Though by number, the area's small businesses predominate, there are some larger enterprises in South Queens that account for a substantial portion of area



Socioeconomic Characteristics								
Area	Population	Poverty Rate	Median Household Income	Households	Owner-Occupied Housing Units	% Homeowners	% Owner-Occupied Housing Units with Mortgage	Median Owner-Occupied Unit Value
Far Rockaway	54,000	22%	\$39,800	17,100	4,400	26%	76%	\$474,200
Rockaway	49,100	21%	\$49,200	17,600	6,700	38%	59%	\$384,100
Belle Harbor/Neponsit	5,500	2%	\$117,200	2,100	1,900	90%	50%	\$810,700
Breezy Point/Roxbury	4,100	2%	\$86,900	1,800	1,700	95%	44%	\$557,300
Broad Channel	2,400	1%	\$78,200	850	700	78%	78%	\$424,000
New Howard Beach	7,400	9%	\$92,700	2,900	2,800	95%	53%	\$673,000
Old Howard Beach/Hamilton Beach	7,300	7%	\$72,000	2,700	2,000	75%	50%	\$550,400
Citywide Total/Average	8,175,000	19%	\$51,300	3,050,000	993,500	33%	64%	\$514,900

Source: 2010 US Census, 2011 American Community Survey, 5-Year estimate

employment. In fact, approximately one-half of the employees of South Queens businesses work for companies and institutions that employ over 100 people. (See chart: Profile of Area Businesses)

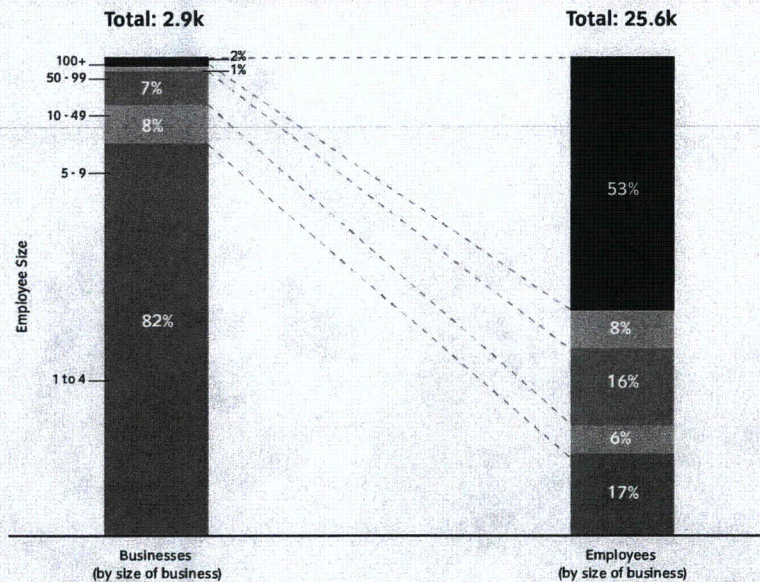
Among the important industries in South Queens, perhaps the most significant is health-care. This sector includes most of the area's larger employers, ranging from local medical offices, to nursing homes, adult care facilities, and a hospital. Two of the major healthcare providers in South Queens are Peninsula General Nursing Home Corporation and St. John's Episcopal Hospital. Since the closure of Peninsula Hospital Center in 2012, St. John's, with an inpatient bed capacity of approximately 400, has been the sole hospital in all of South Queens.

Though the manufacturing sector does not play a significant role in South Queens, one major employer in the area is a manufacturer: Madelaine Chocolates. This company, located in Rockaway Beach, is, in fact, one of South Queens's larger employers. Located in its current location since 1967, before Sandy, the company employed 450 people and, on a typical day, turned 100,000 pounds of chocolate into Easter eggs, Chanukah gelt, and other confections.

Retail is another important sector of the South Queens economy. Generally, businesses in this sector can be found in the area's many commercial corridors that traditionally serve local residents and seasonal visitors. Commercial corridors include:

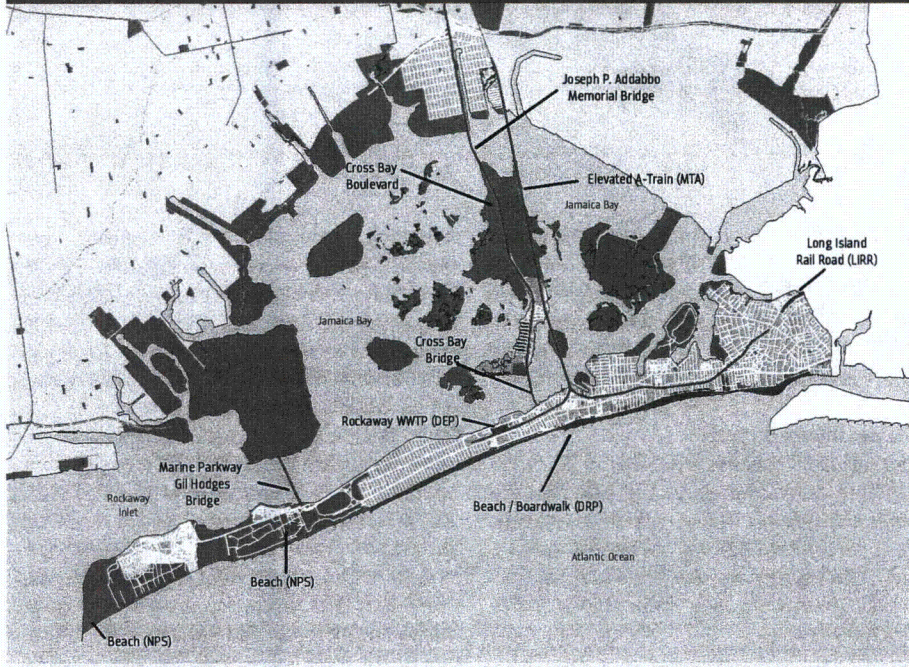
- **Mott Avenue:** Far Rockaway's main commercial corridor, this area is anchored by governmental and educational institutions. It is also served by multiple modes of public transit. The area includes a mix of small businesses and nonprofits as well as larger chain supermarkets and retailers. The area is the only commercial corridor in South Queens served by a local economic development organization, the Rockaway Development & Revitalization Corporation.
- **Beach 116th Street:** This commercial corridor runs from Jamaica Bay to the beach and is lined with small businesses. It intersects with another retail strip for a few blocks along Rockaway Beach Boulevard. Though the location has many advantages, including the terminus of the A line and access to both the beach and the Bay, the area has, struggled in recent years with the impact of vacant or underutilized buildings.
- **Beach 129th Street:** A smaller strip of retail, service, and dining establishments, this corridor primarily serves residents of Neponsit and Belle Harbor.
- **Cross Bay Boulevard:** This thoroughfare, running from the northern end of Jamaica Bay to

Profile of Area Businesses



Source: Hoovers

Critical Infrastructure



the Rockaways, serves as the main commercial corridor of Howard Beach. It contains an auto-oriented retail strip, big-box retail, and, facing the water, restaurants and bars that are popular during the summer.

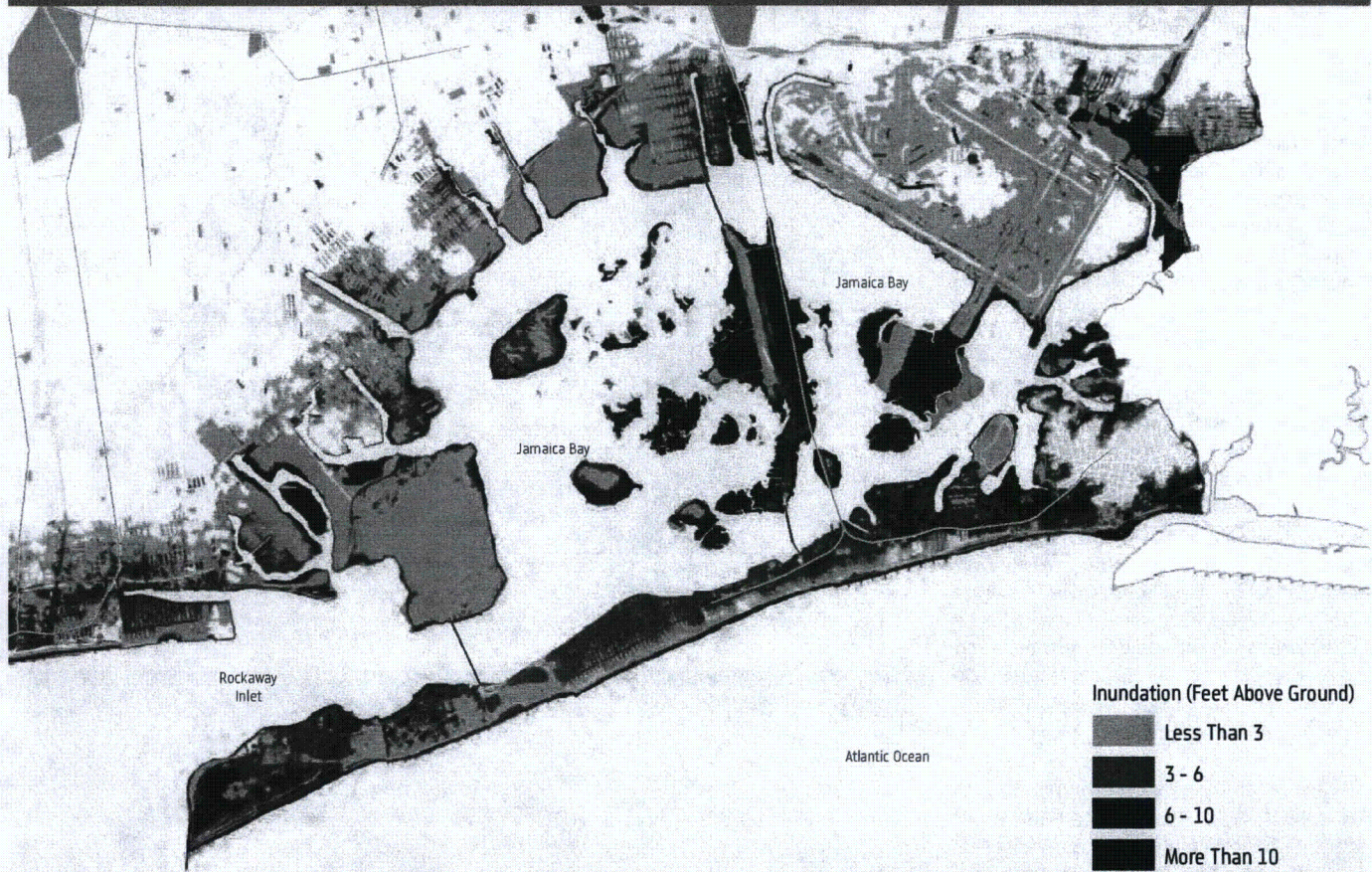
- **Broad Channel:** About a dozen retailers serving this community are scattered throughout the island.

economic activity throughout South Queens, the Peninsula's beachfront and boardwalk also support a significant seasonal workforce. For example, during summer months, DPR hires lifeguards for the City's beaches, and restaurants and vendors, including Rockaway Park's popular Rockaway Taco, hire extra wait staff.

In addition to the foregoing businesses and nonprofits that provide year-round employment and

Notwithstanding this diversity of economic activity and the positive momentum from recent growth in the year-round surfing community

South Queens Surge Heights



Source: FEMA (MOTF 11/6 Hindcast surge extent)

and revitalized concessions around Rockaway Beach and Arverne, many businesses and non-profits in South Queens had been struggling even before Sandy. This was due to a combination of factors, including the impact of the severe economic downturn that began in 2008.

Critical Infrastructure

South Queens contains a number of key infrastructure assets that serve the area and the larger city beyond. These include assets that are a part of the region's transportation network, process area wastewater, and act as vital coastal protections. (See map: *Critical Infrastructure*)

Among the transportation assets that can be found in the neighborhoods of South Queens, several serve as a critical link between this geographically isolated area and the rest of the city. For example, Cross Bay Boulevard and the Gil Hodges Memorial Bridge, both north-south arteries, provide vehicular access to the Rockaway Peninsula (and, in the case of Cross Bay Boulevard, to Broad Channel) from South Queens and Southern Brooklyn. The Metropolitan Transportation Authority's (MTA) A train and shuttle services that run on its lines, meanwhile, link the

Rockaway Peninsula, Broad Channel, and Howard Beach via a causeway that traverses Jamaica Bay. On a typical weekday, thousands of daily commuters ride the A train, along with the Long Island Railroad, which stops in Far Rockaway, and the many bus lines serving the area.

South Queens is home to the Rockaway Wastewater Treatment Plant. The plant has been in operation since 1952 and treats 45 million gallons of wastewater per day while also receiving stormwater runoff. The facility, operated by the New York City Department of Environmental Protection (DEP), sits on low-lying land immediately adjacent to Jamaica Bay and is, therefore, one of the most vulnerable facilities in DEP's network to flooding and other weather-related events.

The Rockaway Wastewater Treatment Plant receives flow from the area's sanitary sewer system. Much of the Rockaways have been undergoing storm sewer build-out for years. Projects have included the extension, replacement, and installation of various water mains and sanitary and storm sewers throughout the Peninsula. However, the required build-out in the area is extensive, and in some neighbor-

hoods, such as Far Rockaway, Edgemere, and Broad Channel, the storm sewer system has not been completed. As a result of this and their low elevation, these neighborhoods tend to be more susceptible to flooding.

Another important piece of infrastructure in South Queens is one that provides a coastal protection function: the area's beaches—especially those, along the Rockaway Peninsula, facing the Atlantic Ocean. However, in most places, these beaches lack dunes, groins and other forms of coastal protection. As a result, they experience regular erosion.

In response to this erosion, starting in 1977, the US Army Corps of Engineers (USACE) designed and implemented two major beach nourishment projects extending from Neponsit through Far Rockaway. However, in 2004, due to the high costs associated with these projects, the USACE deferred further nourishment and other planned projects, with a goal of finding more cost-effective solutions. In the interim, though, the area's beaches have continued to erode, reducing their ability to protect the neighborhoods along the Peninsula.

What Happened During Sandy

Arriving almost exactly at the moment of high tide in South Queens, Sandy brought a massive storm surge and battering waves to the neighborhoods of South Queens, wreaking havoc on the area. Most of the destruction brought by Sandy to these neighborhoods was, directly or indirectly, attributable to the huge volumes of water that inundated the area. This inundation followed three paths. First, areas flooded when waves rose directly up over beaches and broke against the neighborhoods behind them. Second, floodwaters were funneled through the Rockaway Inlet, throughout Jamaica Bay, and then into the tributaries and channels around the circumference of the Bay. Finally, in some places, inundation entered areas through low-lying drainage infrastructure that never was intended to face flooding of this magnitude. (See map: *South Queens Surge Heights*)

The result of all of this was widespread loss—building damage, power and transportation outages, disruptions in other services, displacement, and financial hardship for many residents, businesses, and nonprofits. Throughout South Queens, though few areas escaped harm altogether, different neighborhoods did experience the storm in different ways.

Compared to other neighborhoods in South Queens, generally speaking, Far Rockaway experienced minimal flooding associated with Sandy's surge due to its higher elevation and the fact that a portion of the coastline is protected by Long Beach. However, some pockets of Bayswater and the southern portions of Far Rockaway experienced more flooding than adjacent areas.

In Arverne, meanwhile, Sandy's surge breached the coastline, damaging beach-facing homes. However, damage was mitigated in large sections of Arverne By The Sea, where the dune system on the beach in front of the new development absorbed the impact of waves, while the elevated site and special drainage features in the development kept most housing units free of water.

Farther to the west, in Rockaway Park and Rockaway Beach, as in other sections of the Peninsula, Sandy's surge waters spread throughout the area. The net result in these communities was significant damage to building systems in high-rise structures (knocking out critical services like electricity and water), as well as flooding and structural damage to many of the area's low-rise buildings.

Even farther to the west on the Peninsula, damage generally increased. In these areas, high-velocity waves struck unprotected Belle



Fire damage in Breezy Point

Credit: Kirsten Luce/The New York Times

The Fires in the Rockaways

During and after Sandy, 94 storm-related fires broke out across New York City. About 80 percent of these fires were electrical in nature, caused by the interaction of electricity and seawater, though some were also caused by open flames or even faulty generators. In total, these fires destroyed over 200 homes and businesses across the five boroughs. As devastating as they were wherever they hit, the fires were particularly disastrous across the Rockaway Peninsula, where 175 of the destroyed homes and businesses were located.

Breezy Point

A 6-alarm fire broke out in Breezy Point when seawater brought by Sandy's surge came into contact with the electrical system of a single-family home in the community. Fueled by Sandy's high winds, the fire, which firefighters were unable to reach for some time due to flooding, spread quickly in this densely packed neighborhood, ultimately destroying 126 homes and damaging 22 more. It took 10 hours to bring the fire under control.

Belle Harbor

On Beach 129th Street in Belle Harbor, a major conflagration broke out after utility wires, compromised by the storm, came into contact with a 2-story home. The ensuing fire spread to 31 additional structures, completely destroying all of them.

Rockaway Beach Boulevard

On Rockaway Beach Boulevard and Beach 113th Street, utility wires came into contact with a 3-story, mixed-use building during the storm. The downed wires started a fire that eventually spread to 16 additional structures, destroying them all.

Harbor, Neponsit, Roxbury, and Breezy Point, smashing structures facing the ocean and sending floodwaters down streets, onto properties, and into basements and ground floors. Vast amounts of sand also were pushed onto neighborhood streets, sidewalks, and private land.

At Riis Park, the parking lot and Art Deco bathhouse experienced significant damage, though it was not impacted structurally. At Fort Tilden, the entire network of protective dunes was lost, with the storm uncovering an old seawall with metal rebar and jagged debris. Fort Tilden remains closed as of the writing of this report.

Even as Sandy's surge attacked the Rockaway Peninsula from the ocean, it was also pushing

through Rockaway Inlet. As it raised water levels in the area, it inundated Roxbury, damaging Bay-facing homes in the neighborhood.

From the Rockaway Inlet, the surge spread throughout Jamaica Bay, overtopping deteriorated seawalls along Belle Harbor and Neponsit and bringing floodwaters into these neighborhoods from that direction as well. As a result, at these and other points along the Peninsula the "ocean met the bay," with flood heights reaching as high as 10 feet.

Other Bay-facing Peninsula neighborhoods were deluged as well, including Somerville and Edgemere. There, low-lying land and soft soil conditions, together with already eroded

coastal conditions, allowed Sandy to undermine existing bulkheads, leaving homes virtually unprotected from the storm's waters.

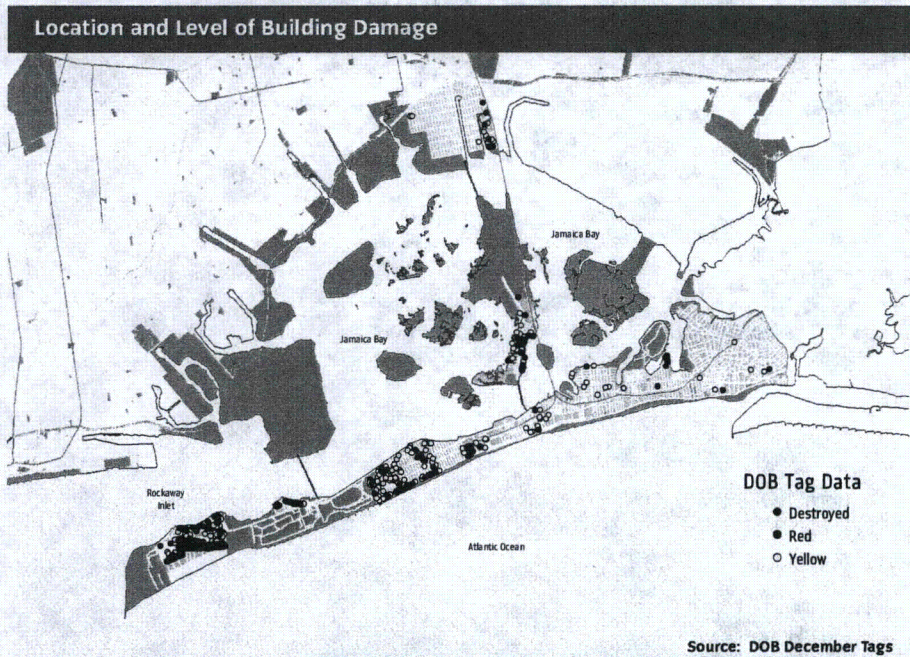
Broad Channel, sitting at a low elevation in the middle of Jamaica Bay, also suffered from Sandy's surge, which spread large volumes of water throughout the neighborhood. Salt water contaminated the Jamaica Bay Wildlife Refuge's West Pond on the northern end of the island. In New Howard Beach, Old Howard Beach, and Hamilton Beach, inundation similarly caused significant devastation. Floodwaters largely en-

tered these neighborhoods from the Bay via the narrow creeks and basins that wind through and among these neighborhoods.

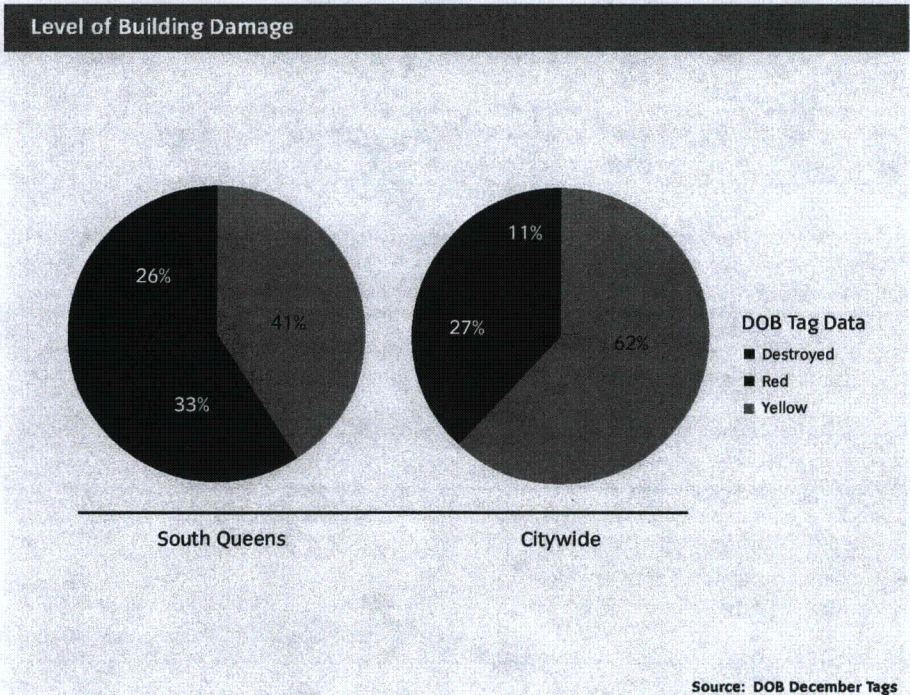
Another way in which Sandy wreaked havoc on South Queens was via its winds, which spread fires that broke out in several South Queens areas, including Breezy Point, Belle Harbor, and Rockaway, spreading them, in some cases, over large areas. (See sidebar: *The Fires in the Rockaways*)

As a result of Sandy, a large number of buildings

in South Queens suffered damage. After the storm, the New York City Department of Buildings (DOB) sent out inspectors to assess damages in South Queens and other inundated areas of the City. These inspectors were asked to assign "tags" to buildings based on the observed condition of each structure. "Green" tags indicated less serious damage or no damage. "Yellow" tags indicated that portions of a building might be unsafe or might have significant non-structural damage. "Red" tags indicated structural damage. And a subcategory of "red" tags was further categorized as "destroyed".



The most methodologically rigorous building damage assessment undertaken by DOB was completed in December 2012. According to this assessment, of those buildings citywide that were tagged, either yellow or red (including those further classified as destroyed), 37 percent were located in South Queens. This was well in excess of the percentage of all buildings in the citywide inundation zone that were located in South Queens (24 percent). The yellow and red tagged buildings in South Queens tended to be clustered in Edgemere, Somerville, Rockaway Beach, Rockaway Park, Belle Harbor, Neponsit, Roxbury, Breezy Point, Broad Channel and Hamilton Beach. Consistent with other ocean-facing areas of the city, in South Queens, the percentage of red and yellow tagged buildings that were tagged red (59 percent) was higher than the percentage citywide (38 percent). This overrepresentation was reflective of the destructive impact that powerful waves coming off of the ocean had on the area's building stock.



Like residents, businesses and nonprofits in South Queens were hit hard by Sandy, with over 2,275 businesses and nonprofits, employing nearly 15,000 people, impacted. These ranged from large to small.

For example, in Rockaway Beach, Madelaine Chocolates was inundated completely. This resulted not just in the loss of inventory and valuable equipment but also missed production during critical holiday seasons, from Thanksgiving through Easter.

Many neighborhood retail corridors, service-providers, and beach-related concession operators also were devastated. This devastation resulted primarily from inundation, though, in some cases, also was caused by fire. To add insult to injury, as these businesses and nonprofits began slowly to reopen after the storm, many found that they had fewer customers, owing to the large numbers of area residents who the storm had displaced. This was even true in Far Rockaway, where storm damage was less severe than elsewhere in South Queens,

Power Outages in South Queens

Although many parts of the city were affected by power outages, few were as significantly impacted as the neighborhoods of South Queens. Not only did the entire area lose power—caused by damage to substations, power lines, and customer equipment—but, in many cases, these power outages lasted longer than anywhere else in the city. To understand why this occurred, it is first necessary to understand how power is supplied to the area.

In the Rockaways, the Long Island Power Authority (LIPA), a public authority controlled by New York State, is responsible for delivering electric power. Meanwhile, as is the case in the rest of the city, Con Edison, a private utility company, is responsible for providing electric power to Broad Channel, New Howard Beach, Old Howard Beach, and Hamilton Beach.

During Sandy, all four LIPA substations serving the Rockaway Peninsula were knocked out of service by floodwaters, resulting in widespread power failures, impacting some 34,000 customers. Because of the extent of

the damage to its system, after Sandy, LIPA was unable to reenergize its grid for some 11 days. Thereafter, LIPA was able to restore power relatively quickly to approximately 10,000 customers, predominantly in portions of Far Rockaway that did not suffer extensive flood damage. However, for the majority of areas that experienced significant flooding, and resulting physical damage to buildings, for safety reasons, it was necessary to repair this damage before power could be restored. As a result, around 24,000 customers remained without power returning one by one over months until each building received certified inspections or repairs to their equipment.

In Con Edison's territory, meanwhile, power outages were also extensive, impacting approximately 2,800 customers in New Howard Beach, Old Howard Beach, and Hamilton Beach and 950 customers in Broad Channel. This was, in large part, due to flooding, which, in turn, made it unsafe to restore electric service to customers until their in-building equipment could be inspected and, if damaged,

repaired. According to Con Edison, eight days after Sandy's departure, half of the customers in New Howard Beach, Hamilton Beach, and Broad Channel had had their power restored, with about a quarter of customers restored in Old Howard Beach. The City's groundbreaking Rapid Repairs program dramatically accelerated the pace of power restoration in South Queens and other impacted areas, by dispatching contractors and skilled construction workers to make emergency repairs on residential properties affected by Sandy. In total, as of the writing of this report, Rapid Repairs has assisted more than 20,000 families—including thousands in South Queens.

Overall, extended power outages created hardships for many in South Queens, including the elderly and disabled. This was especially true for those living in multi-story facilities that had lost critical building systems, as occurred at numerous Mitchell-Lama developments, NYCHA developments, nursing homes, and adult care facilities.

but where, three weeks after the storm, only 40 to 50 percent of area businesses had reopened. Businesses in South Queens suffered many losses, including lost inventory, damaged interiors, and compromised building systems.

Yet another impact that Sandy had on the neighborhoods of South Queens was extensive damage to the area's critical infrastructure. For example, Cross Bay Boulevard was fully submerged during the storm. After the storm, the thoroughfare was littered not just with damaged cars and trucks but also with boats that Sandy's surge had deposited well inland.

Mass transit serving South Queens also was significantly impaired by Sandy. For example, portions of the A train rail connection between Howard Beach and the Rockaway Peninsula were washed away, leaving 35,000 daily riders without a direct rail link to Queens, Brooklyn, and Manhattan. Subway tracks south of Howard Beach were also inundated with up to ten feet of water, washing these tracks out in many places and, in two locations, washing out the land on which the tracks ran. Other railroad equipment was seriously damaged or destroyed, including important signal systems. Though the MTA was able to put shuttle bus and train service in place in the interim, full service along the A line was not restored for some seven months, significantly increasing commuting times for those who normally relied on the subway.





Rockaway Beach, 1902

Restoration of the Rockaways Beachfront

Following Sandy, a top priority for the City was the reopening of the beaches of the Rockaway Peninsula in time for the summer of 2013. To this end, the Department of Parks and Recreation (DPR) repaired portions of the boardwalk that had sustained only minor or moderate damage to pre-Sandy designs, repaired and replaced damaged lifeguard stations and restrooms, and created resilient “boardwalk islands” in several compromised locations to provide access to beach facilities and amenities. Looking to the future, DPR intends not only to restore the boardwalk in full but also to continue to support beach restoration projects that will protect the neighborhoods that it fronts. DPR also is prioritizing opportunities for beach-fueled economic development in both the near- and long-terms that could contribute to the wider recovery of the Rockaway Peninsula, South Queens, and the city as a whole (See South Queens Initiatives 7 & 8).

To address the transit challenges posed by the closure of the A train, in November 2012, the City launched temporary ferry service between the Rockaways and Manhattan. Paid for in part with Federal money and using a landing site provided by National Grid, the service cost riders \$2 per trip.

Another important piece of infrastructure in South Queens impacted by Sandy was the Rockaway Wastewater Treatment Plant. This facility suffered severe flooding and was out of service during the storm, leaving wastewater untreated for three days, although chlorine was applied to untreated effluent. Notwithstanding these releases, water quality samples taken by DEP following the storm showed minimal water quality impacts, due in part to dilution of effluent that resulted from the high volumes of water that Sandy brought with it. The Rockaway Wastewater Treatment Plant finally regained full treatment capacity approximately two weeks after the storm.

Sandy caused significant erosion along the beaches of South Queens. In fact, the USACE estimated that Rockaway Beach alone lost 1.5 million cubic yards of sand, much of it pushed up into neighborhood streets or washed into the Atlantic. Segments of the area’s boardwalk were also destroyed, although the portions built of concrete tended to emerge unscathed or to sustain only minor to moderate damage.

Schools in the area were also damaged. In total, 37 schools in South Queens were closed for up to two months. Until repairs could be completed. Students at these schools were relocated to school facilities that had not been damaged to ensure that instructional disruption was kept to a minimum.

As significant as Sandy’s impacts were on the many neighborhoods of South Queens, they also inspired acts of heroism. These efforts ranged from the relief operations undertaken by community-based organizations, other non-profits, local residents, and outside volunteers. The outpouring of financial and on-the-ground support helped many to begin addressing the damage done to their homes, supported efforts to clean up the area and assisted residents who were displaced or remained in the area but whose access to goods and services were impaired. In fact, the experience of Sandy inspired 40 local organizations to form a new coalition called Rockaway United. This group was established to coordinate services post-Sandy more effectively and to put mechanisms in place for future disasters. Efforts such as these were, in many ways, the silver linings that emerged from an otherwise grave situation, providing a ray of hope that, out of the tragedy of Sandy, the neighborhoods of South Queens will emerge with strengthened community networks that will be critical to resiliency in the future.

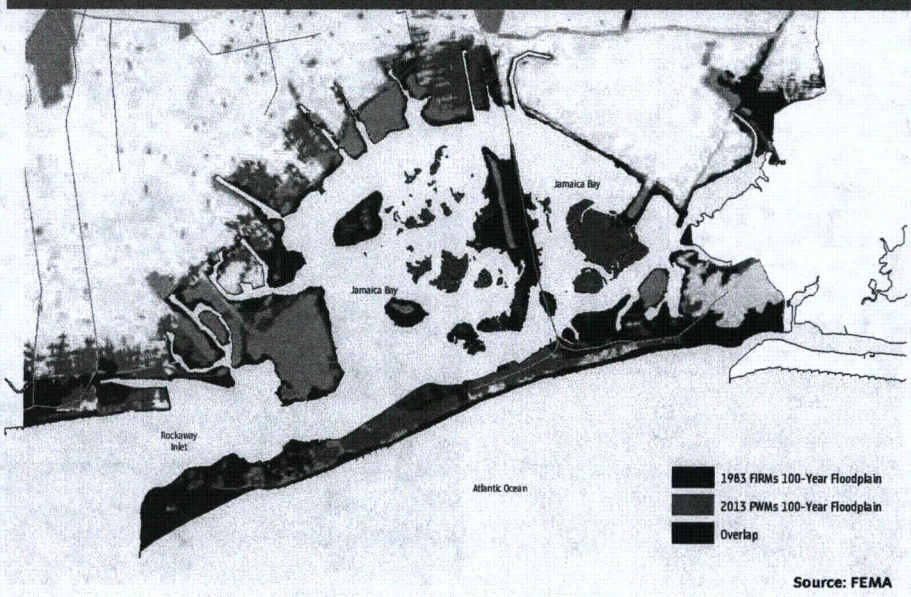
What Could Happen in the Future

Going forward, the neighborhoods of South Queens face a variety of risks relating to climate change. (See chart: *Risk Assessment: Impact of Climate Change*)

Major Risks

Given the area’s coastal exposure, the most significant climate change-related risk posed to the neighborhoods of South Queens is flooding from coastal storms, which is likely to be exacerbated by projected sea level rise. This risk is significant even today, as illustrated by recently

Comparison of 1983 FIRMs and Preliminary Work Maps



Source: FEMA

Risk Assessment: Impact of Climate Change

Major Risk Moderate Risk Minor Risk

Scale of Impact

HAZARD	Today	2020s	2050s	Comments
GRADUAL				
Sea level rise				Some bay-facing, low-lying areas already experience regular tidal flooding; sea level rise likely would result in increases in localized flooding
Increased precipitation				Minimal impact
Higher average temperature				Minimal impact
EXTREME EVENTS				
Storm surge				Significant risk of both flooding and wave action, as evidenced by Sandy; risk likely would grow as V Zone expands; increased storm frequency would leave less time to restore coastal protections
Heavy downpour				May exceed capacity of sewer systems more frequently, resulting in localized flooding
Heat wave				Greater strain on power system with potential for more failures; most significant impact on high-rise buildings.
High winds				Overhead power lines are at risk of failure

released Preliminary Work Maps (PWMs) from the Federal Emergency Management Agency (FEMA). According to these maps, the 100-year floodplain—the area with a 1 percent or greater chance of flooding in any given year—has expanded in the borough of Queens by 40 percent over that shown on the 1983 FEMA maps that were in effect when Sandy hit. In the new maps, the growth in the floodplain is profound for South Queens—with the exception of isolated sections of Far Rockaway, virtually the entirety of the South Queens area now lies within the 100-year floodplain. Additionally, portions of Broad Channel, Roxbury and Bayswater are now within a V Zone, which is a coastal area at risk of storm waves of three feet or more. In some limited instances zones encroach on residential property. (See Chapter 2, *Climate Analysis*; see map: *Comparison of 1983 FIRMs and Preliminary Work Maps*)

As the 100-year floodplain has expanded in size, there has also been an increase in the number of buildings in the floodplain—an increase of over 70 percent (from just over 11,000 to more than 19,000 buildings). Base Flood Elevations—the elevation to which floodwaters could rise during a storm—have increased 1 to 4 feet throughout the area. According to projections from the New York City

Panel on Climate Change (NPCC), described in Chapter 2 (*Climate Analysis*), sea levels are forecast to rise through the 2020s and 2050s. Though already in the 100-year floodplain, many neighborhoods in South Queens will experience more frequent flooding and even greater flood heights. (See map: *Comparison of Preliminary Work Maps and Future Floodplains*)

Although most of South Queens is already in the 100-year floodplain, flooding in these neighborhoods are likely to be at a greater height and occur more frequently. (See table: *Buildings in the Floodplain*)

Other Risks

Though coastal inundation poses the greatest threat to the neighborhoods along the waterfront, these areas face other climate risks, as well. Sea level rise, for example, even without extreme weather events like hurricanes, could, in some communities, lead to increased frequency and severity of street and basement flooding on a chronic basis by the 2050s. This risk, which already exists in areas like Edgemere, Broad Channel, Howard Beach and Hamilton Beach, is expected to impact as much as 12 miles of shoreline in the decades to come. (See map: *Sea Level Rise Analysis in Howard Beach and Hamilton Beach*)

Buildings in the Floodplain				
Buildings & Units	100-Year Floodplain			
	1983 FIRMs	2013 PWMs	Projected 2020s	Projected 2050s
Residential Buildings	10,810	18,790	20,030	20,560
Residential Units	25,400	42,600	45,000	46,500
Commercial and Other Buildings	350	640	690	700

Source: DCP PLUTO, FEMA

Comparison of Preliminary Work Maps and Future Floodplain

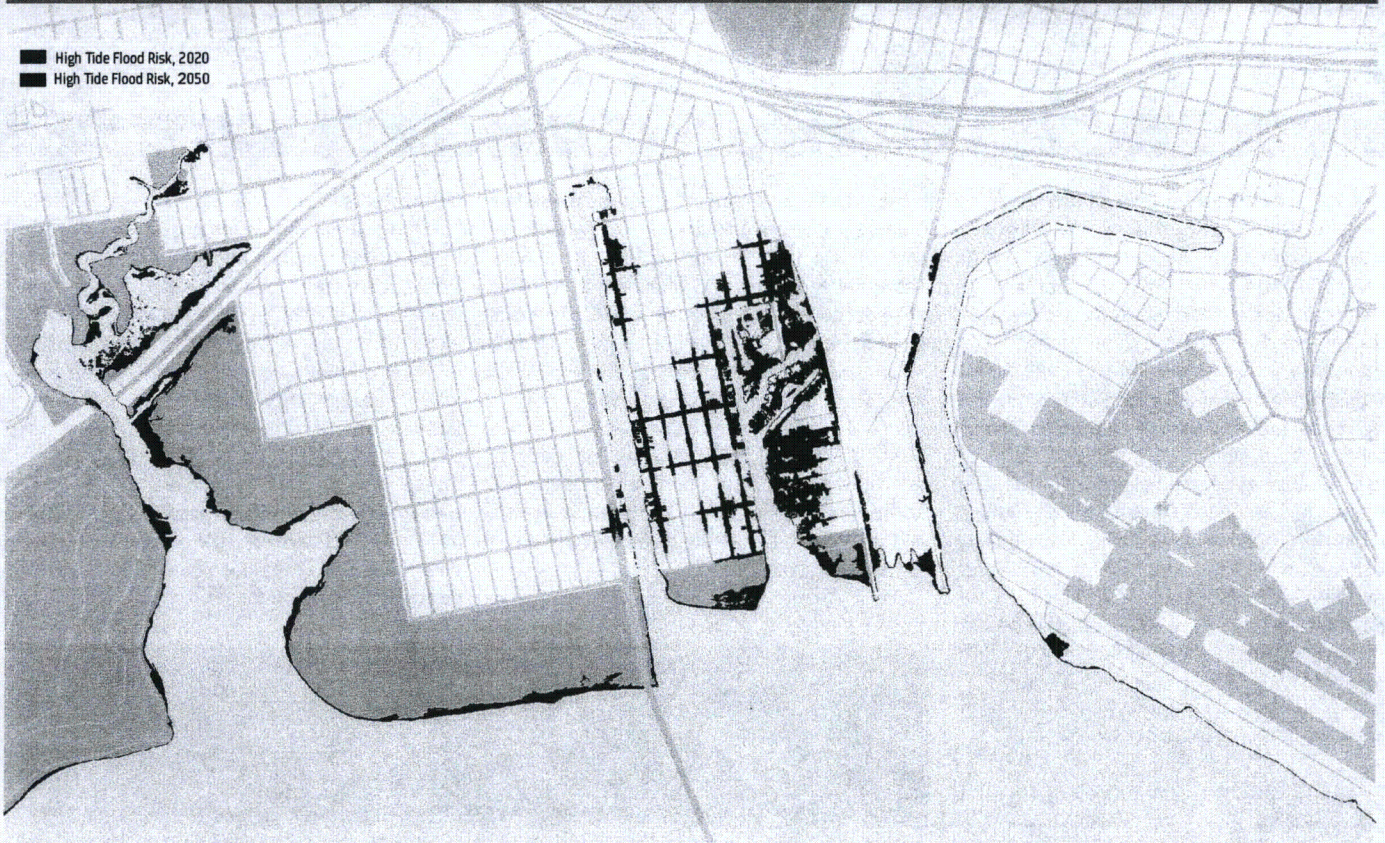


Source: FEMA, CUNY Institute for Sustainable Cities

Increased precipitation and more frequent and heavier downpours also could overwhelm sewer systems going forward, resulting in more flooding. Based on current forecasts, however, this risk is likely to be fairly localized.

While future projections for changes in wind speeds are not available from the NPCC, a greater frequency of intense coastal storms by the 2050s could present a greater risk of high winds in the New York area. This could cause issues for materials that are exposed and for buildings built before modern building codes—of which South Queens has many.

Sea Level Rise Analysis in Howard Beach and Hamilton Beach

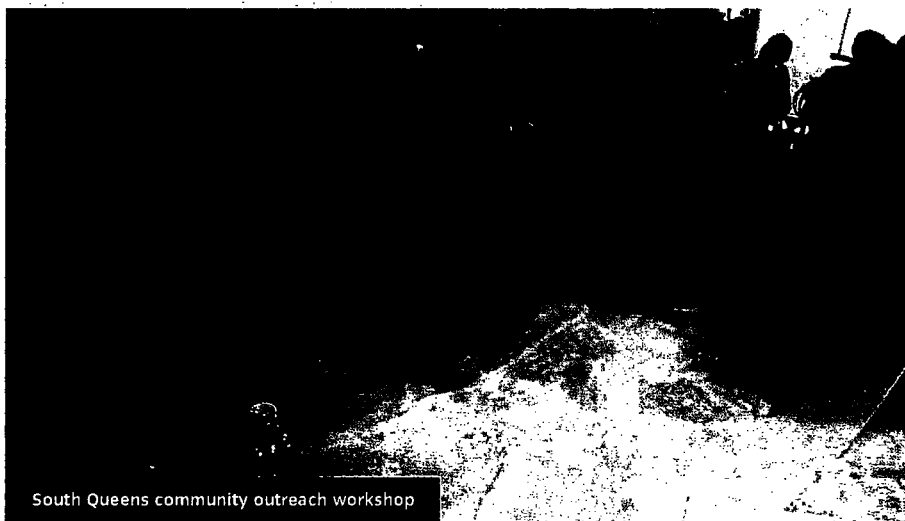


Priorities from Public Engagement in South Queens

Since the Special Initiative for Rebuilding and Resiliency (SIRR) was launched in December 2012, the input of local stakeholders has helped shape an understanding of what happened during Sandy, what risks South Queens faces in relation to climate change and what approaches make sense to address these risks.

South Queens is represented by a wide array of elected officials at the Federal, State, and local levels. It is also represented by two community boards. The area is further served by a large number of community-based organizations, civic groups, faith-based organizations, and other neighborhood stakeholders. All played an important role in relief and recovery efforts after Sandy. Throughout the process of developing this plan, SIRR staff benefited from numerous conversations—both formal and informal—with these groups and individuals, including, in South Queens, two task forces that met regularly.

SIRR also held three public workshops in March of 2013 in South Queens, part of a series of such workshops held citywide in which over 1,000 New Yorkers participated to discuss issues affecting their neighborhoods and communicate their priorities for the future of their homes and communities. Generally, the on-the-ground insights provided at these public workshops helped SIRR staff to develop a deeper understanding of the specific priorities of, and challenges facing the communities of South Queens.



South Queens community outreach workshop

Task Force	Briefing Frequency	# of Stakeholders from South Queens
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Elected officials

Monthly

- ~14 City, State, Federal elected officials

Community-based organizations

4 – 6 weeks

- 2 community boards
- 55+ faith-based, business, and community organizations

Overall, out of the various task force and other meetings and public workshops attended by SIRR staff since January, several priorities for SIRR clearly emerged:

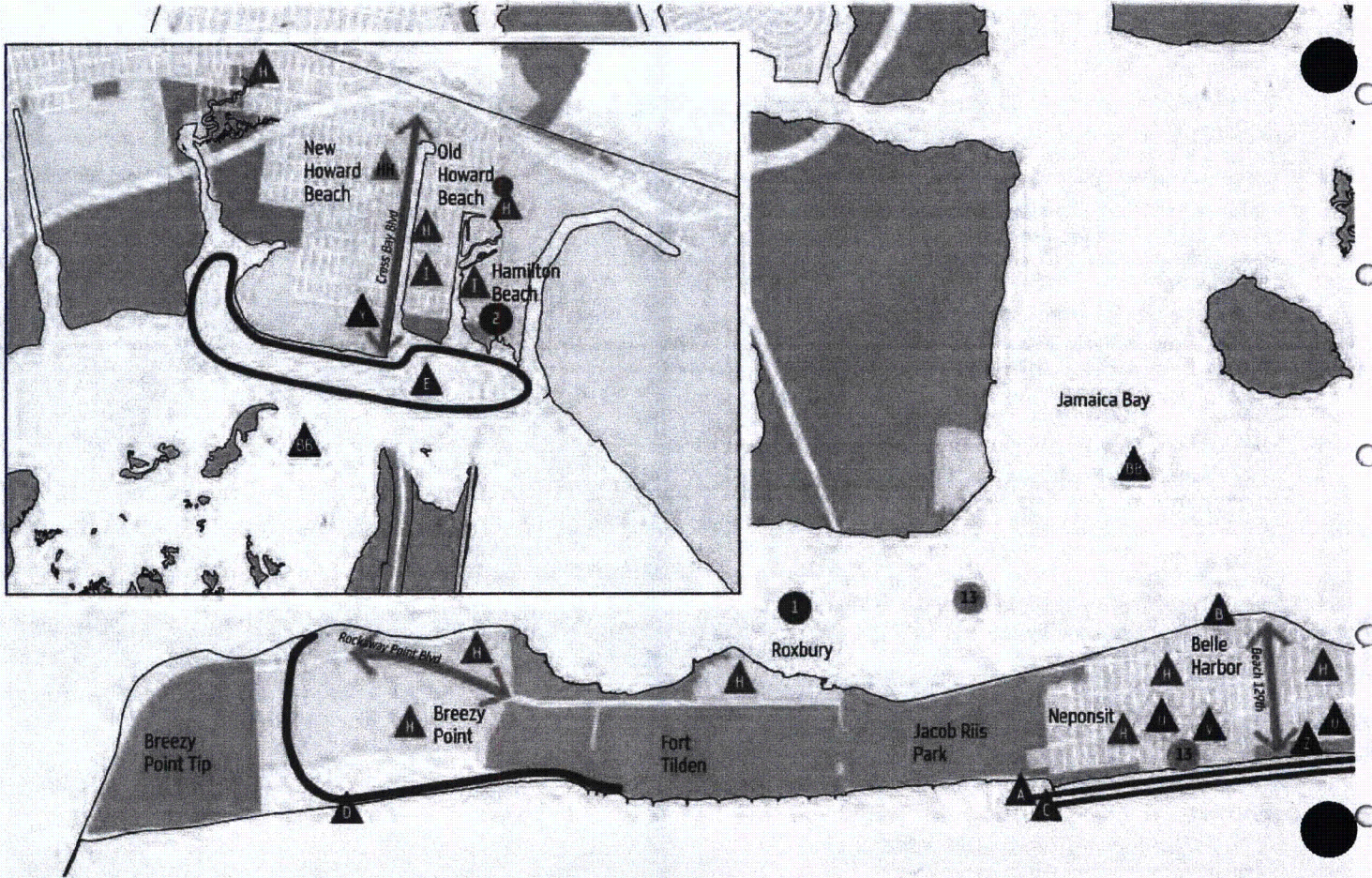
- Providing coastal protection measures on the ocean and bay;
- Clarifying available resources to retrofit, repair, and rebuild homes;

- Addressing concern over future flood insurance rates;
- Providing support to small businesses;
- Expanding transit options; and
- Creating jobs and access to job training and educational opportunities for local community members.

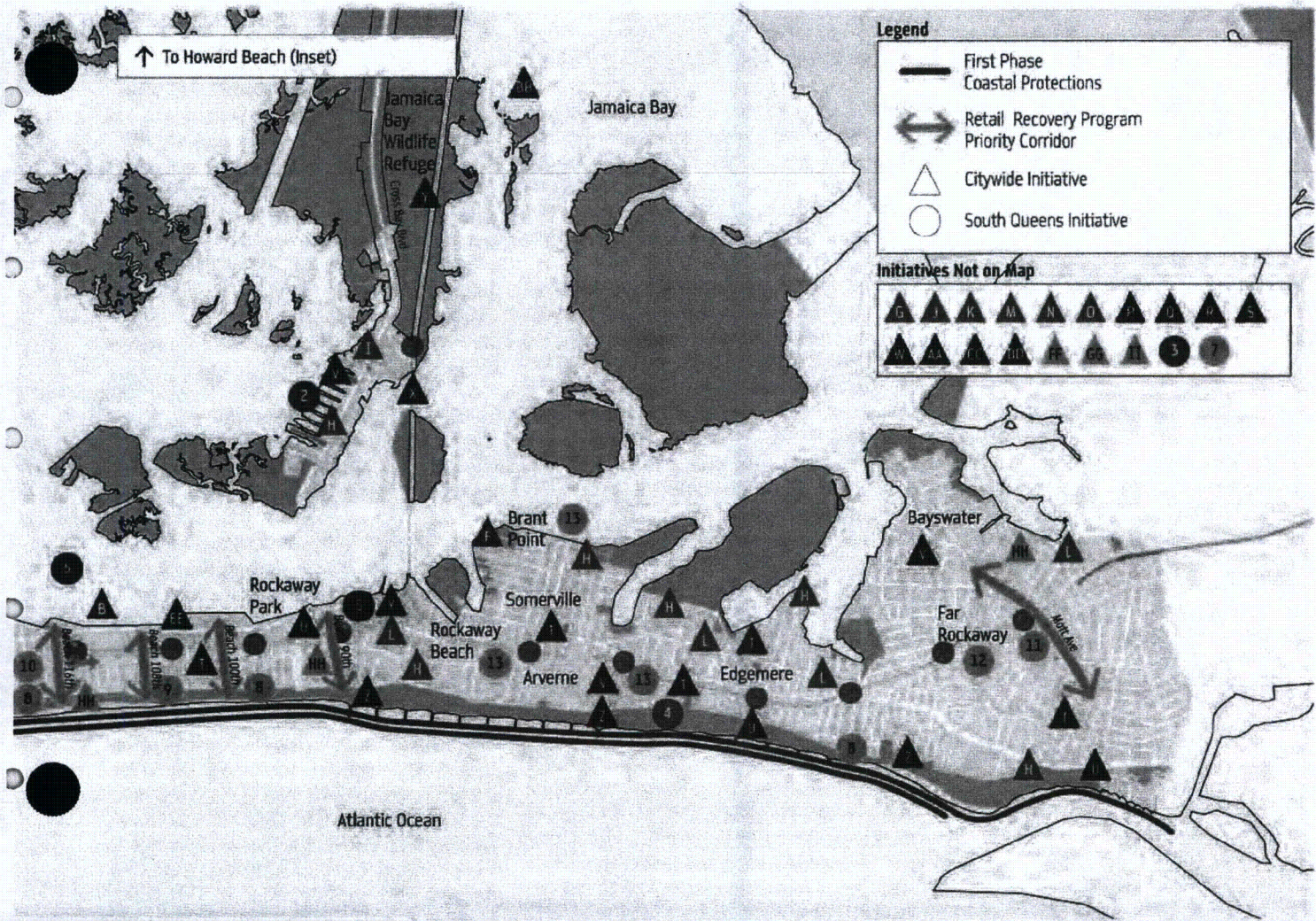


South Queens community outreach workshop

SOUTH QUEENS | Initiative Summary



Coastal Protection	Buildings	Buildings	Critical Infrastructure
<p>Selected Citywide Measures</p> <ul style="list-style-type: none"> A Call on and work with the USACE to complete emergency beach nourishment on the Rockaway Peninsula B Complete bulkhead repairs and roadway drainage improvements adjacent to Beach Channel Drive on the Rockaway Peninsula C Call on and work with the USACE to complete existing studies of the Rockaway Peninsula and implement coastal protection projects D Call on and work with the USACE to study primary and secondary dune systems in vulnerable Rockaway Peninsula neighborhoods and install such system on Breezy Point E Call on and work with the USACE to study and install wetlands for wave attenuation in Howard Beach and to study further flood protection improvements within Jamaica Bay F Complete living shorelines and floating breakwaters for wave attenuation in Brant Point <p>* For additional Coastal Protection initiatives, see Coastal Protection section of Community Plan</p>	<ul style="list-style-type: none"> 1 Call for USACE to develop an implementation plan to mitigate inundation risks through Rockaway Inlet, exploring a surge barrier and alternative measures 2 Develop an implementation plan to address frequent tidal inundation in Broad Channel and Hamilton Beach, incorporating international best practices 3 Complete short-term dune improvements on the Rockaway Peninsula <p>Buildings</p> <p>Selected Citywide Measures</p> <ul style="list-style-type: none"> G Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain H Rebuild and repair housing units destroyed and substantially damaged by Sandy I Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain 	<p>Selected Citywide Measures</p> <ul style="list-style-type: none"> J Amend the Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings K Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate L Retrofit public housing units damaged by Sandy and increase future resiliency of public housing M Launch a sales tax abatement program for flood resiliency in industrial buildings N Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain O Amend the building code to improve wind resiliency for existing buildings and complete studies of potential retrofit <p>* For additional Buildings initiatives, see Buildings section of Community Plan</p> <ul style="list-style-type: none"> 4 Complete design competition to enhance resiliency of planned Arverne East Project 	<p>Selected Citywide Measures</p> <ul style="list-style-type: none"> P Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding Q Work with utilities and the PSC to harden vulnerable overhead lines against winds R Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding S Require the retrofitting of existing hospitals in floodplains T Require retrofitting of nursing homes in floodplains U Require retrofitting of adult care facilities in floodplains V Reconstruct and resurface streets damaged by Sandy W Elevate traffic signals and provide backup electrical power X Call on non-City transportation agencies to implement strategies to address climate change threats



Community & Economic Recovery

- ▲ Expand the city's Select Bus Service (SBS) network
 - ▲ Restore city beaches
 - ▲ Harden or otherwise modify shoreline parks to protect adjacent communities
 - ▲ Work with the Federal government to transform Jamaica Bay
 - ▲ Harden pumping stations
 - ▲ Harden wastewater treatment plants
 - ▲ Explore alternatives for the Rockaway Wastewater Treatment Plant
- * For additional Critical Infrastructure initiatives, see Critical Infrastructure sections of Community Plan

- Build a new multi-specialty ambulatory surgical center in the Rockaways
- Expand ferry service to the Rockaway Peninsula

Selected Citywide Measures

- ▲ Launch business recovery and resiliency programs
- ▲ Launch the Neighborhood Game-Changer Competition
- ↔ Call for Neighborhood Retail Recovery Program
 - Cross-Bay Blvd. (between Belt Parkway and 165th Ave.)
 - Broad Channel
 - Beach 116th St.
 - Beach 108th St.
 - Rockaway Beach Blvd. (between Beach 113th and Beach 116th Sts.)
 - Beach 129th St.
 - Mott Ave. (between Cornaga and Beach Channel Dr.)
 - All streets from Beach 90th to Beach 100th Sts
 - Breezy Point

- ▲ Support local merchants in improving and promoting local commercial corridors
- ▲ Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods
- Get New Yorkers "Back to the Beach" for summer 2013
- Explore opportunities for long-term activation of the beachfront
- Develop a revitalization strategy for the Beach 108th Street corridor

- Develop a comprehensive commercial revitalization plan for Beach 116th Street
- Develop an implementation plan for redevelopment of Far Rockaway, potentially involving repositioning of City- and MTA-controlled sites
- Launch a satellite Workforce 1 career center in Far Rockaways
- Implement planned and ongoing investments by the City and private partners
 - Jamaica Bay/Rockaway Restoration Corps
 - Rockaway Institute for a Sustainable Environment (RISE)
 - Beach 73rd St. YMCA

This chapter contains a series of initiatives that are designed to mitigate the impacts of climate change on South Queens. In many cases, these initiatives are both ready to proceed and have identified funding sources assigned to cover their costs. With respect to these initiatives, the City intends to proceed with them as quickly as practicable, upon the receipt of identified funding.

Meanwhile, in the case of certain other initiatives described in this chapter, though these initiatives may be ready to proceed, they still do not have specific sources of funding assigned to them. In Chapter 19 (Funding), the City describes additional funding sources, which, if secured, would be sufficient to fund the full first phase of projects and programs described in this document over a 10-year period. The City will work aggressively on securing this funding and any necessary third-party approvals required in connection therewith (i.e., from the Federal or State governments). However, until such time as these sources are secured, the City will only proceed with those initiatives for which it has adequate funding.

South Queens Community Rebuilding and Resiliency Plan

South Queens is a section of New York City with scenic vistas and a relaxed pace, a rare find for urban New Yorkers. The area is characterized by tight-knit communities and rich natural and recreational assets, which include miles of open beaches and the majestic waters of Jamaica Bay.

The following is a multilayered plan that not only applies citywide strategies to South Queens, but also provides strategies designed to address the area's specific needs and particular vulnerabilities. In anticipation of future climate change-related risks, this plan proposes ways that South Queens neighborhoods can adapt by: addressing wave action and inundation along the entire coastline and within Jamaica Bay; providing opportunities to retrofit the area's most vulnerable building stock; protecting and improving critical infrastructure; and focusing investments in strategic areas, such as the beachfront, to advance a long-term and sustainable recovery.

Coastal Protection

As Sandy illustrated, the greatest extreme weather-related risk faced by New York City is storm surge, the effects of which are likely to increase given current projections of sea level rise. Going forward, it is anticipated that climate change will render coastal regions of the city, including South Queens, even more vulnerable to these risks.

While it is impossible to eliminate the chance of flooding in coastal areas, the City will seek to reduce its frequency and effects—mitigating the impacts of sea level rise, storm waves including erosion, and inundation on the coastline of the city generally and South Queens in particular. Among the strategies that the City will use to achieve these goals will be the following: increasing coastal edge elevations; minimizing upland wave zones; protecting against storm surge; and improving coastal design and governance.

In the development of cost-effective coastal protections measures that fit these strategies, a range of considerations, particularly the area's exposure to coastal risks, its geomorphology, and land use, must be taken into account. Other considerations, such as impacts to waterfront access, water quality and the environment, navigation, and neighborhood character and quality of life for residents and businesses, will be evaluated, where appropriate. For a full explanation of the following initiatives and a complete description of the City's comprehen-

sive coastal protection plan, please refer to Chapter 3 (*Coastal Protection*).

The initiatives described below provide important examples of how the City intends to advance its coastal protection agenda citywide. These initiatives will have a significant impact on the residents, businesses, and nonprofits of South Queens. Taken together, when completed, the first seven coastal protection initiatives described below, would provide enhanced protection for nearly 18,000 buildings in South Queens, representing around 35,000 housing units as well as many businesses and much of the critical infrastructure.

Coastal Protection Initiative 2 Call on and work with the USACE to complete emergency beach nourishment on the Rockaway Peninsula

Beach replenishment in the Rockaways was suspended in 2004, and in the intervening years they have continued to erode. This erosion, coupled with the 1.5 million cubic yards of sand lost during Sandy, has created a breach that threatens adjacent neighborhoods. The City, therefore, will support emergency beach nourishment work from Beach 19th Street to Beach 149th Street. The initiative will replace approximately 3.6 million cubic yards of sand. This project is expected to start in July 2013, with completion targeted for December 2013. As part of this initiative, the City will continue to work with the USACE will develop a plan for ongoing beach maintenance so that future extreme weather events can be followed quickly by restoration of lost sand.

Coastal Protection Initiative 6 Raise bulkheads in low-lying neighborhoods to minimize inland tidal flooding

Bulkheads provide the first line of defense against flooding in many South Queens neighborhoods, including Old Howard Beach, Hamilton Beach, Broad Channel and Edgemere, but throughout the city, many bulkheads are built to an elevation that may be insufficient given the latest projections of sea level rise by 2050. Subject to available funding, the City, therefore, will launch a program to raise bulkheads and other shoreline structures across the five boroughs in low-lying areas most at risk of daily or weekly tidal flooding, a phenomenon that could impact as much as 12 miles of shoreline by the 2050s. The Mayor's Office of Long Term Planning and Sustainability (OLTPS) will work with the New York City Economic Development Corporation (NYCEDC) to manage this program, to begin implementation in 2013, in conjunction with the new citywide waterfront inspections program described in Chapter 3.

Coastal Protection Initiative 8
Complete bulkhead repairs and roadway drainage improvements adjacent to Beach Channel Drive on the Rockaway Peninsula

Belle Harbor is lined by about two miles of City-owned seawall on its bay side. This floodwall, however, is in deteriorated condition that could allow surge waters to inundate the neighborhood during extreme weather events. Complementing the bulkhead work described above (see Coastal Protection Initiative 6), the City, through NYCEDC, therefore will continue its ongoing work to restore segments of the floodwall that are in poor condition. NYCEDC recently completed the first of three segments between Beach 125th and Beach 130th Streets, and will restore the remaining sections by early 2014. The City also will equip a portion of the roadway drainage network from approximately Beach 116th Street to Beach 143rd Streets with new duckbill tide gates, or valves that block waters from entering pipes from the drainage end, while still allowing stormwater to drain out. This work will make use of existing funding and provide protection concurrent with and subsequent to the upcoming hurricane season. After work is completed, the City will evaluate the elevation of the floodwall generally and whether changes to this elevation should be made over time.

Coastal Protection Initiative 11
Call on and work with the USACE to complete existing studies of the Rockaway Peninsula and implement coastal protection projects

The entire Rockaway peninsula faces continued risk of flood and wave action. The City will, therefore, call on the USACE to complete the Rockaway reformulation study started in 2003. This authorized study offers an expedited path to rethink and improve the current flood protections on the Rockaway Peninsula. DPR will ensure that this work makes effective use of existing Federal appropriations to advance meaningful flood protection projects. It is expected that the reformulation study will be completed by 2015. Consistent with this study, the City also will call upon the USACE to implement further beach nourishment and dune construction projects in the area, and working with DPR to complement its future boardwalk restoration plans.

DPR also will work with the USACE to determine the feasibility and effectiveness of expanding or strengthening the existing groin fields on the Rockaway peninsula. In the interim, DPR will complete short-term dune improvements on the Rockaway peninsula from Beach 9th Street

to Beach 149th Street, using low-cost and readily available solutions to mitigate the effects of storm waves on adjacent neighborhoods during this year's hurricane season.

Coastal Protection Initiative 12
Call on and work with the USACE to study primary and secondary dune systems in vulnerable Rockaway Peninsula neighborhoods and install such a system in Breezy Point

Neighborhoods such as Breezy Point suffered devastating damage from Sandy and are likely to become more exposed to extreme weather events as the climate changes. This vulnerability is particularly great on the ocean-facing side of Breezy Point, where wave action during extreme weather events brings not just inundation, but destructive force, as well. Subject to available funding, the City, working through OLTPS, therefore, will call on and work with the USACE to study and construct a project to protect this neighborhood first on its ocean-facing side. The City believes that such protection should take the form of a primary and secondary dune system, which not only will protect residents and their property but also will demonstrate the viability of these systems. It should be noted that, to obtain federal funding for these or other protective measures, the Breezy Point Cooperative, which is the owner of the oceanfront property in the area, will likely be required to provide public access to the community's beaches. The goal is that, following the completion of the USACE study, the resulting project would be implemented within four years.

Coastal Protection Initiative 14
Call on and work with the USACE to study and install wetlands for wave attenuation in Howard Beach and to study further flood-protection improvements within Jamaica Bay

Howard Beach and Hamilton Beach, two Queens communities along the northern coastline of Jamaica Bay, are highly exposed, low-lying neighborhoods. To address this vulnerability, subject to available funding, the City will call on the USACE to study and implement a wetlands restoration project designed to attenuate waves. This project will build upon the existing work contained in the Hudson-Raritan Estuary Comprehensive Restoration Plan and will leverage planning work done by the Nature Conservancy. This project will not only protect the two aforementioned neighborhoods, but also will allow the effectiveness of such wetland restorations to be tested. DPR will oversee these efforts. Following a USACE study, this project should, be implemented within four years.

The City also will call upon the USACE, simultaneous with the Howard Beach-Hamilton Beach wetlands restoration, to restart existing studies of the Rockaway Peninsula and of Jamaica Bay. These authorized studies offer an expedited path to project completion. Following completion of these studies, the USACE should, subject to available funding, implement coastal protection projects recommended by the studies to provide flood protection and reconstitute some of the city's most important historic



Wetlands Restoration Project, Jamaica Bay

Credit: Courtesy of US Army Corps of Engineers/Great Lakes Dredge & Dock, LLC; Stefan Turner Aerial Photography

protective wetlands and marsh islands. DPR will ensure that these projects make effective use of existing Federal appropriations. If restarted now, these studies should be completed by 2016. Improvements of bulkheads in low-lying neighborhoods, and implementation of a local storm surge barrier for Rockaway Inlet.

Coastal Protection Initiative 17 **Complete living shorelines and floating breakwaters for wave attenuation in Brant Point, Queens**

The Brant Point Wildlife Sanctuary is a low-lying natural area that, even today, is vulnerable to the potential impacts of extreme weather events. This threatens the Wildlife Sanctuary and the neighborhoods that it fronts. This vulnerability, moreover, is expected to grow as the climate changes. Therefore, the City, working through the Department of Environmental Protection (DEP) and subject to available funding, will construct and monitor new living shorelines and floating breakwaters in this area. These improvements not only will protect the Wildlife Sanctuary and the residents of the communities abutting the Sanctuary but also will demonstrate the viability of these protection systems, especially in areas with existing wetlands and marsh islands. If effective, living shoreline and floating breakwater projects could be replicated elsewhere in the city. The goal is that the project would be implemented during 2014.

Beyond the priority coastal protection projects described in Chapter 3, including those summarized briefly above, the City is proposing additional coastal protection initiatives specific to South Queens's vulnerabilities. These initiatives are described below.

South Queens Initiative 1 **Call for USACE to develop an implementation plan to mitigate inundation risks through Rockaway Inlet, exploring a surge barrier and alternative measures**

Much of the flood damage from Sandy in the neighborhoods of Brooklyn and Queens that face Jamaica Bay came from water that flowed through Rockaway Inlet into the Bay. The extensive shoreline that surrounds Jamaica Bay supports a variety of land uses and densities, all of which are at risk of flooding. Because flood protection along the existing shoreline of Jamaica Bay would be extremely expensive, and disruptive, and in some cases nearly impossible, the City will call on and work with the USACE to develop an implementation plan for a local storm surge barrier to be constructed

across Rockaway Inlet approximately between Manhattan Beach in Brooklyn and Breezy Point in Queens. A Rockaway Inlet local storm surge barrier at this location could protect against significant inland flooding and wave risk in neighborhoods from Sheepshead Bay to Howard Beach, as well as JFK Airport, Broad Channel, and the entire bayside of the Rockaway peninsula (provided that the barrier was completed in conjunction with dune enhancements along the oceanside of the Rockaway peninsula and mitigation measures along Coney Island Creek). This project, in turn, would obviate the need for extensive localized coastal protections spread around the shoreline of the Bay. A preliminary feasibility assessment, to be performed by OLTPS in coordination with DEP, would examine impacts on water quality, habitat, hydrodynamics, and navigation, and would identify potential secondary coastline reinforcements.

The goal is for USACE to begin work on this plan as part of its comprehensive study of flood risk reduction in New York City, based on the recommendations of this report.

South Queens Initiative 2 **Develop an implementation plan to address frequent tidal inundation in Broad Channel and Hamilton Beach, incorporating international best practices**

Already experiencing more frequent tidal flooding (even without extreme weather events) than other neighborhoods in South Queens, Broad Channel and Hamilton Beach face acute risk from projected sea level rise as described in Chapter 2 (*Climate Change*). To address this risk, the City, working through OLTPS and NYCEDC and subject to available funding, will develop cost-effective protection and adaptation strategies to address the vulnerability of buildings, land, and critical infrastructure in these communities in a manner that also addresses neighborhood character. Prior to launching the plan, the City will issue a Request for Qualifications for a technical support team of experts, including architects, engineers, urban and landscape designers, scientists and others who have international experience working in areas vulnerable to comparable flood risks and have experience generating innovative solutions. These experts will be tasked by the City with developing viable designs to address the challenges in these communities. The goal is to launch the planning process in 2013.

Simultaneously with launching this initiative, the City also will evaluate the flood protection impact of a joint DEP/Department of Transportation (NYCDOT) project on Broad Channel that is slated to commence by 2014. The project involves three local roadways and includes raising these

roadways 3 feet, upgrading drainage systems, and installing bulkheads. If effective, the project could be replicated in other vulnerable areas of Jamaica Bay.

South Queens Initiative 3 **Complete short-term dune improvements on the Rockaway Peninsula**

In the event of a storm, the entire Rockaway Peninsula—without additional protection—is vulnerable to storm surge and flooding. While awaiting the completion of the Rockaway Reformulation Study described above (see Coastal Protection Initiative 11), the City will, through DPR, will complete short-term dune improvements on the Peninsula from Beach 9th Street to Beach 149th Street. These improvements will utilize low-cost solutions to mitigate the effects of extreme weather events on adjacent neighborhoods during the upcoming hurricane season.

Buildings

The city's buildings give physical form to New York. As Sandy demonstrated, however, the building stock citywide, including in South Queens, is highly vulnerable to extreme weather events—a vulnerability that is expected to increase in the future. While the coastal protection measures outlined above are designed to reduce the effects of sea level rise, storm surge, and wave action on the city and South Queens, these measures will not completely eliminate those risks. They also will take time to design, fund, and build. It is equally important, therefore, to supplement these measures by pursuing resiliency at the building level.

To achieve building-level resiliency, the City will seek to protect structures in South Queens and throughout the five boroughs against a spectrum of climate risks, including not only flooding but also high winds and other extreme events. Among the strategies that the City will use to achieve these goals will be to construct new buildings to the highest resiliency standards and retrofit as many existing buildings as possible so that they will be significantly better prepared to handle the impacts of extreme weather events. The initiatives described below provide important examples of how the City intends to advance building resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough building resiliency plan, please refer to Chapter 4 (*Buildings*).

Buildings Initiative 1

Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain

Though buildings constructed to modern Construction Codes generally performed well during Sandy, given the increasing risk of flooding that is likely with climate change, modifications are warranted. The City, therefore, will seek to amend the Construction Codes, and Zoning Resolution to provide for strengthened requirements that will, among other things, improve the design of new buildings through the application of appropriate resiliency measures that are calibrated to the best floodplain data available over time and provide that critical building systems are better-protected from flood risks. In 2013, the City, through the OLTPS, will seek to implement these code changes and the Department of City Planning (DCP) will continue to take zoning changes through the public review process, with the goal of adoption before the end of the year. If adopted, they will improve resiliency for developments throughout South Queens.

Buildings Initiative 2

Rebuild and repair housing units destroyed and substantially damaged by Sandy

Roughly 23,000 private residential buildings encompassing nearly 70,000 housing units were damaged or destroyed during Sandy. Subject to available funding, the City, therefore, through the Mayor's Office of Housing Recovery Operations (HRO), will provide financial and other assistance to owners of residential properties that were destroyed or substantially damaged during Sandy, including to approximately 7,000 residential buildings encompassing approximately 8,000 housing units in South Queens. This program will help homes to be rebuilt or repaired to the highest resiliency standards based on the best floodplain data available over time. In limited circumstances, the City will explore acquisition of homes that were destroyed or damaged with the goal of subsequently disposing of such sites for redevelopment consistent with zoning. Additionally, the City is seeking to incorporate resiliency measures into approximately 500–600 multi-family properties that sustained minor damage including many publicly assisted buildings properties such as those developed pursuant to the Mitchell-Lama program and other affordable housing. The City, therefore, will support the retrofit of these publicly-assisted buildings, such as those developed pursuant to Mitchell-Lama and other affordable housing programs.

Buildings Initiative 3

Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain

The City, through DCP, will undertake a series of citywide and neighborhood-specific land use studies to address key planning issues in severely affected and vulnerable communities. As part of these studies, the City will identify ways to facilitate the voluntary construction of new, more resilient building stock, and to encourage voluntary retrofits of existing vulnerable buildings over time. To be undertaken in close consultation with local residents, elected officials, and other community stakeholders, these land use studies will focus on the challenges posed by flood exposure of the applicable neighborhoods; the vulnerability of the building types that are found in these neighborhoods (e.g., older, one-story bungalows); and site conditions in these areas (e.g. narrow lots and streets) in Hamilton Beach that can make elevation or retrofit of vulnerable buildings expensive or complicated.

In South Queens, DCP will examine neighborhoods including Old Howard Beach, Hamilton Beach and Broad Channel, exploring zoning and other land use changes that, in the future, could encourage residents, if they so choose, to make changes with respect to existing homes or build new homes that would result in significantly greater resiliency. Subject to available funding, the goal is for DCP to commence this study in 2013. Thereafter, DCP would move to implement changes, if any, that it deems to be appropriate, based on the results of its study.

Buildings Initiative 4

Launch a competition to encourage development of new, cost-effective housing types to replace vulnerable stock

Subject to available funding, the City, through the Department of Housing Preservation and Development (HPD), will launch an international Resilient Housing Design Competition. This competition will offer prizes to private-sector developers who design and develop new, high-quality housing prototypes that offer owners of vulnerable building types (e.g., older, one-story bungalows), a cost-effective path that is consistent with city building and zoning requirements to replacing these structures with structures that meet the highest resiliency standards. In addition to cash prizes, the winners of this competition will be given the opportunity to put these structures into service in connection with a City-sponsored development project. Prototypes will have applicability throughout the

five boroughs, including in sections of South Queens such as Broad Channel and Hamilton Beach and other vulnerable bungalow communities. The goal is for HPD to launch this competition in 2013.

Buildings Initiative 5

Work with New York State to identify eligible communities for the New York Smart Home Buyout Program

The City will evaluate opportunities for collaboration with the State in connection with its home buyout program, using an objective set of criteria developed by the City, including extreme vulnerability, consensus among a critical mass of contiguous local residents, and other relevant factors. It is anticipated that these criteria will be met in a limited number of areas citywide. As of the writing of this report, no areas have been identified for this program in South Queens.

Buildings Initiative 6

Amend the Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings

As noted above, buildings constructed to modern Building Code standards generally performed well during Sandy. Sandy, however, brought relatively weak winds, compared to other hurricanes. Given the possibility of more frequent or intense wind events in the future, modifications to the Building Code are warranted. The City, therefore, through DOB will seek to amend the Building Code to provide for strengthened requirements so that new buildings citywide can meet enhanced standards for wind resiliency. The City will further study whether additional wind resiliency standards should be required going forward. The amendments will be submitted to the City Council for adoption, and the study will commence, in 2013.

Buildings Initiative 7

Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate

Even if every structure destroyed or damaged by Sandy were rebuilt to the highest resiliency standards, this would still leave tens of thousands of existing structures in the 100-year floodplain vulnerable—with more becoming vulnerable as the climate changes. Subject to available funding, the City, therefore, will launch a \$1.2 billion program to provide incentives to owners of existing buildings in the 100-year floodplain to encourage them to make resiliency investments in those buildings. Of the up to \$1.2

billion available through the program, the City will reserve up to \$100 million for 1- to 3-family homes, up to \$500 million for distribution across the five boroughs based on each borough's share of vulnerable buildings, citywide, up to \$90 million for small businesses, and \$100 million for affordable housing developments. The City also will mandate that large buildings (i.e., those with seven or more stories that are more than 300,000 square feet in size) undertake certain flood resiliency investments by 2030. If the City consistently achieves its stated goal of encouraging significant resiliency retrofit investments for the vast majority of the built floor area in the 100-year floodplain in the five boroughs, as many as 13,500 buildings in South Queens, encompassing over 25,000 housing units and over 40 million square feet of built space would, over time, be made meaningfully less vulnerable. The goal would be to launch these programs in 2013.

Buildings Initiative 8

Establish Community Design Centers to assist property owners in developing design solutions for reconstruction and retrofitting and connect them to available City programs

The City, through HRO will establish Community Design Centers in neighborhoods affected by Sandy, potentially including South Queens, to assist property owners in developing design solutions for reconstruction and retrofitting, and connect them to available City programs. The Centers would be managed by the City—through agencies such as HRO, HPD, DOB, DCP, and NYCEDC—with support from local partners.

Buildings Initiative 9

Retrofit public housing units damaged by Sandy and increase future resiliency of public housing

During Sandy, public housing developments owned and operated by NYCHA suffered significant damage throughout the city. Still more were not impacted by Sandy but remain vulnerable to extreme weather, with even more likely to become vulnerable as the climate changes. The City, therefore, through NYCHA, will repair public housing developments across the City that were damaged by Sandy, incorporating new flood resiliency measures. In South Queens, 59 buildings containing over 4,000 units will be repaired incorporating resiliency investments.

Buildings Initiative 10

Launch a sales tax abatement program for flood resiliency in industrial buildings

As Sandy demonstrated, many industrial buildings are vulnerable to extreme weather, with more likely to become vulnerable as the climate

changes. However, many industrial buildings operate on thin margins, making it challenging to invest in resiliency. The City, through the New York City Industrial Development Agency (NYCIDA), therefore, will launch a \$10 million program to provide incentives to owners of industrial buildings to encourage them to make resiliency investments in those buildings. The program will prioritize 1- to 2- story building with more than 4 feet between their actual ground elevation and the applicable Base Flood Elevation (BFE). In South Queens, 16 industrial buildings with over 300,000 square feet of floor area will be eligible for this program. This program will be launched in 2013.

Buildings Initiative 11

Launch a competition to increase flood resiliency in building systems

Many existing strategies for improving resiliency in buildings are either imperfect, expensive, or a combination of both. The City, through NYCEDC, therefore, will launch an approximately \$40 million Resiliency Technologies Competition using allocated Community Development Block Grant (CDBG) funding to encourage the development, deployment, and testing of new resiliency technologies for building systems. In South Queens, 19,400 buildings will be eligible to benefit from this competition. The program will be launched in 2013.

Buildings Initiative 12

Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain

The City, through the Landmarks Preservation Commission, will clarify the Commission's regulations to assist owners of landmarked buildings and properties in landmarked districts in the 100-year floodplain who are contemplating retrofit projects. In South Queens, there is one landmarked building in the floodplain. The Commission will issue its clarifying regulations in 2013.

Buildings Initiative 13

Amend the building code to improve wind resiliency for existing buildings and complete studies of potential retrofit

As noted above, given the possibility for more frequent intense wind events in the future, modifications to the Building Code are warranted. The City, therefore, through OLTPS, will seek to amend the Building Code and expand the existing DOB Façade Inspection Safety Program for high-rise buildings to include rooftop structures and equipment. The City will further study whether additional wind resiliency standards are required going forward. These amendments will be submitted to the City

Council for adoption and the study will commence in 2013.

Beyond the priority building resiliency projects described in Chapter 4, including those summarized briefly above, the City is proposing an additional building resiliency initiative specific to South Queens' vulnerabilities. This initiative is described below.

South Queens Initiative 4

Complete design competition to enhance resiliency of planned Arverne East Project

The Arverne East Urban Renewal Area in the Arverne section of the Rockaway Peninsula was planned for approximately 1,700 housing units, 500,000 square feet of retail and commercial space, together with a significant amount of open space, including a large nature preserve. As Sandy demonstrated, however, without resiliency investments, this area will be highly vulnerable to future extreme weather events. This vulnerability is expected to expand as the climate changes. Given this, HPD and its designated private development partner have launched a new design competition to solicit revised ideas for the development that would incorporate resiliency elements. Among the resiliency elements that will be considered will be the placement of open space and built elements to provide protection from extreme weather events. It is anticipated that competition winners will be announced in the fall of 2013.

Insurance

Insurance can help provide residents and businesses with financial protection against losses from climate change and other types of risks. Sandy not only highlighted the importance of insurance, it also revealed that many New Yorkers are exposed to flood losses, which are not covered in standard homeowners or small business property insurance policies. Citywide, 95 percent of homeowners carry homeowners insurance, but when Sandy struck less than 50 percent of residential buildings in the effective 100-year floodplain had coverage through the National Flood Insurance Program (NFIP), a federal program administered by FEMA that provides flood insurance to properties in participating communities like New York City. While larger properties, in particular large commercial properties, tend to purchase flood insurance through the private market, NFIP is the primary source of flood insurance for homeowners throughout the country. The City estimates that in areas of South Queens inundated

by Sandy, less than 31 percent of residential properties typically insured under the NFIP, including 1- to 2- family homes, amongst others, actually had policies in force during Sandy. Furthermore, Sandy drew attention to the significant cost increases in flood insurance that many New Yorkers will soon face, resulting from recent reforms to the NFIP as required by the Biggert-Waters Flood Insurance Reform Act.

The City will use several strategies to encourage more New Yorkers to seek coverage and to help the NFIP meet the needs of policyholders citywide. Specifically, the City will work to: address affordability issues for the most financially vulnerable policyholders; define mitigation measures that are feasible in an urban environment such as South Queens and create commensurate premium credits to lower the cost of insurance for property owners who invest in these measures; encourage the NFIP to expand pricing options (including options for higher deductibles) to give potential policyholders more flexibility to make choices about coverage; and launch efforts to improve consumer awareness, to help policyholders make informed choices. The initiatives described below are important examples of how the City will advance these strategies. These initiatives will have a major impact on the residents, small businesses and nonprofits in this community. For a full explanation of the following initiatives and a complete description of the City's five-borough insurance reform plan, please refer to Chapter 5 (*Insurance*).

Insurance Initiative 1

Support Federal efforts to address affordability issues related to reform of the NFIP

The City will call on FEMA to work with the National Academy of Sciences to complete the study of flood insurance affordability, as required under the Biggert-Waters Act. The City will urge its Federal government partners to comply with this provision of the Act and take swift action to enact the recommendations:

Insurance Initiative 4

Call on FEMA to develop mitigation credits for resiliency measures

The NFIP provides few incentives for property owners to protect their buildings from flood damage and reduce their premiums, other than by elevating their buildings—actually lifting structures above flood elevation levels. In an urban environment such as South Queens, for a variety of reasons, elevation can be impractical, undesirable, and/or economically infeasible. Fortunately, other mitigation options are available. The City, therefore, will call upon

FEMA to provide appropriate premium credits for mitigation measures other than elevation.

Insurance Initiative 6

Call on FEMA to allow residential policyholders to select higher deductibles

Flexible pricing options can encourage more people, especially those not required to carry insurance, to purchase insurance coverage that suits their needs. A higher-deductible option can substantially reduce premium costs to policyholders while remaining truly risk-based. Currently under the NFIP, deductibles up to \$50,000 are allowed for commercial policies, but residential policies are limited to a maximum deductible of \$5,000. The City, therefore, will call upon FEMA to allow homeowners that are not required to carry NFIP policies to purchase high-deductible policies, protecting them from catastrophic loss; initial estimates indicate that doing so could reduce insurance premiums by about half.

Critical Infrastructure

A resilient New York requires protection of its critical services and systems from extreme weather events and the impacts of climate change. This infrastructure includes the city's utilities and liquid fuel system, its hospitals and other healthcare facilities, telecommunications network, transportation system, parks, wastewater treatment and drainage systems, as well as other critical networks—all vital to keeping the city, including South Queens, running.

Utilities

The city's electric, natural gas, and steam systems are essential for everyday life in areas throughout the five boroughs, including South Queens. As Sandy proved, however, these systems are highly vulnerable to extreme weather events, with 800,000 customers losing electricity and 80,000 customers losing natural gas service during Sandy across the city, including approximately 131,000 in the borough of Queens that lost electricity service in the borough of Queens. This vulnerability likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: call for risk-based analysis of low-probability, but high-impact weather events to be incorporated into utility regulation and investment decision-making; call for capital investments that harden energy infrastructure and make systems more flexible in responding to disruptions and man-

aging demand; and better diversify the city's sources of energy. The initiatives described below provide important examples of how the City intends to advance utilities resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South-Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough utilities resiliency plan, please refer to Chapter 6 (*Utilities*).

Utilities Initiative 5

Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding

Various transmission substations, distribution substations, utility tunnels, and underground equipment in the city are at risk of flooding during extreme weather. For example, 40 percent of transmission substations are in the 100-year floodplain today, and 67 percent are likely to be in the 100-year floodplain by the 2050s. The City, through the OLTPS, will work with Con Edison and LIPA to prioritize these assets based on their roles in system reliability, and to harden them as appropriate. This effort will begin in 2013.

Utilities Initiative 6

Work with utilities and the PSC to harden vulnerable overhead lines against winds

During extreme weather events, high winds and downed trees threaten overhead electric poles, transformers, and cables. The City, through OLTPS, will work with Con Edison and LIPA to manage the risk of wind and downed-tree damage through tree maintenance, line strengthening, and a line-relocation program. In some limited cases, rerouting lines underground may also be warranted, depending on the outcome of a cost-benefit analysis to be performed in partnership with the utilities. This effort will begin in 2013.

Utilities Initiative 7

Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding

Although the city's high-pressure gas transmission system performed relatively well during Sandy, there were instances where remote operation of parts of the system failed. Additionally, the distribution system had localized outages due to water infiltration. Seeking to limit the compromising effects of future floods on both the system's backbone and the ability of Con Edison and National Grid to control and monitor the system, the City, through OLTPS, will work with the PSC, Con Edison, and National Grid to harden control equipment against

flooding. In addition, the City will call upon Con Edison and National Grid to take steps to prevent water from infiltrating its gas pipes. This effort will begin in 2013.

Utilities Initiative 12

Work with public and private partners to scale up distributed generation (DG), including microgrids

The city's DG systems, including microgrids, have the potential for significant expansion—but are constrained by regulations, financing challenges, and lack of information. The City—through OLTPS and the New York City Distributed Generation Collaborative—a stakeholder group convened by the City in 2012—will continue efforts to achieve a PlaNYC goal of installing 800 megawatts of DG citywide by 2030. These efforts will include reform of PSC tariffs and other regulatory changes, expansion of low-cost financing, and provision of technical assistance to property owners and developers. This ongoing effort will continue in 2013.

Liquid Fuels

The liquid fuel supply chain is essential for everyday life throughout the five boroughs, including in South Queens. Sandy demonstrated the vulnerability of this system to extreme weather events. In the aftermath of Sandy, citywide—and particularly in South Queens—there were long lines at gas stations and other challenges for drivers, including emergency responders. The vulnerability of this system likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: develop a strategy for the hardening of liquid fuel infrastructure along the supply chain; increase redundancy and fuel supply flexibility; and increase supply availability for vehicles critical to the city's infrastructure, safety, and recovery from significant weather events. The initiatives described below provide important examples of how the City intends to advance its liquid fuel resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the city's five-borough liquid fuels resiliency plan, please refer to Chapter 7 (*Liquid Fuels*).

Liquid Fuels Initiative 1

Call on the Federal government to convene a regional working group to develop a fuel infrastructure hardening strategy

The fuel supply shortage after Sandy was caused mainly by damage to infrastructure in New Jersey and other states, where the City and State of New York have no regulatory or legislative authority or oversight. The City, through OLTPS, will call on the Federal Hurricane Sandy Rebuilding Task Force and the United States Department of Energy to convene regional stakeholders to develop a strategy for hardening key infrastructure against future extreme weather. This effort will be launched in 2013.

Liquid Fuels Initiative 4

Work with New York State to provide incentives for the hardening of gas stations to withstand extreme weather events

Work with New York State to provide incentives for the hardening of gas stations to withstand extreme weather events. New York State's 2013–2014 budget required that certain retail fuel stations invest in equipment that would allow them to connect generators quickly in the event of a power loss, and to enter into supply contracts for emergency generators. The City, through OLTPS, will support the State in the design and implementation of this generator program, an effort that will include working with the New York State Energy Research and Development Authority (NYSERDA) to develop an incentive program to minimize the financial impact of the requirements on the businesses involved. In addition, OLTPS will work with the State to develop incentives to encourage retail fuel stations to implement resiliency measures other than back-up power capability. This effort will be launched in 2013.

Liquid Fuels Initiative 5

Enable a subset of gas stations and terminals to have access to backup generators in case of widespread power outages

Gas stations are vulnerable to widespread power outages resulting from extreme weather events, which could prevent them from dispensing fuel. In New York State's 2013–2014 budgets, NYSERDA was directed to develop a generator pool program for gas stations. The City, through its Office of Emergency Management (OEM), will work with NYSERDA, FEMA, and the USACE in 2013 and beyond to develop such a pool and to create a pre-event positioning plan to enable the ready deployment of generators to impacted areas in the wake of a disaster.

Liquid Fuels Initiative 8

Develop a package of City, State, and Federal regulatory actions to address liquid fuel shortages during emergencies

Various regulations relating to the transportation and consumption of fuels in New York City limit the flexibility of the market to respond to disruptions, including following extreme weather. The City, through OEM, will work with the State and Federal governments to prepare an "off-the-shelf" package of regulatory measures for use in the event of a liquid fuels shortage to allow supply-demand imbalances in the fuel supply to be mitigated more quickly. This effort will be launched in 2013.

Liquid Fuels Initiative 9

Harden municipal fueling stations and enhance mobile fueling capability to support both City government and critical fleets

The City must be able to respond quickly to a fuel supply disruption, providing continuous fueling to vehicles that are critical for emergency response, infrastructure rebuilding, and disaster relief. The City, through the Department of Citywide Administrative Services (DCAS), will procure fuel trucks, generators, light towers, forklifts, and water pumps to permit the City to put in place emergency fueling operations immediately following a disruption in the fuel supply chain. DCAS also will issue a request for expressions of interest (RFEI) to potential suppliers of liquid fuels to evaluate options for sourcing such fuel during emergencies. The procurement effort will be launched in 2013, with the RFEI to follow in 2014.

Healthcare

The city's healthcare system is critical to the well-being of New Yorkers throughout the five boroughs, including in South Queens. This system is also a major economic engine for the city as a whole. This is especially true for South Queens, where numerous nursing homes and adult care facilities, and a network of community-based facilities, doctors' offices, and pharmacies support the local area. Sandy demonstrated this system's vulnerabilities, which are expected to grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: build new hospitals, nursing homes, and adult care facilities to higher resiliency standards and harden existing facilities to protect critical systems; seek to keep lines of communication open between patients and providers, even

during extreme weather events; and enable community-based providers to reopen quickly after a disaster. The initiatives described below provide important examples of how the City intends to advance its healthcare resiliency agenda citywide. These initiatives will have a positive impact on the residents, and healthcare providers of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough healthcare resiliency plan, please refer to Chapter 8 (*Healthcare*).

Healthcare Initiative 2 **Require the retrofitting of existing hospitals in floodplains**

Many existing hospital buildings in the floodplain remain vulnerable to the impact of storm surge, with more likely as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Code to require existing hospital buildings in the 500-year floodplain to meet, by 2030, a subset of the amended New York City Construction Code standards for flood-resistant design. To minimize the risk of emergency evacuations and extended closures, these hospitals will be required to protect their electrical equipment, emergency power system, and domestic water pumps to the 500-year flood elevation. These hospitals also will be required to install backup air-conditioning service for inpatient care areas in case of utility outages, pre-connections for temporary boilers and chillers if primary equipment is not elevated, and pre-connections for external generators as a backup power source. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 3 **Support the HHC's efforts to protect public hospital emergency departments from flooding**

Emergency departments (EDs) are critical access points for patients in need of hospital services, and three public hospitals in Manhattan and Brooklyn are at risk of flooding due to storm surge. The City will support HHC's ongoing efforts to invest in measures to flood-protect these vulnerable EDs so they can remain available to provide care during extreme weather events. The goal is for this effort to begin in 2013.

Healthcare Initiative 4 **Improve design and construction of new nursing homes and adult care facilities**

New nursing homes and adult care facilities are at risk of power failures due to storm surge, which could result in patient evacuations. The

City, through OLTPS, therefore, will seek to amend the Construction Codes to require that new facilities are constructed with additional resiliency measures for their emergency power systems. New nursing homes also will be required to have emergency generators and electrical pre-connections for external stand-by generators. Adult care facilities will be required to install either emergency generators that are adequately protected or pre-connections to external stand-by generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 5 **Require retrofitting of nursing homes in floodplains**

Many existing nursing home facilities in the five boroughs are vulnerable to storm surge, including 9 in South Queens—a vulnerability that likely will grow as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Codes to require nursing homes in the 100-year floodplain—including five facilities in South Queens—to meet standards for the protection of electrical equipment, emergency power systems, and domestic water pumps (if applicable) by 2030. These systems will be protected to the 100-year BFE, in accordance with specifications already in the Construction Codes, and will help enable patients to shelter in place safely or re-occupy quickly after a storm. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 6 **Require retrofitting of adult care facilities in floodplains**

Nineteen adult care facilities in the city are vulnerable to storm surge, including seven in South Queens alone. The City, through OLTPS, will seek to amend the Construction Codes to require existing adult care facilities located in the floodplain to elevate or protect their electrical equipment to the 100-year flood elevation by 2030, in accordance with the specifications in the Construction Codes. In addition, the City will seek to require these providers to have either emergency generators that are adequately protected or electrical pre-connections for external generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 7 **Support nursing homes and adult care facilities with mitigation grants and loans**

The primary challenge for most nursing homes and adult care facilities in implementing mitigation measures is obtaining financing. Subject to available funding, the City, through NYCEDC

and the New York City Department of Health and Mental Hygiene (DOHMH), therefore, will administer competitive grants and subsidized loans to assist providers with mandated retrofit projects. The goal is for NYCEDC and DOHMH to launch the program when proposed Construction Code amendments applicable to nursing homes and adult care facilities proposed in this report go into effect, likely in 2013.

Healthcare Initiative 8 **Increase the air conditioning capacity of nursing homes and adult care facilities**

Nursing homes and adult care facilities typically do not have enough emergency power capacity to run their air conditioning systems following the loss of power. This could cause some providers to evacuate during power outages that occur during hot summer months. The City will offer a sales tax waiver, totaling \$3 million citywide, to assist eligible nursing homes and adult care facilities to install emergency power solutions for air conditioning systems.

Healthcare Initiative 9 **Harden primary care and mental health clinics**

In communities such as South Queens that are at risk of extensive flooding during extreme weather events, primary care and mental health services may be compromised for weeks after a disaster due to extended facility closures. Subject to available funding, the City, through DOHMH and a fiscal intermediary, therefore, will administer a competitive financing program to harden large clinics providing primary care and mental health services in South Queens and other high-need communities. The program will include grants and interest-free loans for capital investments that enable faster recovery of services—for example, installation of emergency power systems, protection of other critical building systems, and wet flood-proofing of facilities. The goal is for this effort to be launched in late 2013 or early 2014.

Healthcare Initiative 10 **Improve pharmacies' power resiliency**

Pharmacies dispense life-saving medicines essential for those with chronic conditions. However, without power, pharmacists cannot access the necessary patient records or insurance information to dispense these medicines. The City, through DOHMH, will work with pharmacies to improve their ability to leverage generators for power resiliency and address their other emergency preparedness needs—including the launch of an emergency preparedness website for pharmacies. This effort already has begun and will continue throughout 2013.

Healthcare Initiative 11

Encourage telecommunications resiliency in the healthcare system

In the aftermath of a disaster, it is important that New Yorkers be able to speak to their doctors for guidance on needed medical care. The City, through DOHMH, therefore, will develop a best practice guide and outreach plan to help community-based providers understand the importance of telecommunications resiliency. Resiliency solutions could include using back-up phone systems (such as a remote answering service that would not be affected by local weather hazards), Voice over Internet Protocol (VoIP) technology that allows office phone lines to be used off-site, and pre-disaster planning to inform patients of available emergency phone numbers. This effort will begin in 2013.

Healthcare Initiative 12

Encourage electronic health record-keeping

Doctors rely on patients' medical records to provide and track care, but paper records may be compromised or destroyed due to extreme weather events. The City, through existing DOHMH programs, therefore, will call upon community-based providers located in the 100-year floodplain and other disaster-prone areas to implement electronic health records (EHR) systems for resiliency. DOHMH's Primary Care Information Project will sponsor initiatives to provide primary care and mental health providers citywide with EHR technical assistance. This effort will begin in 2013.

Beyond the priority healthcare resiliency projects described in Chapter 8, including those summarized briefly above, the City is proposing an additional healthcare resiliency initiative specific to South Queens' vulnerabilities. This initiative is described below.

South Queens Initiative 5

Build a new multi-specialty ambulatory surgical center on the Rockaway Peninsula

The closure of the Peninsula Hospital Center in 2012 left the entire Rockaway Peninsula with only one full-service hospital, St. John's Episcopal Hospital. To help fill the service gap and improve access to medical services for the entirety of the Peninsula, including during extreme weather events, the City, working through NYCEDC, has selected a private development partner to renovate the historic Rockaway Courthouse building in 2013. Following its renovation, the Courthouse will be turned into a new multi-specialty ambulatory surgical

center and will also house medical tenants, providing outpatient surgical services in specialties that include ophthalmology, urology, obstetrics, gynecology, and orthopedics. It is anticipated that this renovation will be completed by 2015.

Telecommunications

The city's telecommunications system is essential to individuals and businesses throughout the five boroughs, including in South Queens. While this is true at all times, it is especially true during emergencies. As Sandy demonstrated, however, this system is highly vulnerable to extreme weather events—precisely when it is most needed. Citywide and in South Queens, Sandy resulted in outages to landlines and mobile service, as well as to data service. The vulnerability of this system likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: increase accountability among providers to promote resiliency; use strengthened City regulatory powers and stronger relationships with providers to enable rapid recovery after extreme weather events; encourage hardening of facilities to reduce weather-related impacts; and increase redundancy to reduce the impact of outages. The initiatives described below provide important examples of how the City intends to advance its telecommunications resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough telecommunications resiliency plan, please refer to Chapter 9 (*Telecommunications*).

Telecommunications Initiative 1

Establish an office within the Department of Information Technology and Telecommunications (DoITT) to focus on telecommunications regulation and resiliency planning

While the City has regulatory authority over some aspects of telecommunications service, it has no entity focused broadly on ensuring the resiliency of the public communications networks. The City, therefore, will form within DoITT a new Planning and Resiliency Office (PRO) that will have the resources needed to develop, monitor, and enforce resiliency standards, in close cooperation with State and Federal regulators and providers. DoITT will launch the new office in 2013.

Telecommunications Initiative 2

Establish new resiliency requirements for providers using scheduled renewals of the City's franchise agreements

Flooding caused outages during Sandy in facilities that did not follow the Federal Communication Commission's recommended best practices for resiliency, including flood protection measures. The City, through DoITT, will, therefore, encourage and enforce resiliency standards for telecommunications providers through the franchise renewal process and through other agreements into which such providers enter with the City. The City will also seek to require standardized outage reporting and publishing. This effort will be launched in 2014, in advance of 2020 franchise renewals.

Transportation

Without the city's expansive transportation system, New York would grind to a halt. This was illustrated starkly during Sandy when outages occurred across the system during and immediately following the storm. These outages severely impacted South Queens, which found itself isolated by the shutdown of its only subway line for over six months and other public transit systems, as well as by flooding on arterial and secondary roads. The vulnerability of this system likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: make the system more flexible and more resilient; protect critical elements of the system from damage; and seek to maintain system operations during extreme weather events; and, following extreme events, to enable quick recovery, while also putting in place plans for back-up transportation options until regular service can be restored. The initiatives described below provide important examples of how the City intends to advance its transportation resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough transportation resiliency plan, please refer to Chapter 10 (*Transportation*).

Transportation Initiative 1

Reconstruct and resurface key streets damaged by Sandy

Sandy's waves and flooding caused significant damage to area roadways. The City, through New York City Department of Transportation (NYCDOT) will reconstruct 60 lane-miles of

streets that were damaged severely, and will repave approximately 500 lane-miles of streets with damaged surfaces. In South Queens, this will include 4 linear miles of reconstructed street and 23 lane miles resurfaced along the Joseph P. Addabbo Memorial Bridge, Cross Bay Boulevard, and in Hamilton Beach, Broad Channel, Neponsit, Belle Harbor, Rockaway and Far Rockaway. Wherever feasible, the reconstructed streets also will include upgraded resiliency features to prevent future damage. NYCDOT will launch this initiative in 2013 with funding from Federal and City sources.

Transportation Initiative 3 **Elevate traffic signals and provide backup electrical power**

New York's traffic signals—and particularly the controllers that operates these signals and communicate with the NYCDOT Traffic Management Center—are vulnerable to damage from flooding as well as to power loss from various extreme weather events. Accordingly, the City, through NYCDOT, will raise controllers at approximately 500 intersections in flood-vulnerable locations across the city, including in South Queens. In tandem with this effort to place electrical hardware above the 100-year flood elevation, NYCDOT also will install power inverters in approximately 500 NYPD vehicles to allow these vehicles to provide backup electrical power to critical traffic signals. This effort will begin in 2013.

Transportation Initiative 8 **Call on non-City transportation agencies to implement strategies to address climate change threats**

Many non-City agencies that own and operate critical portions of New York City's transportation system already announced resiliency and protection initiatives appropriate to their system. Without such action, the critical facilities, managed by these agencies, will remain vulnerable to damage and disruption from future weather-related events. The City, therefore, will call on these agencies to implement the initiatives that they announced and take additional steps to protect their major transportation assets from climate change threats and prepare for quick restoration following an extreme weather event. Assets that may require hardening and/or preparation measures in South Queens include the A train viaduct between the Rockaway Peninsula and Howard Beach. The City will work with these agencies to advance these plans in 2013.

Transportation Initiative 9 **Plan for temporary transit services in the event of subway system suspensions**

When major portions of the subway system are out of service, there simply is not sufficient capacity in the rest of the transit network or the roadway system to carry the increased volume of commuters and other travelers. The City, through NYCDOT, therefore, will work with the MTA and other transportation partners to develop and regularly update formal plans to provide temporary transportation services in such an event, including following extreme weather. This planning effort will begin in 2013.

Transportation Initiative 10 **Identify critical transportation network elements and improve transportation responses to major events through regular resiliency planning exercises**

Many of the facilities critical to the City's ability to respond effectively to a disaster are vulnerable to disruption and damage during extreme weather events, potentially impairing delivery of emergency services and supplies, as well as impairing the restoration of critical non-transportation infrastructure and economic activity. This vulnerability is expected to increase as the climate changes. To respond better to a variety of different possible transportation outage and restoration scenarios, the City, through NYCDOT, will work with transportation agencies around the region to identify the critical elements of the transportation network that need to be available quickly following different types of events. The key tool to identify these networks will be an ongoing series of detailed and multi-disciplinary resiliency planning exercises—and potentially even live drills—that will allow NYCDOT and its partners to understand where resources need to be focused before, during, and after an event. This effort will begin in 2013.

Transportation Initiative 16 **Expand the city's Select Bus Service (SBS) network**

Parts of the city lack subway access or have slow and unreliable public transportation. In these areas, the City and the MTA have been deploying SBS routes to improve general mobility. These routes can form the backbone of high-capacity bus service in the event of major subway outages, including following extreme weather events. The City, through NYCDOT, will work with the MTA to expand the SBS network significantly, building on a plan developed jointly in 2010. Implementation of this plan has already begun, with a new BRT route planned for Wood-

haven Boulevard. In 2013, the City, working through NYCDOT, will commence the public outreach process to solicit feedback on a proposed SBS route along Woodhaven Boulevard and Cross Bay Boulevard, serving Howard Beach, Broad Channel and the Rockaway Peninsula.

Beyond the priority transportation resiliency projects described in Chapter 10, including those summarized briefly above, the City is proposing an additional transportation resiliency initiative specific to South Queens's vulnerabilities.

South Queens Initiative 6 **Expand ferry service to the Rockaway Peninsula**

The vulnerability of the Rockaway Peninsula and Broad Channel to a prolonged outage of A train service was demonstrated immediately following Sandy, when the subway viaduct on which that service crosses Jamaica Bay was compromised. To provide transit alternatives while the viaduct was repaired after Sandy, the City, working with Seastreak LLC, launched an emergency ferry service running on weekdays between Beach 108th Street on the Rockaway Peninsula, Lower Manhattan and 34th Street, supported by federal funding provided by FEMA. At the same time, the MTA put in place shuttle train service along the Rockaway Peninsula and temporary bus service connecting the Peninsula, Broad Channel and subway service elsewhere in Queens. With the restoration of regular subway service to Broad Channel and the Rockaway Peninsula, the foregoing stop-gap measures were scheduled to end. However, to help with the recovery of area businesses and to assess the viability of such service on a long-term basis, the City has both extended the weekday ferry service that was instituted post-Sandy through Labor Day 2013 (subject to certain ridership thresholds) and is subsidizing through Labor Day 2013 expanded weekend ferry service to the Rockaways from Manhattan, in partnership with Seastreak LLC and TWFM Ferry, Inc. The weekday service will continue to stop at Beach 108th Street on the Peninsula and Wall Street/Pier 11 and East 34th Street in Manhattan. The weekend service will stop at both Riss Landing and Beach 108th Street on the Peninsula and Wall Street/Pier 11 in Manhattan.

Building on this pilot ferry service, the City will take two other ferry-related steps. First, the City will, working through NYCEDC, seek to secure existing Federal transportation funding designated for the Rockaway Peninsula to allow it to purchase and construct a flexible ferry landing that will enable the City to deploy future ferry service (whether for emergency, seasonal, or

commuter use) in a rapid and cost-effective way. Second, the City will also explore expanded ferry service to areas citywide, including the Rockaway Peninsula, on a permanent basis, through a Comprehensive Ferry Study. The study will be led by NYCEDC and will be launched during 2013.

Parks

During Sandy, it became clear that, in addition to serving as neighborhood front yards and recreation centers, in many places (including South Queens), the City's parks serve as the city's front line of defense when extreme weather events hit, buffering adjacent neighborhoods. As the climate changes, it will be even more critical that the city's parks are able to play all of these roles.

Among the strategies that the City will use to address these challenges for residents of South Queens and elsewhere in the City will be to: strengthen the city's parks so that they are able to survive weather-related events more effectively and can act as stronger buffers for adjacent communities; and pursue technologies and approaches that will enable the City to monitor, analyze, and prepare the park system for its many roles in an era of increasing change. The initiatives described below provide important examples of how the City intends to advance its parks resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough parks resiliency plan, please refer to Chapter 11 (*Parks*).

Parks Initiative 1 Restore city beaches

Beaches play an important recreational role and also are an important component in the city's coastal defenses, but they cannot protect adjacent areas without being "nourished" (replenished with new sand to replace that lost to erosion) from time to time. Subject to available funding, the City, through DPR, will collaborate with Federal and State partners—including the USACE—to implement plans quickly to restore sand lost after extreme storm events and to conduct regular nourishment of beaches and regular monitoring to detect the early signs of erosion. The goal is launch this effort at city beaches such as Plumb Beach in Brooklyn and Orchard Beach in the Bronx by 2015 (see Chapter 3). To restore the city's beaches following Sandy, DPR and the Department of Design and Construction, in cooperation with many other City, State, and Federal partners, conducted an expedited program of projects to provide new and elevated lifeguard

stations and public bathrooms and improvements to other beachfront amenities in advance of Memorial Day 2013. DPR constructed 35 prefabricated modular buildings, to be used as comfort stations and lifeguard stations, in Rockaway, Coney Island, and Staten Island, informed by storm surge projections for the 500-year floodplain at a height ranging from 7 to 14 feet above the existing grade to reduce the risk of flood damage and give a greater level of protection to these facilities. This impressive achievement comprised the first phase of restoring the city's beaches. In the coming months and years, DPR will continue its efforts to provide emergency sand nourishment and to expedite planning, evaluation, and design work for long-term plans to restore the city's beaches, boardwalks, and other beachfront amenities.

Parks Initiative 2 Harden or otherwise modify shoreline parks and adjacent roadways to protect adjacent communities

Approximately 24 percent of DPR parks and other open spaces are in the 100-year floodplain on the PWMs, which is expected to expand as sea levels rise—including in areas where parks front residential and commercial districts. Subject to available funding, the City, through DPR, will study and identify mitigation strategies, including cost-effective ways to use its parks system to protect adjacent neighborhoods and the parks themselves. Strategies could include hardening or elevating park infrastructure, construction of levees or floodwalls to minimize flooding and attenuate waves, and using flood-tolerant materials in the construction of parks. The goal is to complete this study in 2014.

Parks Initiative 4 Expand the City's Greenstreets, including for Jamaica Bay

Increased localized flooding is likely from more frequent heavy downpours in the future. Subject to available funding, the City, through DPR and in partnership with DEP, will expand its efforts to build more and larger Greenstreets to absorb stormwater, mitigate local flooding, decrease urban heat island effect, increase pedestrian and traffic safety, and beautify neighborhoods. This will expand the installation of green infrastructure at appropriate locations in the City's streets, with approach modeled upon the NYC Green Infrastructure Plan, which improves water quality in combined sewer areas.

The first phase of this expansion would focus on fourteen neighborhoods with the greatest potential for improvement, areas that are not

slated for CSO improvements through the NYC Green Infrastructure Plan, but could be well-suited for Greenstreets based on best available data showing low bedrock and ground water. The goal is to construct and maintain 1,600 Greenstreets at a high density to amplify impacts such as cooling and ecological health. This expansion would capture approximately 32 million cubic feet of stormwater per year by 2015, with a footprint of over 50 acres of increased green space. Thereafter, DPR will consider expansion of this strategy over a 10-year period, focusing on the remaining 20 percent of the city where new Greenstreets could provide myriad benefits. An early priority for this effort will be the area surrounding Jamaica Bay, where DPR will collaborate with DEP and NYCDOT to reduce localized flooding and stormwater runoff, directly improving the health of the Bay. The goal is to begin pilot projects in and around Coney Island, Marine Park, the Rockaways, and Canarsie, including Greenstreets and parkland installations by 2014.

Parks Initiative 9 Work with the Federal government to transform Jamaica Bay

One of the most significant opportunities in New York's history for the development, management, maintenance, and programming of an integrated set of wetlands and other natural areas for natural habitat and recreational use exists in and around Jamaica Bay. Through its groundbreaking partnership with the National Park Service, the City, through DPR, will seek to promote habitat preservation and flood protection as well as a variety of programs in the 10,000 acres of Federally and City-owned parks in and around Jamaica Bay. This program will offer educational, scientific, recreational, and other opportunities to visitors. The goal for this partnership is to lead large-scale bay restoration and green infrastructure projects, which, in addition to improving the Bay itself, also will protect the many adjacent neighborhoods in Brooklyn and Queens.

Parks Initiative 11 Improve the health and resiliency of the city's urban forests

The city's forests and trees provide an array of health and environmental benefits. They are, though, vulnerable to a variety of climate-change-related impacts, including storm surge, wind, and changes in average temperatures. Subject to available funding, the City, through DPR, therefore, will undertake a variety of efforts to protect trees—whether located in natural areas and parks, or along streets. This would include adding forest management crews, identifying locations in which to expand

tree beds, and modifying regular tree inspection and pruning efforts to prioritize trees in areas vulnerable to extreme weather events. The goal is for DPR to launch this effort in 2013.

Parks Initiative 13 **Establish a center for resiliency and restoration efforts in the Jamaica Bay Rockaway Parks**

The joint City-Federal effort to transform Jamaica Bay into a national model has, as one of its centerpieces, a plan to create a new Science and Resilience Center at Jamaica Bay. The City, through DPR and in close collaboration with the NPS, will work with leading academic institutions to make this center a reality, with initial operations to begin in the fall of 2013. The Science and Resilience Center at Jamaica Bay will serve a variety of key functions. First, the Center will facilitate decision-making by policy makers based on the latest scientific information developed by academic institutions. Second, the Center will address Jamaica Bay issues, such as water quality and ecological restoration. Third, the Center will seek to ensure the broad dissemination of resiliency-related research and policymaking to governments and scientific institutions around the world. The goal is to launch the Center in 2013.

Water and Wastewater

The city's water and wastewater system is one of the most complex in the world, not only supplying millions of New Yorkers with safe drinking water, but also treating wastewater to enable the area's waterways to remain clean while draining rainwater to minimize flooding. Sandy demonstrated vulnerability to this system to a whole host of weather-related threats, ranging from surge and sea level rise, to heavy downpours—threats that are expected to worsen as the climate changes.

Among the strategies that the City will use to address these challenges for residents of South Queens and parts of the city will be to: protect wastewater facilities from storm surge; improve and expand drainage infrastructure; and promote redundancy and flexibility to make available a constant supply of high-quality drinking water. The initiatives described below provide important examples of how the City intends to advance its water and wastewater resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough water and wastewater resiliency plan, please refer to Chapter 12 (*Water and Wastewater*).

Water and Wastewater Initiative 1 **Adopt a wastewater facility design standard for storm surge and sea level rise**

Sandy damaged wastewater treatment plants and pumping stations even though the design of City wastewater facilities typically has taken into account the highest historically recorded water height of nearby water bodies or the BFEs identified in FEMA maps. The City, therefore, will adopt an increased level of protection for design and construction of all wastewater facilities based on the latest FEMA maps, modified to reflect sea level rise projections for the 2050s. DEP will adopt the new design guidelines in 2013.

Water and Wastewater Initiative 2 **Harden pumping stations**

Many of the city's pumping stations are located in low-lying areas and are necessary to convey wastewater and stormwater out of communities; however, their location also increases their vulnerability to storm surge. Therefore, subject to available funding, the City, through DEP, will retrofit these pumping stations to improve their resiliency. These retrofits will include raising or flood-proofing critical equipment, constructing barriers, and installing backup power supplies. Preliminary estimates indicate that there are currently 58 at-risk pumping stations, of which several are already scheduled for capital improvements. DEP will pursue implementation of resiliency projects, in conjunction with repairs and planned capital work, and as appropriate based on the level of risk, historical flooding, and potential community impacts, among other criteria. Among the pumping stations to be considered for hardening are five in South Queens. The goal is to begin implementation in 2014.

Water and Wastewater Initiative 3 **Harden wastewater treatment plants**

All 14 of the City's wastewater treatment facilities are located along the waterfront and are therefore at risk in the event of a coastal storm. Subject to available funding, the City, through DEP, will protect these critical treatment facilities by raising or flood-proofing assets that are critical to the treatment process, or constructing barriers to avoid failure of these critical treatment systems. DEP will target initially facilities that have been identified as either most at-risk, or most likely to create issues for adjacent communities and waterways, based on the findings of an in-depth study by DEP. These facilities include the Rockaway and Jamaica Wastewater Treatment Plants, which serve the Peninsula, Broad Channel, Howard Beach and Hamilton Beach. The goal is for DEP to begin implementation of adaptation measures for these and

other facilities in 2014 as part of repairs and other planned capital projects.

Water and Wastewater Initiative 4 **Explore alternatives for the Rockaway Wastewater Treatment Plant**

The Rockaway Wastewater Treatment Plant was one of the most heavily damaged wastewater facilities during Sandy. However, prior to investing significant funds to protect the plant from future storms, the City, through DEP, will conduct a feasibility study to consider converting it to a pumping station, and potentially transferring its treatment responsibilities to a less vulnerable wastewater treatment facility elsewhere in the city. The conversion of this treatment plant would provide the opportunity to incorporate protective measures that would help avoid the failure of critical systems in future extreme weather events and the potential impacts to water quality that could come with such failure. DEP will initiate this feasibility study in 2014.

Water and Wastewater Initiative 11 **Build out stormwater sewers in areas of South Queens with limited drainage systems**

Large areas of South Queens, including portions of Broad Channel, Edgemere, Bayswater, Far Rockaway, Rockaway Beach and Arverne, as well as surrounding neighborhoods in South-east Queens, such as Rosedale and Jamaica, do not have fully built-out storm sewer systems and currently experience regular street flooding, which may be exacerbated if rainfall increases with climate change. DEP will, therefore, continue to build out the storm sewer systems in these locations along with sanitary sewer upgrades and high-level storm sewers, undertaking 30 projects through 2023. DEP will seek additional sewer build-out, improvement, or upgrade opportunities in conjunction with NYCDOT street improvements and other community infrastructure projects, including areas with chronic street flooding.

Other Critical Networks: Food Supply

Though the food supply chain generally emerged intact following Sandy, in certain local areas (including parts of South Queens), residents found themselves without access to basic sustenance after the storm. In addition, had Sandy played out just a little differently, it is possible that significant links in the food supply chain—including the food distribution center in Hunts Point in the Bronx—could have been seriously threatened. As the climate changes, it is likely that risks such as these will grow.

Although initiatives outlined in several other sections above are important contributors to the overall resiliency of the food supply network (including especially those addressing utilities, liquid fuels, and transportation), the City also will pursue food-specific strategies to meet this goal for the benefit of residents of South Queens and other parts of the city. These strategies will involve calling for resiliency investments at the most significant food wholesaling and distribution centers in the city and addressing issues relating to retail access in the event of extreme weather. The initiatives in Chapter 13 describe how the City intends to advance its food supply resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a complete description of the City's five-borough food supply resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

Other Critical Networks: Solid Waste

On a daily basis, the solid waste collection system in New York disposes of more than 12,000 tons of waste and recycling in a safe and sanitary fashion. Unlike many other critical City systems, during Sandy this one proved remarkably resilient, resuming many of its normal functions almost immediately after the storm. In fact, thanks to the efforts of the City's Department of Sanitation, even as the agency was dealing with its own storm-related challenges, it was able to assist with the recovery of South Queens and the larger city by collecting the debris left by the storm in an organized and efficient manner.

However, the system does face real issues. For example, during Sandy, the city's solid waste disposal system did experience interruptions that interfered with its ability to convey refuse out of the city to its ultimate destination. Additionally, as the climate changes, it is likely that this system will become more vulnerable to extreme weather.

Among the strategies that the City will use to address these challenges for residents of South Queens and other parts of the city will be to: harden critical City-owned solid waste assets to protect them from extreme weather-related impacts; and seek to improve the resiliency of the broader solid waste network—both City- and third-party owned—enabling it to resume operation quickly should disruptions occur. The initiatives in Chapter 13 describe how the City intends to advance its solid waste resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses,

and nonprofits of South Queens. For a complete description of the City's five-borough solid waste resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

Environmental Protection and Remediation

Sandy showed that extreme weather events—which are likely to increase in severity with climate change—not only have the potential to impact the city's people, built environment, and critical systems; they also can have a deleterious impact on the natural environment. To help minimize the impact of future extreme weather on the environment, the City will advance a range of initiatives to protect open and enclosed industrial sites containing hazardous substances in an economically feasible way, and to encourage the cost-effective remediation and redevelopment of brownfields in a resilient fashion. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens, which is home to approximately 16 industrial companies. For a complete description of the City's five-borough environmental protection and remediation plan, please refer to Environmental Protection and Remediation.

Community and Economic Recovery

New York is a city of neighborhoods, and these neighborhoods vary widely in size and nature. Notwithstanding this variety, successful neighborhoods across the city tend to share certain traits. Two of these are: a formal and informal network of community members who help and support one another in good times and bad; and vibrant commercial and nonprofit sectors that employ and provide goods and services to the people of the community.

As Sandy demonstrated, however, both the network of community-based organizations and the commercial and nonprofit sectors in New York's neighborhoods can be sorely tested when extreme weather hits. During these times (when contributions from these networks and sectors are desperately needed) these organizations and businesses themselves are frequently coping with the same set of challenges that the community at large is—a circumstance that can push even the most well-run organization or business to the breaking point. Even with these pressures, during and in the immediate aftermath of Sandy, New York's commercial and nonprofit sectors overcame many of their own difficulties, playing a critical role in the recovery

of neighborhoods across the city, including South Queens. However, as the climate changes, difficulties such as these will likely arise more frequently, testing institutions mightily.

Among the strategies that the City will use to achieve the goal of making its neighborhoods and their critical institutions more resilient will be to: help build grassroots capacity and foster community leadership; help businesses and nonprofits impacted by Sandy to recover; help businesses and nonprofits in vulnerable locations to make resiliency investments that will better prepare them for future extreme weather; and bring new economic activity to neighborhoods recovering from the impacts of Sandy to enable these neighborhoods to come back even stronger than before.

The initiatives described below provide important examples of how the City intends to advance its community and economic recovery agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough community and economic recovery plan, please refer to *Community and Economic Recovery*.

The initiatives described below provide important examples of how the City intends to advance its community and economic recovery agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of South Queens. For a full explanation of the following initiatives and a complete description of the City's five-borough community and economic recovery plan, please refer to *Community and Economic Recovery*.

Community Disaster Preparedness Initiative 1

Identify and address gaps in community capacity

The capacity of a community to organize to aid businesses and residents after an extreme weather event or other disaster is a strong predictor of the success of that community's recovery. To improve the capacity of vulnerable communities, OEM, working with the NYC Center for Economic Opportunity (CEO), will undertake a pilot assessment of the strengths and weaknesses of a Sandy-impacted community, —which could be in South Queens—to inform the creation of a plan to address needs uncovered by the assessment. Subject to funding, OEM and CEO will choose a pilot community and begin their study by 2013.

Community Disaster Preparedness Initiative 2

Continue and expand OEM's Community Emergency Response Teams

OEM currently trains 54 teams of 1,500 volunteers across the city, which staff Community Emergency Response Teams (CERTs). Before, during, and after disasters, including extreme weather events, members of these teams help to organize community disaster preparedness and participate in emergency response and recovery. Going forward, OEM will work with communities to create additional teams, ensuring that the volunteers that staff them are as representative as possible of the communities that they serve. Towards the same end, OEM, working with the NYC Center for Economic Opportunity (CEO), will also identify low-income young adults to be trained to lead their communities in disaster preparedness. OEM and CEO will launch this program by 2014.

Economic Recovery Initiative 1

Launch business recovery and resiliency programs

Over 27,000 businesses citywide, including nearly 2,300 in South Queens, were inundated by the storm. For many, recovery has been challenging. To assist with this recovery, immediately after the storm, the City launched the series of programs, described in Community and Economic Recovery, including a \$25 million loan and grant program and a \$25 million sales tax waiver program designed to help businesses get back on their feet. Building on the momentum of these programs, which have assisted over 2,500 businesses as of the writing of this report, the City, through NYCEDC, will launch the CDBG-funded Business Resiliency Investment Program of up to \$90 million to help vulnerable businesses throughout the city make resiliency investments in their buildings and equipment, and the up to \$80 million will assist businesses with recovery and rebuilding efforts. NYCEDC will launch these programs in 2013.

Economic Recovery Initiative 2

Launch the Neighborhood Game-Changer Competition

The recovery of many of the communities impacted by Sandy, including South Queens, has been hampered by a lack of opportunities for economic advancement and employment among significant populations that were impacted by the storm. In many cases, these challenges existed even before Sandy, but have been exacerbated by the impacts of the storm. To address this, the City, through NYCEDC, will launch the CDBG-funded Neighborhood Game

Changer Competition to invest up to \$20 million in public money in each of the five communities on which this report focuses, including South Queens. This funding will be available on a competitive basis to help finance transformational projects. To win the competition, a project will have to spur incremental economic activity, and match public funding with significant private capital. Projects that would be eligible to be funded in South Queens through this competition could include new attractions bringing new visitors, significant new operations of a major business or non-profit, the revitalization of important commercial corridors, the expansion of an existing neighborhood institution, or a major new transportation option. NYCEDC will launch this program in 2013.

Economic Recovery Initiative 3

Launch Neighborhood Retail Recovery Program

At the core of many Sandy-impacted neighborhoods are the local commercial corridors that provide employment opportunities and services to those who live and work around them. They include local retailers, institutions, and service providers—including food markets, pharmacies, social service organizations, laundromats, and others. In many cases, though, these corridors were devastated by the storm. To address this, the City will call on the PSC and Con Edison to amend the preferential Business Incentive Rate (BIR) program, which offers a discount on Con Edison's electric delivery charges, and will work with call on LIPA to create such a program in the Rockaways to allow it to be extended to impacted small businesses in the five communities on which this report focuses. Businesses and nonprofits with 10 or fewer employees that have received support from City-sponsored loan and grant programs will be eligible for the discount for five years up to a maximum discount of \$50,000 per business or nonprofit. The maximum aggregate benefit available across the impacted community areas will be \$1 million, for a total benefit of \$5 million. The goal is for NYCEDC to launch this effort in 2013. Among the corridors where the benefit would be available in South Queens include:

- Cross-Bay Blvd. (between Belt Pkwy and 165th Ave.)
- Broad Channel
- Beach 116th St.
- Rockaway Beach Blvd. (between Beach 113th and Beach 116th Sts.)
- Beach 129th St.
- Mott Ave. (between Cornaga and Beach Channel Dr.)
- All streets from Beach 90th to Beach 100th Sts.
- Breezy Point

Economic Recovery Initiative 4

Support local merchants in improving and promoting local commercial corridors

As mentioned above, Sandy highlighted the important role played by local commercial corridors in many impacted communities. The City, through the Department of Small Business Services (SBS), will provide financial and/or technical assistance to area business improvement districts (BIDs), merchant associations, and other groups that work to improve market, maintain, and otherwise promote primarily commercial corridors. Subject to review of applications received, SBS will prioritize allocating its resources, including its CDBG funding, to impacted commercial corridors. Such funding could be used for a variety of purposes, including capacity building, façade improvement programs, streetscape improvements, and business recruitment and marketing efforts. In South Queens, corridors that could receive this additional assistance include Beach 116th Street, Beach 129th Street, Mott Avenue in Far Rockaway, and Cross Bay Boulevard in Howard Beach and Broad Channel. SBS will provide this assistance beginning in 2013.

Economic Recovery Initiative 5

Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods

Even before Sandy, the residents of many communities impacted by Sandy, including parts of South Queens, lacked adequate access to fresh fruits, vegetables, and other healthy foods. To address this challenge, especially in underprivileged areas of the city, in 2009, the City launched the FRESH program (Food Retail Expansion to Support Health), a series of zoning and financial incentives available to supermarkets that fill this gap in underserved neighborhoods. To promote the recovery of commercial corridors in these areas, the City will continue to promote the FRESH program, with a particular focus on Sandy-impacted neighborhoods, including all areas east of Beach 116th Street on the Rockaway Peninsula.

In addition to the measures described above, the City will advance the following initiatives to address South Queens's community and economic recovery needs:

South Queens Initiative 7

Get New Yorkers "Back to the Beach" for summer 2013

Sandy caused extensive damage to the beaches of the Rockaway Peninsula. Thanks to substan-



Conceptual rendering of Beach 116th Street revitalization

tial efforts by DPR, all beaches in the area were able to reopen by Memorial Day 2013, the traditional start of the summer season, with ongoing boardwalk restoration continuing for parts of the boardwalk that sustained minor to moderate damage during Sandy. However, to restore these beaches fully to provide recreational and protective value to the neighborhoods they front, will require significant planning and construction. While this work will take time, it is critical to the local economy that the beaches continue to attract visitors from all over South Queens, the wider city and beyond. To this end, in addition to reopening the beaches with interim repairs to beach-related infrastructure and portion of the boardwalk, the City, along with the local community, is also bringing back popular recreational and entertainment events from previous years, including the Art in the Parks Program, yoga and zumba outdoor fitness classes, movie nights and the annual Rockstock and Barrels festival. The City also is exploring additional opportunities to revitalize the beachfront at key locations through the deployment of additional food and beverage concessions. As noted above, these efforts will be bolstered further by the extended and expanded ferry service being supported by the City during the summer of 2013.

South Queens Initiative 8
Explore opportunities for long-term activation of the beachfront

Building on the beach restoration work described above, the City will explore new opportunities to activate the beach and boardwalk along the Rockaway Peninsula that are more long-term and ambitious in nature. As a first step, the City, working through DPR, will continue to address those sections of the boardwalk that were more substantially damaged during Sandy and that, therefore, cannot be

restored in near-term. This process will include a full consideration of ideas received from the community in numerous public forums since Sandy and the completion of a detailed analysis of resilient rebuilding options. This work is already underway, with plans expected to be released to the public for discussion by fall 2013.

In addition to the physical restoration of the boardwalk, the City also will explore several options to create new beachfront destinations at key nodes along the Rockaway Peninsula. The City, through DPR, will create a plan for recreational and community amenities on the beachfront in consultation with the community, and release it publicly for discussion by fall 2013. These amenities could include new recreational amenities such as a state-of-the-art skate park, new playgrounds with water features, volleyball and basketball courts and shade structures, as well as appropriate commercial amenities consistent with a boardwalk environment. The commercial components that will be included within this plan, as appropriate, could receive City capital support, subject to available funding, in conjunction with private investment, and will be implemented by DPR and NYCEDC.

As part of this effort, the City will further explore a partial reconfiguration of portions of Shorefront Parkway to provide additional space for activities as well as improved parking and bike access. It also will pursue opportunities for permanent cultural attractions such as public art installations, and music and performing arts venues along the beach. The City, through DPR and NYCEDC, will issue an RFEI in 2013 to seek partners to bring cultural programming, as a first phase, either to the Beach 108th Street roller hockey rink or in a new “pop up venue” at Beach 96th Street, starting in 2014.

South Queens Initiative 9
Develop a revitalization strategy for the Beach 108th Street corridor

As the City explores opportunities for long-term activation of the beachfront, it also will create a detailed revitalization strategy for the Beach 108th Street corridor, running from Jamaica Bay to the beach, exploring opportunities for potential ferry service on the Bay-side, potential redevelopment of underused parcels, potential public realm improvements along the length of the corridor including adjacent to the Rockaway Wastewater Treatment Plant, and retail improvements. Development of this plan will be started by NYCEDC and DCP in 2013, with completion expected in 2014. Thereafter, the City would move to implement land use and other changes that it deems to be appropriate, if any, based on the results of its study.

South Queens Initiative 10
Develop a comprehensive commercial revitalization plan for Beach 116th Street

Beach 116th Street is centrally located on the Rockaway Peninsula and provides easy access to mass transit and Cross Bay Boulevard. By some measures, it faced challenges even before Sandy, with store vacancies and underused or vacant buildings and lots. As a result of Sandy, however, the corridor suffered extensive damage, with many businesses destroyed and area infrastructure, including the subway terminus, knocked out of service. To help in the post-Sandy revival of Beach 116th Street, both for year-round residents and seasonal visitors, the City will create a detailed and comprehensive commercial revitalization plan for Beach 116th Street. This plan will set forth City-sponsored strategies (including, potentially, incentive programs and land use changes) that



Rendering of Beach 20th Street Plaza, Far Rockaway

will encourage the rebuilding of retail that was destroyed by Sandy along Rockaway Beach Boulevard, as well as the attraction of new development to underutilized lots (such as a possible “anchor block” at the corner of Beach 116th Street and the beach). Development of this plan will be started by NYCEDC and DCP in 2013, with completion expected in 2014.

Meanwhile, in the nearer-term, the City, through the Department of Small Business Services (SBS), will simultaneously continue to support small business-owners and the larger community with a retail facade improvement program and local merchant association capacity building program, using donated funds from private partners and the Mayor’s Fund to Advance New York City. Applications for funding have already begun to be processed. Also, in the nearer-term, the City, through multiple agencies, will work to enhance the image of Beach 116th Street through streetscape improvements, including new shrubbery, planters, benches, better lighting, an art installation, and cleaner and safer streets.

South Queens Initiative 11
Develop a commercial revitalization plan for Far Rockaway, potentially involving repositioning of City- and MTA-controlled sites

Far Rockaway’s downtown, surrounding Mott Avenue, is the commercial center and transit hub for the dense Far Rockaway neighborhood. However, the area contains strategically placed properties with unrealized or under-realized potential. The challenges faced by the area were exacerbated by the events surrounding Sandy, when many area residents who support the area’s businesses were displaced and critical infrastructure, including subway service

to Manhattan, was lost. To help in the post-Sandy revival of Far Rockaway’s downtown, the City will create a detailed and comprehensive commercial revitalization plan for the area. This plan will set forth City-sponsored strategies (including, potentially, incentive programs and land use changes) that will help create a vibrant, multi-modal hub serving the Rockaway Peninsula and beyond, including by encouraging the development of currently vacant, privately owned sites in the area. In conjunction with the development of this plan, NYCEDC and the MTA will also issue a request for proposals to private developers seeking new development on the publicly-controlled parking and bus depot sites adjacent to the A train station. Finally, in the near-term, NYCEDC and NYCDOT, in partnership with the Rockaway Development & Revitalization Corporation, are working on a beautification project in the area that is expected to result in the construction of a new pedestrian plaza south of Mott Avenue, linking the Beach 20th and Beach 21st Streets. In May, the project received preliminary approval from the City’s Public Design Commission, once formalized, construction will commence.

South Queens Initiative 12
Launch a satellite Workforce1 Career Center in Far Rockaway

Far Rockaway suffers from a high unemployment rate, relative to others in South Queens. SBS will, therefore, work with local elected officials and institutions to launch a satellite Workforce1 Career Center in Far Rockaway, serving its population as well as residents of surrounding areas. Staff members will connect qualified candidates to job opportunities and work with local businesses to help recruit for their needs. The Center also will provide

workshops and trainings to build skills and place individuals in positions throughout New York City. The new Workforce1 Career Center will open by late summer 2013.

South Queens Initiative 13
Implement planned and ongoing investments by the City and private partners

Preservation and revitalization of neighborhoods most significantly impacted by Sandy will be hampered if the momentum of planned investments is lost. The City, therefore, will continue to pursue and execute on public and private investments that had been planned prior to Sandy in South Queens. Such projects include but are not limited to:

Parks and Open Space

- Jamaica Bay/Rockaway Restoration Corps, a partnership with NPS launched in May that employs 200 workers to assist in the cleanup of Jamaica Bay and Rockaway Parks, restoring woodlands, wetlands and parkland damaged by Sandy.

Community Facilities

- Rockaway Institute for a Sustainable Environment (RISE), a visitor’s center for community-based programs and cultural activities focused on environmental issues in a former Arverne firehouse converted by the Rockaway Waterfront Alliance with City support that is to open in 2015.
- Beach 73rd Street YMCA, a new 44,000 square-foot facility, the Peninsula’s first, being built on 2.2 acres at Beach 73rd Street and Rockaway Beach Boulevard that is to open in fall 2013.



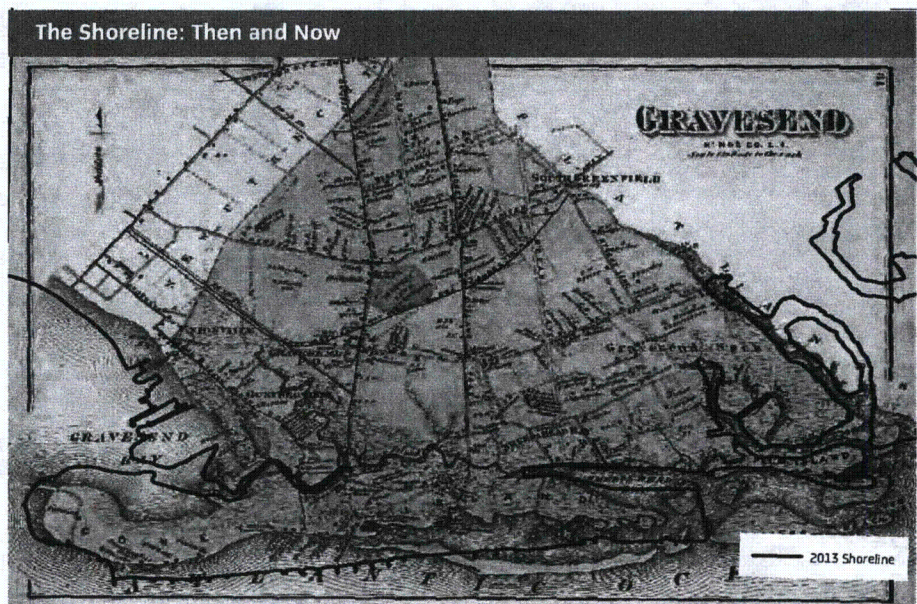
Coney Island, Brooklyn

Southern Brooklyn

The D, F, N, and Q trains converge at Stillwell Avenue in Coney Island, one of the most vibrant centers of residential and commercial life in Southern Brooklyn. Each year millions of visitors stream onto the boardwalk here overlooking the beach and Atlantic Ocean. Many move on to ogle the sea lions at the New York Aquarium or race down the famed wooden Cyclone, one of dozens of rides on offer.

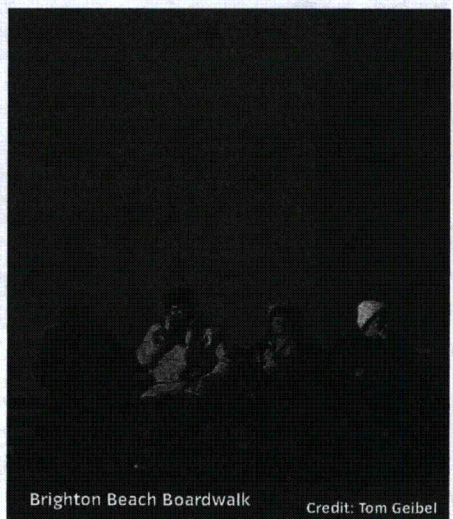
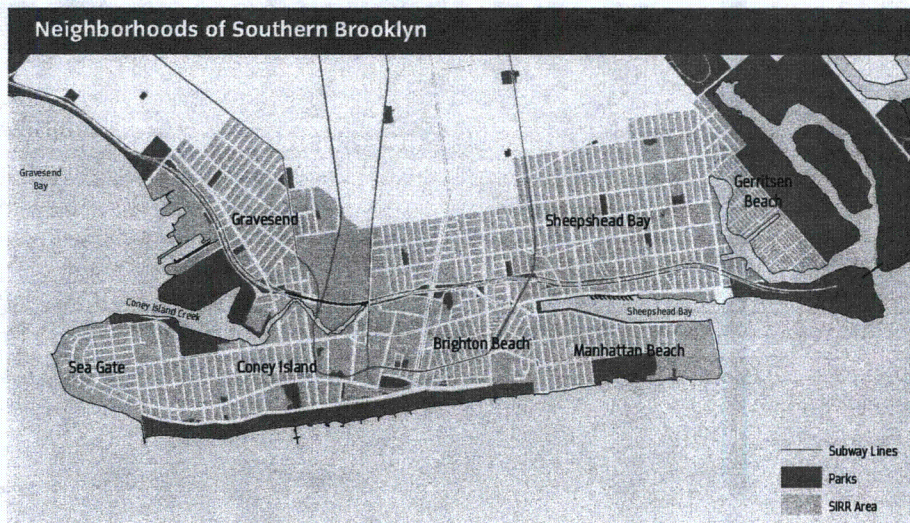
Coney Island was not always so lively—or so accessible. The peninsula that now contains Coney Island and three other Southern Brooklyn neighborhoods was once an actual island, separated from the mainland by Coney Island Creek and reachable only at low tide. The entire area was a collection of wetlands, tidal marshlands, bays, inlets, creeks, and barrier islands—first the fishing grounds of the Lenape people and then part of a quiet farming community. (See map: *The Shoreline: Then and Now*)

Over time, as the area evolved into a summer resort and further development took place, property owners (and later, the City) filled in the middle of Coney Island Creek, connecting the island to the mainland. Throughout the area, marshlands and waterways were also filled to yield new land for development. The coastline was extended into the ocean and Sheepshead and Gravesend Bays, subsuming smaller barrier islands. By the mid-20th century, summer bungalow communities had largely become year-round neighborhoods: Sea Gate, Coney Island, Brighton Beach, Manhattan Beach, Gravesend, Sheepshead Bay, and Gerritsen Beach. Home to an economically and ethnically diverse array of residents—some with roots that go back generations—these neighborhoods offer a range of housing types, along with access to beautiful beaches, bays, and a network of public parks. (See map: *Neighborhoods of Southern Brooklyn*)



But because of Southern Brooklyn's location, low-lying topography, and pattern of development, the area has long been vulnerable to damage from storm waves and flooding. While the Rockaway Peninsula provides some protection to eastern portions of Southern Brooklyn, the smaller barrier islands that once helped attenuate (or break up) waves elsewhere are gone, and some of the area's building stock, including bungalows built in the early 20th century for summer use, are particularly susceptible to damage. Portions of the shoreline have experienced continuous erosion—in fact, the first documented beach nourishment project in the United States was at Coney Island in the 1920s, and there have been many such projects in the area since then, including a major United States Army Corps of Engineers (USACE) effort in the mid-1990s along the oceanfront in Coney Island and Brighton Beach.

During Sandy, the beach that had been nourished by the USACE did indeed help buffer those two neighborhoods. However, storm waves battered buildings in areas without coastal protections, including Sea Gate and Manhattan Beach, and inundation in Southern Brooklyn was widespread, much of it caused by flooding originating not from the ocean but from the area's bays, creeks, and inlets. As of the writing of this report, local businesses remain slow to recover. Although the USACE plans to restore the beach along Coney Island and Brighton Beach to its pre-storm condition—replenishing the roughly 272,000 cubic yards of sand that were washed away or pushed inland during Sandy—all of Southern Brooklyn is expected to be subject to future risks from storm surge, rising sea levels, and increased storms and precipitation resulting from climate change.



To help Southern Brooklyn recover from Sandy and move forward on firmer footing, the City has developed a strategy that reflects the overarching goals of this report, which are to seek to limit the impacts of climate change, while enabling New York and its neighborhoods to bounce back quickly when those impacts cannot be averted. The plan will address Southern Brooklyn's most significant risk—its vulnerability to storm surge, particularly as sea levels rise—by strengthening oceanfront and backdoor exposures, by facilitating retrofits and resiliency in new construction and existing buildings, and by protecting vital infrastructure. The plan will also address other significant risks such as more frequent heavy downpours, heat waves, and high wind events by drawing on both citywide and locally tailored initiatives. Finally, the plan will build on the area's natural assets and local economic strengths to encourage reinvestment in its many neighborhoods.

Area Characteristics

Southern Brooklyn is largely residential, encompassing a range of housing types, from small bungalows to large single-family homes to multi-family elevator buildings. While the vast majority of the area's residential buildings are private homes, most Southern Brooklyn households (76 percent) live in multi-family structures, each of which may contain scores or even hundreds of individual units. Small businesses on local commercial corridors primarily serve local residents, but Southern Brooklyn also has, of course, the destination entertainment attractions that draw people from all across the city and beyond, as well as large institutions and critical infrastructure. (See charts: *Area Buildings Characterized by Type*; *Area Housing Units Characterized by Building Type*)

Neighborhoods and Residential Development

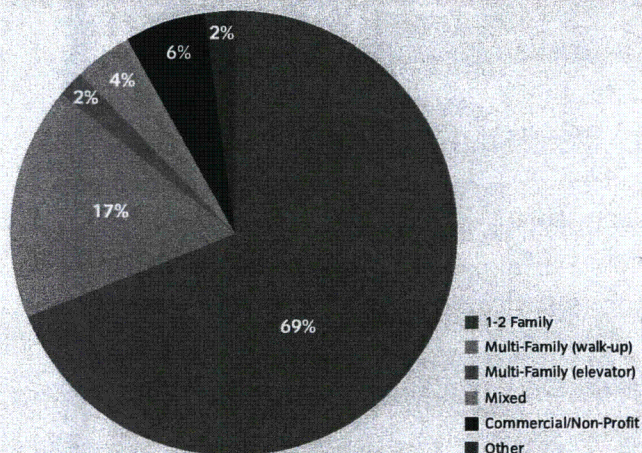
Seven major neighborhoods make up Southern Brooklyn. Though several share a number of characteristics, in some cases they are quite distinct from one another.

There are four primary neighborhoods on the Coney Island peninsula. On the western tip of the peninsula is Sea Gate, a private enclave developed as a planned community in the late 1890s and today operated by the Sea Gate Association. Sea Gate's 4,800 mixed-income residents live mostly in single-family homes on quiet streets near community-maintained private beaches and the waterfront Lindy Park.

Next to Sea Gate, at the center of the Coney Island peninsula is the neighborhood of Coney Island itself. Coney Island has a mix of multi-



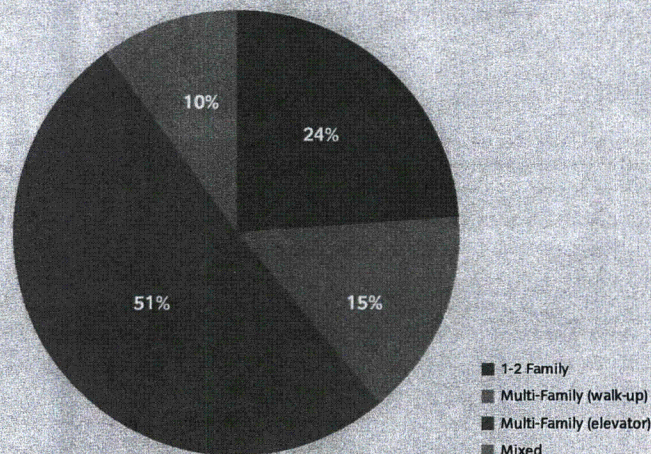
Area Buildings Characterized by Type



Total = 21,000 Buildings

Source: DCP PLUTO

Area Housing Units Characterized by Building Type



Total = 81,000 Housing Units

Source: DCP PLUTO

family buildings and single-family homes, with a high concentration of public housing and publicly-supported housing, including 37 buildings managed by the New York City Housing Authority (NYCHA) and approximately 6,300 units in the Mitchell-Lama program. Coney Island's main retail corridor is Mermaid Avenue; meanwhile, an entertainment district stretches along Surf Avenue and the Coney Island Boardwalk. On the north side of Coney Island is Kaiser Park, bordering Coney Island Creek.

To the east of Coney Island and sharing its broad beach is Brighton Beach, the most densely developed Southern Brooklyn neighborhood, at 102 residents per acre (more than twice the city average). Most of its 31,500 residents live in multi-family buildings, though some bungalows remain from the 1920s, and have now been adapted to year-round occupancy. An elevated train runs over Brighton Beach Avenue, the principal commercial corridor in the area. (See chart: Area Population Density)

Manhattan Beach is the easternmost neighborhood on the peninsula. Its 4,600 residents primarily occupy large single-family homes in an oceanfront setting. The neighborhood encompasses Manhattan Beach Park—dotted with playgrounds, baseball diamonds, and tennis courts—and Kingsborough Community College, which sits on a former Coast Guard base along the shoreline.

Farther inland are three other major Southern Brooklyn neighborhoods. Gravesend, one of the area's larger neighborhoods, has a population of 38,300 people primarily occupying single-family row houses and multi-family elevator buildings. The MTA's Coney Island Yards, Coney Island Hospital, and Calvert Vaux Park also lie within Gravesend's boundaries.

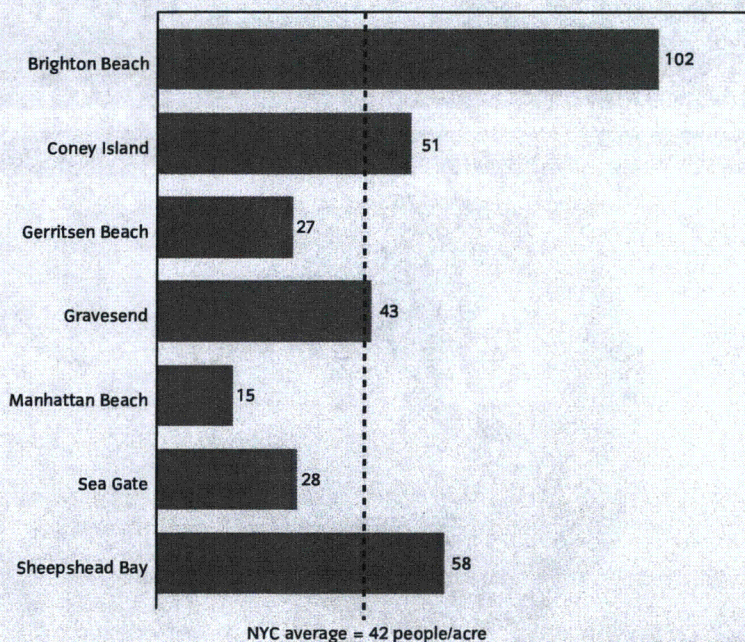
The neighborhood of Sheepshead Bay, fronting the water body of the same name, has 62,000 residents, most of whom live in single-family homes and newer multi-family buildings. Rows of bungalows, however, remain along pedestrian walks on the north and south sides of Emmons Avenue, one of Sheepshead Bay's main commercial corridors. Some of these bungalows are as much as 5 feet below the street grade (which has been raised over time), making them particularly susceptible to flooding.

Gerritsen Beach—located on Plumb Beach Channel and Shell Bank Creek, off Gerritsen Inlet—today is a tight-knit neighborhood of 5,200 residents who reside mostly in single-family homes. Developed in the 1920s as a planned community, Gerritsen Beach still has hundreds of bungalows. Despite renovations, alterations, and expansions over the decades, many of these structures not only were erected without the benefit of modern construction codes; they also were built at low elevations and today are at risk of flooding.

Socioeconomic Characteristics

Just as there are differences in population density and housing types among Southern Brooklyn's neighborhoods, so too do these neighborhoods differ in their socioeconomic makeup. Southern Brooklyn encompasses both wealthier and economically distressed neighborhoods. For example, in Manhattan Beach, where unemployment is 5 percent and the poverty rate 16 percent, the majority (over 75 percent) of residents owns their homes and the average property value is close to \$1 million. At the other end of the socioeconomic spectrum is Coney Island, where the unemployment rate is 13 percent and the poverty rate is 23 percent. Only one-fifth of Coney Island residents own homes. (See table: Socioeconomic Characteristics)

Area Population Density



Source: 2010 US Census



Typical residences in Gerritsen Beach

Credit: gerritsenbeach.net

Socioeconomic Characteristics								
Area	Population	Poverty Rate	Median Household Income	Households	Owner-Occupied Housing Units	% Homeowners	% Owner-Occupied Housing Units with Mortgage	Median Owner-Occupied Unit Value
Brighton Beach	31,500	24%	\$31,700	12,100	2,700	22%	58%	\$487,000
Coney Island	45,000	23%	\$32,100	18,000	3,800	21%	38%	\$320,800
Gerritsen Beach	5,200	7%	\$62,500	1,900	1,400	75%	78%	\$446,000
Gravesend	38,300	16%	\$38,900	13,800	4,700	34%	44%	\$546,200
Manhattan Beach	4,600	16%	\$84,800	1,600	1,200	77%	52%	\$922,300
Sea Gate	4,800	14%	\$61,500	1,500	730	48%	66%	\$614,600
Sheepshead Bay	62,000	14%	\$49,900	24,000	11,200	47%	55%	\$460,500
Citywide Total/Average	8,175,000	19%	\$51,300	3,050,000	993,500	33%	64%	\$514,900

Source: 2010 US Census, 2011 American Community Survey, 5-Year estimate

Vulnerable populations also reside in Southern Brooklyn. There are over 18,000 residents of NYCHA developments, including significant numbers of individuals who have impaired mobility or are on life-support equipment. The nine nursing homes in the area have capacity for approximately 2,400 inpatients; meanwhile, the area's seven adult care facilities house over 1,300 residents. Coney Island Hospital has 371 beds.

Business and the Local Economy

Most businesses in Southern Brooklyn (nearly 85 percent) are small enterprises employing fewer than five people, with many occupying

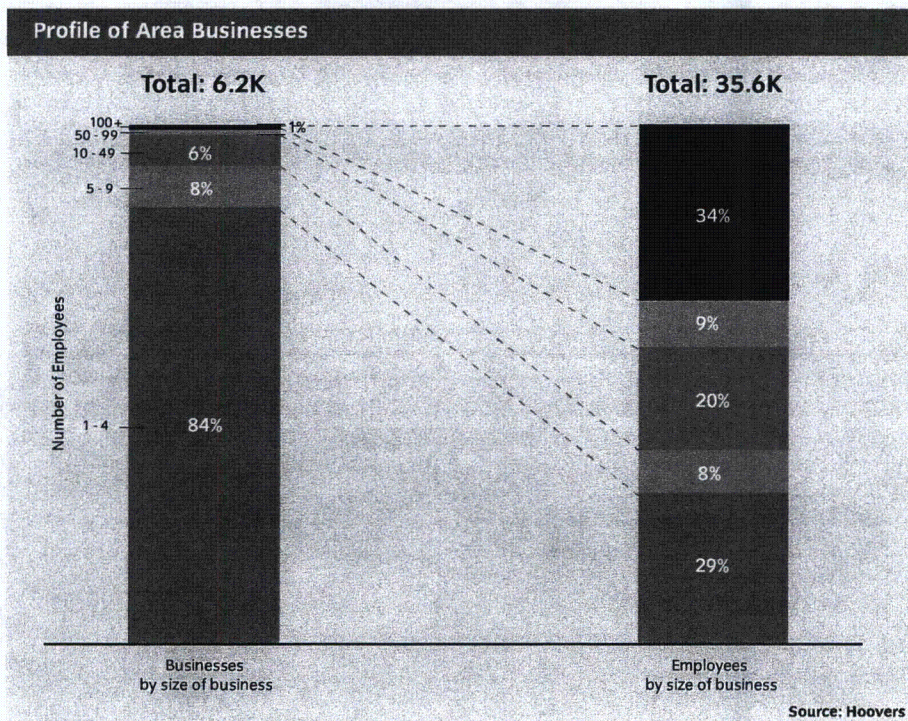
neighborhood commercial corridors that serve local residents. However, over one-third of the area's employees work for larger businesses or institutions, each of which may employ hundreds or even thousands of workers. For example, Coney Island Hospital, the biggest employer in the area and the largest medical facility in Southern Brooklyn, employs over 2,000 people. Coney Island Hospital is but one part of the area's healthcare sector, which plays a significant role in the local economy. The nursing homes, adult-care facilities, and other medical businesses serving Southern Brooklyn—including larger employers such as Shorefront

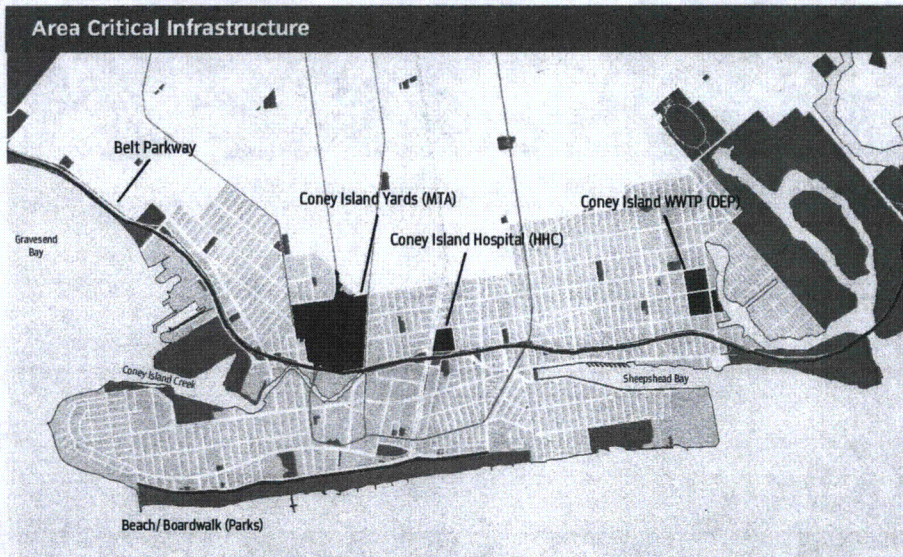
Geriatric and the Shore View Nursing Home—offer not only critical services but also valuable employment. Nonprofit organizations also provide significant local employment, in addition to valuable social services. (See graphic: *Profile of Area Businesses*)

The amusement area, including the Coney Island Boardwalk, is a significant economic engine, supported by seasonal visitation. The amusement area stretches from the New York Aquarium, a 14-acre campus at West 8th Street that draws 750,000 visitors annually, to MCU Park, home of the Brooklyn Cyclones, at West 17th Street. First developed in the late 19th century, the district has been undergoing a renaissance that started in the 1990s with the Cyclones and the renovation of the Stillwell Avenue subway station. Revitalization accelerated with the passage in 2009 of a comprehensive rezoning plan that has led to the opening of three new amusement areas, together with other year-round development in and around the amusement area.

Critical Infrastructure

Southern Brooklyn contains important infrastructure assets. While the 2.5-mile beach bordering Coney Island and Brighton Beach, maintained by the Department of Parks and Recreation (DPR), is a major recreational amenity, it is also critical for storm protection for the entire peninsula. The mid-1990s replenishment project by the USACE raised the beach by as much as 11 feet from Corbin Place in Manhattan Beach to West 37th Street at the edge of Sea Gate, to attenuate waves and protect adjacent flood-prone neighborhoods and shoreline buildings.





Meanwhile, the Belt Parkway, an integral part of the regional highway network, extends 25 miles from the Gowanus Expressway in Brooklyn to the Cross Island Parkway in Queens. Built beginning in the 1930s, this major roadway has adjacent parks and esplanades maintained by DPR. Many sections of the Belt Parkway have oceanfront exposures and flood during rain or storm surge events, although a seawall or bulkhead exists along portions of the roadway. On Plumb Beach, a former barrier island east of Sheepshead Bay, the USACE has advanced renourishment projects to protect the roadway from erosion, including a recent project that involved the installation of geotubes (large, long textile tubes filled with sand).

Run by the Metropolitan Transportation Authority (MTA), Coney Island Yards facility is another integral part of the transportation infrastructure. The 75-acre facility—the largest rapid transit complex of its type in the world—includes workshops where maintenance and overhauls are performed on the subway fleet. The facility was constructed on former marshlands and near sea level, however, making the yard vulnerable to inundation.

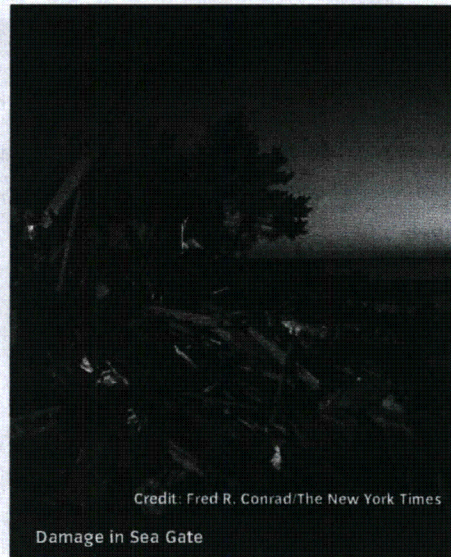
The Coney Island Wastewater Treatment Plant (WWTP) is also a critical infrastructure asset. Located on Shell Bank Creek within Gerritsen Inlet, this Department of Environmental Protection (DEP) facility has the capacity to process 110 million gallons per day. It serves most of Southern Brooklyn and areas to the north and east. (See map: *Area Critical Infrastructure*)

What Happened During Sandy

Sandy's storm surge struck Southern Brooklyn in two ways. The storm brought direct wave impacts

along ocean-facing areas, particularly in areas where coastal protections were lacking or inadequate, such as in Sea Gate and Manhattan Beach. Even more significant, though, was the inundation that occurred via inland waterways, and historic creeks and marshland that had been paved over decades before. Generally, waters that entered Southern Brooklyn through these routes resulted in "stillwater flooding," where the water rose steadily through the peak of the storm, and then receded quickly after the surge and high tide had passed. At Sandy's peak, floodwaters reached a height of 10 feet in some places, including, for example, along Neptune Avenue in Coney Island. (See map: *Area Inundation and Surge Height*)

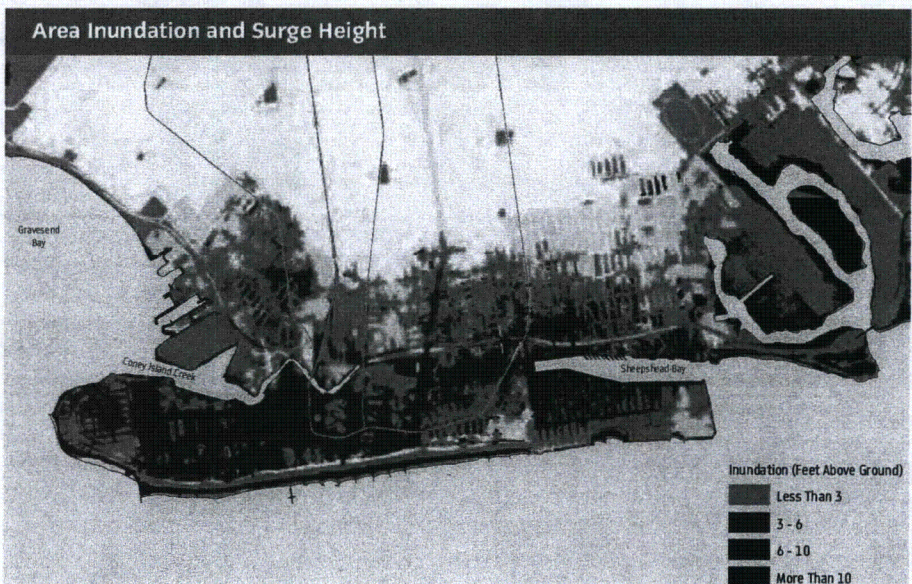
In Sea Gate, powerful waves struck buildings along the waterfront, knocking out the first floors of a number of structures. Where owners



Credit: Fred R. Conrad/The New York Times
Damage in Sea Gate

had built bulkheads at the edges of their properties, damage generally was mitigated. However, areas without bulkheads both were themselves vulnerable and allowed waves to scour and undermine neighboring seawalls and bulkheads. For example, the substandard bulkhead at Lindy Park collapsed as a result of severe wave impacts.

Along Coney Island and Brighton Beach, by contrast, the USACE nourishment project generally performed as intended, breaking waves before they made contact with buildings. However, the beach lost approximately 272,000 cubic yards of sand, according to USACE estimates, and some areas along the beach that were nourished to lower elevations experienced breaches, with waves pushing sand and water into adjacent neighborhoods. At Ocean Parkway, for instance, waves pushed thousands of tons of



Source: FEMA MOTF 11/6 Hindcast surge extent

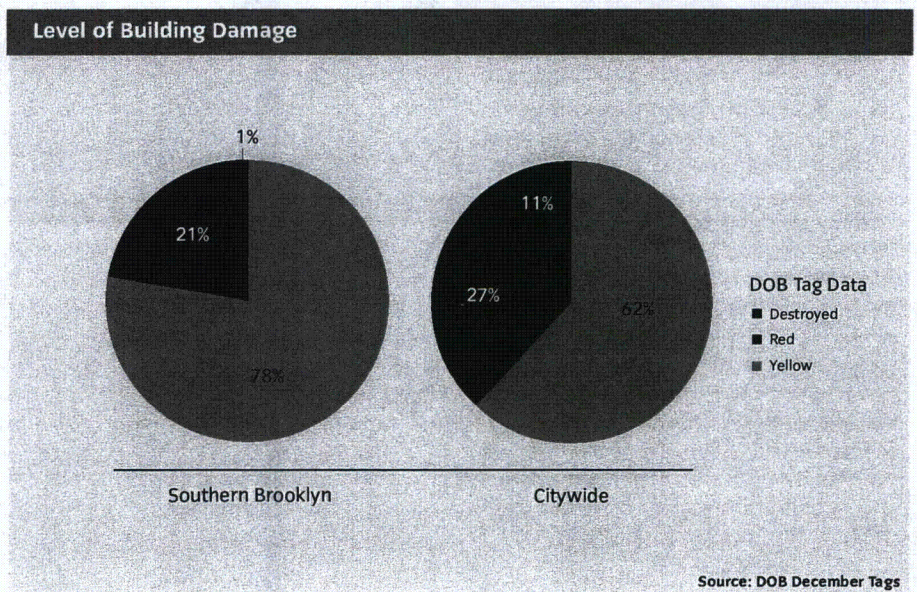
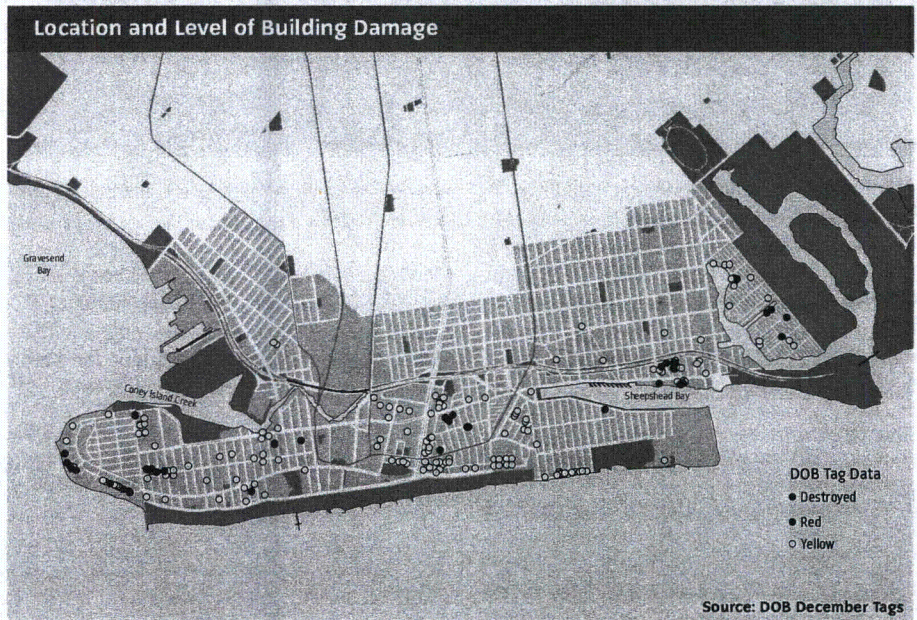
sand northward, with water traveling 1.5 miles north to Avenue W, joining floodwaters from Sheepshead Bay and Coney Island Creek.

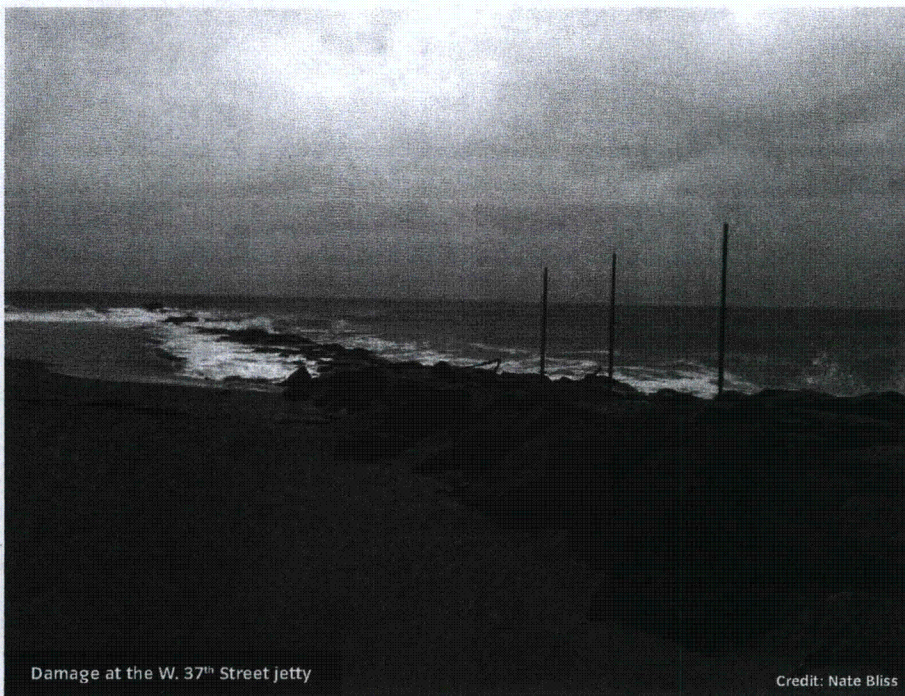
Meanwhile, in Manhattan Beach and at Kingsborough Community College, the elevation of the area helped mitigate flooding. Waves, though, damaged esplanades, docks, and other structures at the water's edge, particularly along the Manhattan Beach waterfront, from Corbin Place to the college campus at the eastern tip of the peninsula.

Sheepshead Bay was a major source of the floodwaters that impacted the neighborhoods of Sheepshead Bay and Manhattan Beach. The swelling of Coney Island Creek, too, led to inundation in Coney Island and Gravesend. The surge overtopped the creek's low edges (in fact, there was flooding along Neptune Avenue, adjacent to Coney Island Creek, a full 12 hours before the surge's peak). Even in the ocean-facing neighborhoods of Coney Island, Brighton Beach, and Manhattan Beach, floodwaters came primarily from their "backdoors" until the peak of the storm when, in many areas, waters from the ocean met waters from the north side of the peninsula on land.

Elsewhere, storm surge pushed into Gerritsen Inlet, which then overflowed into the neighborhood of Gerritsen Beach (although floodwaters also came over Plumb Beach and the Belt Parkway). This water then flowed to Shell Bank Creek and up and over the creek's edges into adjacent homes.

The most methodologically rigorous building damage assessment undertaken by New York City of Buildings (DOB) was completed in December 2012. According to this assessment, of those buildings citywide that were tagged, either yellow or red (including those further classified as destroyed), 10 percent were located in Southern Brooklyn. The yellow and red tagged buildings in Southern Brooklyn tended to be clustered along Atlantic Avenue in Sea Gate, in Sheepshead Bay and Gerritsen Beach. Southern Brooklyn was unusual among ocean-facing parts of the city, with a larger percentage of red and yellow tagged buildings that were tagged yellow (78 percent) than neighborhoods such as South Queens (41 percent) and the East and South Shores (52 percent). This was reflective of the fact that, in Southern Brooklyn, although a significant number of buildings were damaged by powerful waves coming off of the ocean, the area also experienced significant "backdoor" (stillwater) inundation in its northern regions. (See map: *Location and Level of Building Damage*)





Damage at the W. 37th Street jetty

Credit: Nate Bliss

Overall, the storm's impact on buildings in Southern Brooklyn was primarily from stillwater flooding. Inundation damaged ground-floor and basement spaces, destroying electrical equipment and other building systems, and disrupting power service. Thousands of commercial spaces were inundated, resulting in the loss of inventory and valuable equipment that

was not elevated, as well as the destruction of interior finishes.

Flooding had a huge impact on the homes and residents of Southern Brooklyn. Flooding of ground-floor residential units, single-family homes, and bungalows throughout the area resulted in temporary displacement of

residents. Repairs to electrical, heat, and elevator systems in high-rise buildings—including public housing and Mitchell-Lama buildings—took two to four weeks and, in some cases, even longer. Meanwhile, 10 Department of Education buildings had major damage, which impacted fifteen schools. In Coney Island, it was nearly two and half months before students could return to P.S. 288 (the Shirley Tanyhill School). In the interim, these students were sent to other schools.

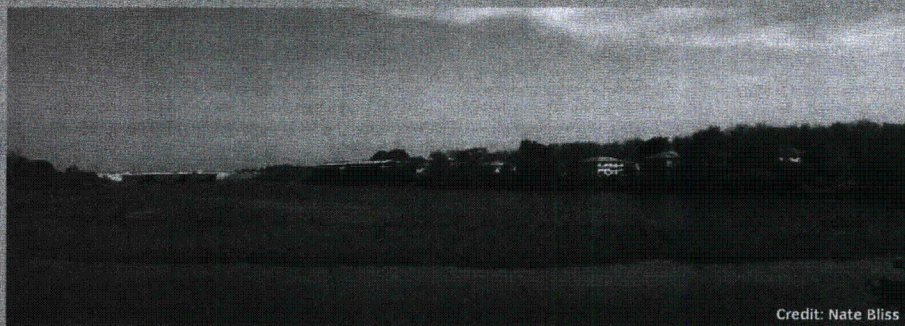
Local businesses were also hit hard, with over 5,000 businesses employing over 30,000 people affected by the storm. Along neighborhood retail corridors, local grocery stores were closed, making it difficult for residents in Coney Island to access food following the storm. In turn, many businesses that managed to reopen found themselves with fewer customers because so many Southern Brooklyn residents had been displaced.

There were significant losses within the entertainment area as well. At the New York Aquarium, operated by the Wildlife Conservation Society, floodwaters poured into buildings, causing an estimated \$65 million in damage to life-support systems for fish and marine mammals and exhibit infrastructure. Sandy also destroyed the MCU Park front office, locker rooms, and field, and did millions of dollars of damage to rides and electrical systems at the area's amusement parks.

Southern Brooklyn's Jamaica Bay Neighborhoods

The neighborhoods of Southern Brooklyn that front on Jamaica Bay, including Marine Park, Bergen Beach, Mill Basin, Canarsie, and East New York, experienced Sandy in some ways that were similar to the neighborhoods on which this report focuses and in some ways that were different. However each was impacted in ways that continue to affect the residents and businesses of these neighborhoods.

During Sandy, most of the damage done to these neighborhoods was the result of inundation from Jamaica Bay. Sandy's floodwaters arrived with the storm, were pushed through Rockaway Inlet into the Bay and then made their way into creeks, basins, and inlets, overflowing sandy beaches and wetlands and overwhelming bulkheads. In the case of Canarsie, this neighborhood was flooded on multiple fronts, with waters coming both from Paerdegat Basin and Fresh Creek, impacting hundreds of structures.



Credit: Nate Bliss

Looking to the future, low-lying areas such as these neighborhoods are particularly at risk from rising sea levels that could exacerbate storm surges like that brought by Sandy. The initiatives described in this report are designed to help address these risks through a range of strategies. Among these are: new coastal protections (studying, for example, a potential storm surge barrier across Rockaway Inlet; see *Southern Brooklyn Initiative 4*); a program to raise bulkheads

and other shoreline structures in low-lying areas most at risk of flooding, including potentially these Bay-facing Brooklyn neighborhoods (see *Coastal Protection Initiative 6*); and wetland restoration measures in and around Jamaica Bay. At the same time, this report proposes other measures that will help with recovery in these neighborhoods by supporting housing and commercial rebuilding, building-level resiliency investments, and investments in critical infrastructure.

Risk Assessment: Impact of Climate Change

Major Risk Moderate Risk Minor Risk

Scale of Impact

Hazard	Today	2020s	2050s	Comments
Gradual				
Sea level rise				Minimal impact
Increased precipitation				Could result in combined sewer overflows and flooding of low-lying areas
Higher average temperature				Minimal impact
Extreme Events				
Storm surge				Significant risk of both flooding and wave action, as evidenced by Sandy; risk will grow as V Zone expands; increased storm frequency will leave less time to restore coastal protections
Heavy downpour				As with increased precipitation, likely to result in more combined sewer overflows and flooding
Heat wave				Greater strain on power system with potential for more failures; most significant impact on high-rise buildings
High winds				Overhead power lines are at risk of failure

Meanwhile, Coney Island Hospital and many area nursing homes, adult-care residences, and other outpatient medical facilities experienced flooding and power loss, resulting in evacuations in the days after the storm. In fact, Coney Island Hospital, which lost power and suffered significant damage to its mechanical and electrical systems, had to close the day after the storm—evacuating more than 220 patients—and it was months before the hospital could begin providing inpatient care (see Chapter 8, *Healthcare*).

Sandy also had a significant impact on key infrastructure in the area, resulting in damage and disruption to critical services. The Belt Parkway was inundated in sections, with damage to its seawall and bulkhead. At Coney Island Yards, there was flooding and significant damage to track switches. Transit service was down for nine days following the storm. The Coney Island WWTP lost power during the storm for two hours, and inundation inflicted modest damage on the facility. DEP workers heroically labored to get the plant back online quickly, which helped minimize the discharge of untreated wastewater following the storm.

What Could Happen in the Future

Going forward, given the area's coastal exposure and low topography, and as evidenced by Sandy's destructive impacts, the most significant risk to Southern Brooklyn is from flooding resulting from coastal storms, exacerbated by projected sea level rise.

Major Risks

Preliminary Work Maps (PWMs) were released in June 2013 by the Federal Emergency Management Agency (FEMA). According to these new PWMs, the boundaries for the 100-year floodplain—the area that has a 1 percent or greater chance of flooding in any given year—have expanded to include most portions of the area that were once marshlands. (See map: *Comparison 1983 FIRMs and Preliminary Work Maps*)

There is also a dramatic increase—215 percent—in buildings of all types in the 100-year floodplain of the PWMs compared to that of the 1983 FIRMs. Base Flood Elevations (BFE)—the height to which floodwaters could rise during a storm—shown on the maps have increased two to three feet in large swaths of

the area. Meanwhile, V Zones, the areas of the 100-year floodplain where waves could exceed three feet in height, have increased along the oceanfront and, in some cases, they even extend into residential areas. Sensitive facilities, such as Coney Island Hospital and Coney Island Yards, are now within the 100-year floodplain. (See table: *Buildings in the Floodplain*)

According to projections from the New York City Panel on Climate Change (NPCC), described in Chapter 2, sea levels are projected to rise through the 2020s and 2050s. During this period, the floodplain will likely expand, and throughout the area, the BFE will likely continue to rise, reflecting the risk of ever-higher floodwaters during storms. According to the NPCC's high-end projections, the 2050s, in Southern Brooklyn, approximately 20,000 buildings are expected to be in the floodplain (an increase of 30 percent over the PWMs), V Zones are also expected to expand, and BFEs are expected to increase. (See map: *Comparison of Preliminary Work Maps and Future Floodplains*)

Taking into account the combination of sea level rise and increased storm severity, existing coastal protections may prove no

Buildings in the Floodplain				
Buildings & Units	100-Year Floodplain			
	1983 FIRMs	2013 PWMs	Projected 2020s	Projected 2050s
Residential Buildings	4,240	14,220	16,880	18,560
Residential Units	28,100	61,400	73,700	78,800
Commercial and Other Buildings	700	1,340	1,540	1,650

Source: DCP PLUTO, FEMA, CUNY Institute for Sustainable Cities

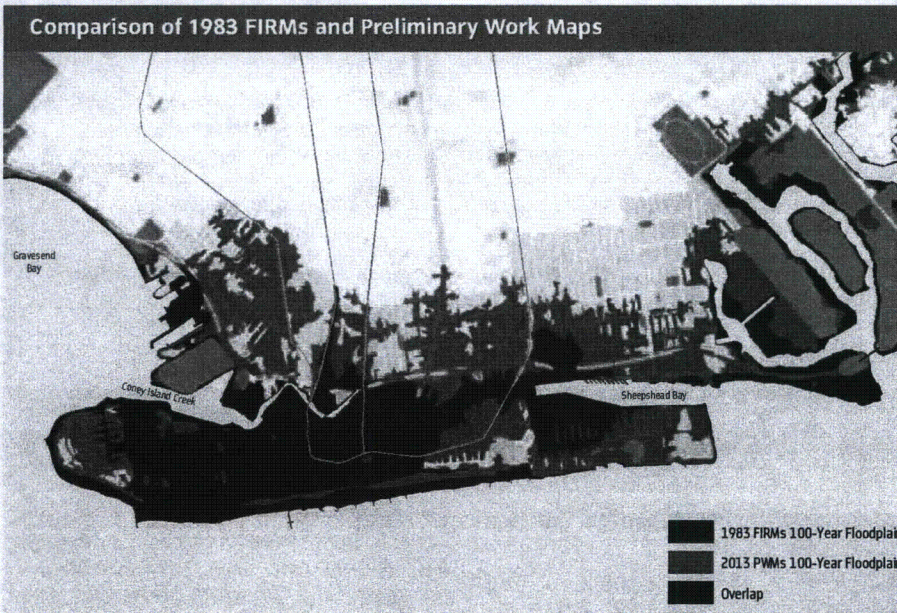
longer adequate. Additionally, increased storm frequency will make it challenging to restore coastal protections between extreme weather events.

Other Risks

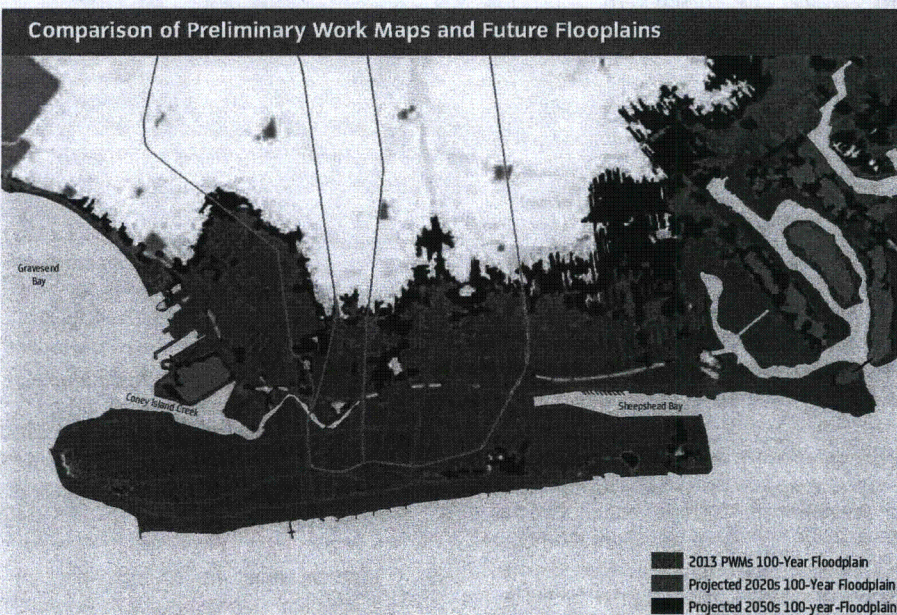
Though considerably less significant than the risk from storm surge, other moderate climate change risks do exist going forward for Southern Brooklyn. For example, increased precipitation and heavy downpours may overwhelm sewer systems, a phenomenon that already occurs today in some areas. Heavy rain events also could result in additional localized flooding.

While future projections for changes in wind speeds are not available from the NPCC, a greater frequency of intense hurricanes by the 2050s could present a greater risk of high winds in the New York area, which could result in downed overhead powerlines and trees, and potentially damage older buildings not constructed to modern wind standards. Heat waves may also strain power systems.

Because much of its land lies at least several feet above sea level, most of Southern Brooklyn is not expected to be threatened by sea level rise alone, under typical conditions, and in the absence of extreme weather events. However, isolated low-lying areas may experience increased regular tidal flooding. Higher average temperatures outside of the increase in the number of heat waves are not expected to have meaningful impacts on the area.



Source: FEMA



Source: FEMA, CUNY Institute for Sustainable Cities



Coney Island Creek

Credit: Charles Denson/
Coney Island History Project

Priorities from Public Engagement in Southern Brooklyn



Southern Brooklyn community outreach workshop

Since the Special Initiative for Rebuilding and Resiliency (SIRR) was launched in December 2012, the input of local stakeholders has helped shape an understanding of what happened during Sandy, what risks Southern Brooklyn faces in relation to climate change, and what approaches make sense to address these risks.

Southern Brooklyn is represented by a wide array of elected officials at the Federal, State, and local levels. It is also represented by three community boards. The area is further served by a large number of community-based organizations, civic groups, faith-based organizations, and other neighborhood stakeholders. All played an important role in relief and recovery efforts after Sandy. Throughout the process of developing this plan, SIRR staff benefited from numerous conversations—both formal and informal—with these groups and individuals, including, in Southern Brooklyn, two task forces that met regularly.

SIRR also held two public workshops in March of 2013 in Southern Brooklyn, part of a series

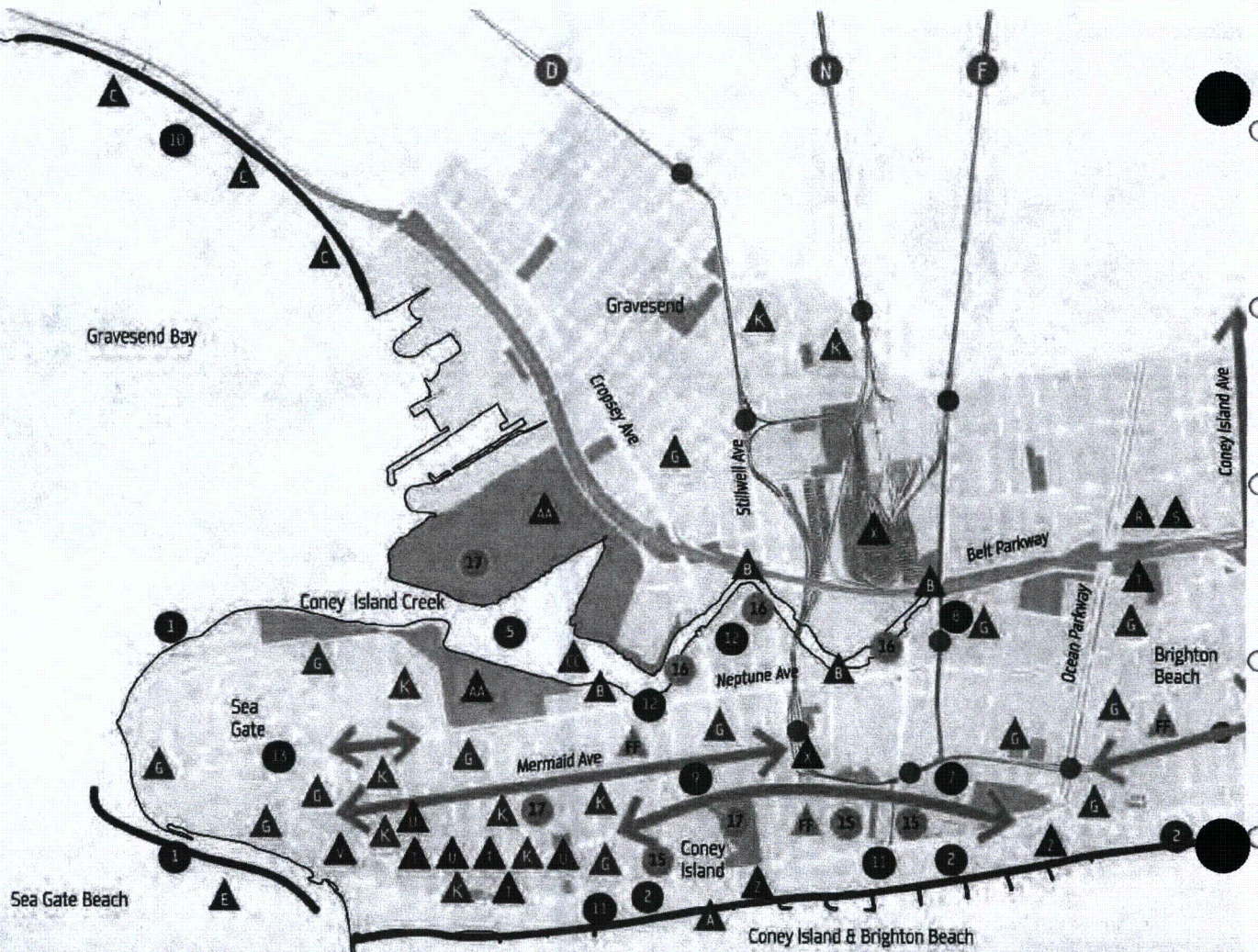
Task Force	Briefing Frequency	# of stakeholders from Southern Brooklyn
Elected Officials	Monthly	<ul style="list-style-type: none"> • 11 City, State, Federal elected officials • 3 community boards
Community-Based Organizations	4 - 6 weeks	<ul style="list-style-type: none"> • 40+ faith-based, business, and community organizations

of such workshops held citywide in which over 1,000 New Yorkers participated to discuss issues affecting their neighborhoods and communicate their priorities for the future of their homes and communities. Generally, the on-the-ground insights provided at these public workshops helped SIRR staff to develop a deeper understanding of the specific priorities of, and challenges facing, the communities of Southern Brooklyn.

Overall, out of the various task force and other meetings and public workshops attended by SIRR staff since January, several priorities for SIRR clearly emerged:

- Providing additional coastal/shoreline protection from wave action, beach erosion, and oceanfront vulnerabilities.
- Adding protection from “back-door” inundation that can lead to flooding of inland areas.
- Focusing on infrastructure inadequacy, particularly drainage
- Improving communication, which was hindered after the storm
- Addressing the lagging recovery of some neighborhood services and commercial corridors

SOUTHERN BROOKLYN | Initiative Summary



Coastal Protection

Selected Citywide Measures

- A** Continue to work with the USACE to complete emergency beach nourishment in Coney Island
- B** Install armored stone shoreline protection (revetments) in Coney Island
- C** Complete emergency bulkhead repairs adjacent to the Belt Parkway in Southern Brooklyn
- D** Continue to work with the USACE to complete its Plumb Beach breakwater and beach nourishment project in Southern Brooklyn
- E** Continue to work with the USACE to complete its Sea Gate project in Southern Brooklyn

* For additional Coastal Protection Initiatives, see Coastal Protection section of Community Plan

- 1** Call on and work with the USACE to study additional Sea Gate oceanfront protection
- 2** Continue to work with the USACE to study strengthening the Coney Island/Brighton Beach nourishment

- 3** Call on and work with the USACE to study Manhattan Beach oceanfront protections
- 4** Call on and work with the USACE to study mitigating inundation risks through Rockaway Inlet, exploring a surge barrier and alternative measures
- 5** Develop an implementation plan and preliminary designs for new Coney Island Creek wetlands and tidal barrier

Buildings

Selected Citywide Measures

- A** Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain
- B** Rebuild and repair housing units destroyed and substantially damaged by Sandy
- C** Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain

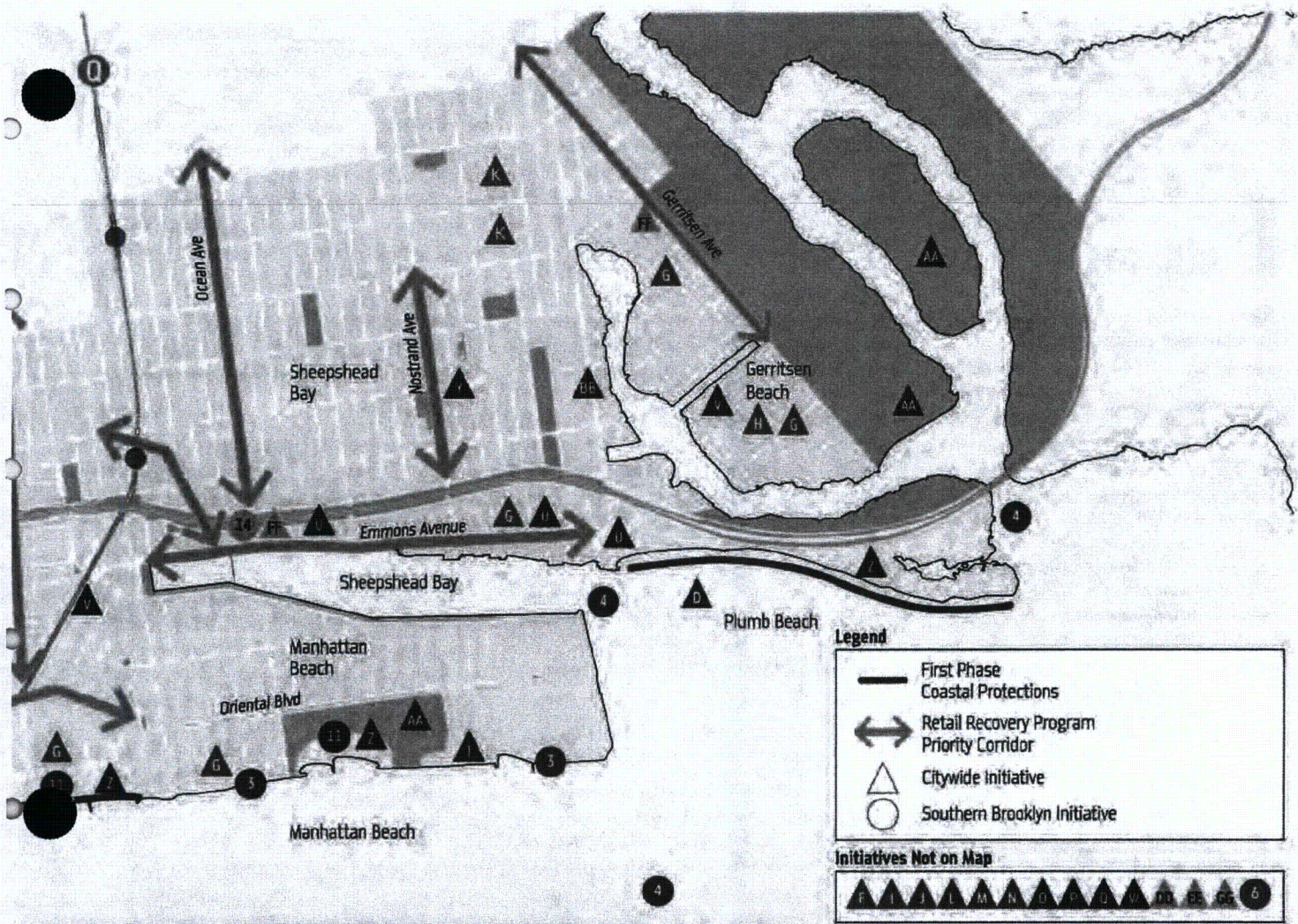
- A** Amend the Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings
- A** Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate
- A** Retrofit public housing units damaged by Sandy and increase future resiliency of public housing
- L** Launch a sales tax abatement program for flood resiliency in industrial buildings
- M** Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain
- N** Amend the Building Code to improve wind resiliency for existing buildings and complete studies of potential retrofits
- 6** Study additional resiliency initiatives for ground-floor housing within NYCHA buildings

* For additional Buildings Initiatives, see Buildings section of Community Plan

Critical Infrastructure

Selected Citywide Measures

- A** Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding
- P** Work with utilities and the PSC to harden vulnerable overhead lines against winds
- U** Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding
- H** Require the retrofitting of existing hospitals in floodplains
- S** Support the HHC's efforts to protect public hospital emergency departments from flooding
- T** Require retrofitting of nursing homes in floodplains
- A** Require retrofitting of adult care facilities in floodplains
- R** Reconstruct and resurface key streets damaged by Sandy
- E** Elevate traffic signals and provide backup electrical power



Community & Economic Recovery

- ▲ Call on non-City transportation agencies to implement strategies to address climate change threats
- ▲ Expand the city's Select Bus Service (SBS) network
- ▲ Restore city beaches
- ▲ Harden or otherwise modify shoreline parks to protect adjacent communities
- ▲ Harden wastewater treatment plants
- ▲ Reduce combined sewer overflow with Green Infrastructure
- * For additional Critical Infrastructure initiatives, see Critical Infrastructure sections of Community Plan
- Support CUNY launch of study and pilot of new technologies for high-rise buildings
- Study options to ensure resiliency of private cogeneration facilities in the area
- Construct new Coney Island Hospital outpatient clinic to replace the destroyed Ida G. Israel facility

- Call for the USACE to develop an implementation plan for the reinforcement of existing Belt Parkway edge protections
- Restore recreational infrastructure along Southern Brooklyn beaches
- Complete planned drainage improvements in Coney Island to mitigate flooding
- Provide technical assistance to support Sea Gate in repairing Sandy-damaged infrastructure

Selected Citywide Measures

- ▲ Launch business recovery and resiliency programs
- ▲ Launch Neighborhood Game-Changer Competition
- ↔ Call for Neighborhood Retail Recovery Program
 - Brighton Beach Ave.
 - Coney Island, including Neptune, Mermald, and Surf Avenues
 - Coney Island Ave.
 - Emmons Ave.
 - Gerritsen Ave.
 - Nostrand Ave.
 - Ocean Ave.
 - Sheepshead Bay Rd.
- ▲ Support local merchants in improving and promoting local commercial corridors
- ▲ Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods.

- Work with Brooklyn Chamber of Commerce to assist in organizing Sheepshead Bay businesses
- Support area recovery through the rebuilding and expansion of the entertainment district
- Study opportunities along Coney Island Creek to generate economic activity and facilitate resiliency investments
- Implement planned and ongoing investments by the City and private partners
 - Calvert Vaux Park
 - The West 8th Street Access Project
 - Coney Island Commons and YMCA
 - Coney Island Comprehensive Plan

This chapter contains a series of initiatives that are designed to mitigate the impacts of climate change on Southern Brooklyn. In many cases, these initiatives are both ready to proceed and have identified funding sources assigned to cover their costs. With respect to these initiatives, the City intends to proceed with them as quickly as practicable, upon the receipt of identified funding.

Meanwhile, in the case of certain other initiatives described in this chapter, though these initiatives may be ready to proceed, they still do not have specific sources of funding assigned to them. In Chapter 19 (*Funding*), the City describes additional funding sources, which, if secured, would be sufficient to fund the full first phase of projects and programs described in this document over a 10-year period. The City will work aggressively on securing this funding and any necessary third-party approvals required in connection therewith (i.e., from the Federal or State governments). However, until such time as these sources are secured, the City will only proceed with those initiatives for which it has adequate funding.

Southern Brooklyn Community Rebuilding and Resiliency Plan

Southern Brooklyn is an historic area containing some of New York City’s most iconic attractions and unique neighborhoods. The area benefits from unparalleled access to a beautiful beach, the waterfront, and a network of public parks.

The following is a multilayered plan that not only applies citywide strategies to Southern Brooklyn, but also provides strategies designed to address the area’s specific needs and particular vulnerabilities. In anticipation of future climate change-related risks, this plan proposes ways that Southern Brooklyn neighborhoods can adapt by: addressing wave action and inundation along the entire coastline; providing opportunities to retrofit the area’s most vulnerable building stock while exploring potential redevelopment over time in certain neighborhoods; protecting and improving critical infrastructure; and focusing investments in strategic areas, such as the beachfront, to advance a long-term and sustainable recovery.

Coastal Protection

As Sandy illustrated, the greatest extreme weather-related risk faced by New York City is storm surge, the effects of which are likely to increase given current projections of sea level rise. Going forward, it is anticipated that climate change will render coastal regions of the city, including Southern Brooklyn, even more vulnerable to these risks.

While it is impossible to eliminate the chance of flooding in coastal areas, the City will seek to reduce its frequency and effects—mitigating the impacts of sea level rise, storm waves including erosion, and inundation on the coastline of the city generally and Southern Brooklyn in particular. Among the strategies that the City will use to achieve these goals will be the following: increasing coastal edge elevations; minimizing upland wave zones; protecting against storm surge; and improving coastal design and governance. When evaluating coastal protection, other priorities including navigation and ongoing efforts to improve water quality and natural habitats, also will be considered prior to implementation, where appropriate.

The initiatives described below provide important examples of how the City intends to advance its coastal protection agenda citywide. These initiatives will have a significant impact on the residents, businesses, and nonprofits of Southern Brooklyn. Taken together, when completed, the

first six coastal protection initiatives described below would provide enhanced protection for nearly 1,000 buildings in Southern Brooklyn, representing nearly 12,000 housing units as well as many businesses and much of the critical infrastructure in Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City’s comprehensive coastal protection plan, please refer to Chapter 3 (*Coastal Protection*).

Coastal Protection Initiative 1 Continue to work with the USACE to complete emergency beach nourishment in Coney Island

Though the beach at Coney Island helped to protect adjacent neighborhoods from some of the impacts of Sandy’s surge, doing so came at the cost of significant beach erosion. The City, therefore, will support emergency beach nourishment work from Corbin Place to West 37th Street. The initiative will replace approximately 1 million cubic yards of sand, which replaces sand lost during Sandy and will restore the beach to its original design profile. As part of this initiative, the City and USACE will develop a plan for ongoing beach maintenance to ensure future events can be followed quickly by restoration of lost sand. The project will begin in July with completion expected by the end of 2013.

Coastal Protection Initiative 4 Install armored stone shoreline protection (revetments) in Coney Island

During Sandy, Coney Island Creek was the source of much of the “backdoor” flooding in Southern Brooklyn. Subject to available funding, the City, therefore, will raise the lowest edge elevations with revetments along Coney Island Creek to a consistent grade. The City, through the Office of Long-Term Planning and Sustainability (OLTPS) and the New York City Economic Development Corporation (NYCEDC), will begin design in 2013 with completion expected within three years.

Coastal Protection Initiative 6 Raise bulkheads in low-lying neighborhoods to minimize inland tidal flooding

Bulkheads provide the first line of defense against flooding in many neighborhoods, including Southern Brooklyn, but throughout the city many bulkheads are built to an elevation that may be insufficient given the latest projections of sea level rise by 2050. Subject to available funding, the City, therefore, will launch a program to raise bulkheads and other shoreline structures across the five boroughs in low-lying areas most at risk of daily or weekly

tidal flooding, a phenomenon that could impact over one mile of Southern Brooklyn's shoreline by the 2050s. OLTPS will work with NYCEDC to manage this program, to begin implementation in 2013, in conjunction with the new citywide waterfront inspections program described in Chapter 3.

Coastal Protection Initiative 7 Complete emergency bulkhead repairs adjacent to the Belt Parkway in Southern Brooklyn

Several critical bulkheads along the Belt Parkway failed during Sandy, leaving several portions of the roadway exposed and vulnerable to future extreme weather. The City, through DPR, therefore will complete bulkhead repairs in areas damaged during Sandy, including at 14th Avenue, 17th Avenue and 95th Street. These repairs will enhance protection during this year's hurricane season. These repairs are expected to be completed in 2013.

Coastal Protection Initiative 16 Continue to work with the USACE to complete its Plumb Beach breakwater and beach nourishment project in Southern Brooklyn

Shortly before Sandy's arrival, the USACE completed the first phase of a beach nourishment project at Plumb Beach, along the Belt Parkway. The project provided critical protection to the Parkway during the storm. The City, therefore, will support completion of the second phase of this existing project. The second phase will include additional nourishment and construction of an offshore breakwater. It is expected to be completed in 2014.

Coastal Protection Initiative 18 Continue to work with the USACE to complete its Sea Gate project in Southern Brooklyn

Sea Gate has very little coastal protection. As a result, during Sandy, the neighborhood sustained significant damage. The City, therefore, will support construction of groins in this neighborhood. These offshore structures are primarily intended to protect the terminal groin at West 37th Street, but also will provide a first line of protection to the neighborhood against some of the impacts of inundation and destructive wave action. This project is expected to be completed by 2014.

Beyond the priority coastal protection projects described in Chapter 3, including those summarized briefly above, the City is

proposing additional coastal protection initiatives specific to Southern Brooklyn's vulnerabilities. These initiatives are described below.

Southern Brooklyn Initiative 1 Call on and work with the USACE to study additional Sea Gate oceanfront protection

As described above, Sea Gate is highly vulnerable to wave action risks. This is due in part to the neighborhood's decision not to participate in the USACE replenishment project of the mid-1990s as a result of concerns relating to public access required in connection with the receipt of Federal funding. The City will call for the USACE to develop an implementation plan for additional protection measures at Sea Gate to address these lingering vulnerabilities. While the groin project referenced above will provide needed shoreline protection in the near-term, in developing its implementation plan, the USACE should investigate whether additional beach nourishment extending west of the existing West 37th Street jetty to Norton's Point and development of a reinforced sea wall or dune system on the coastal edge of Gravesend Bay may be appropriate. To obtain Federal funding for protective measures, the Sea Gate Association, which is the predominant owner of oceanfront property in the area, will likely be required to provide public access to the community's beaches. The goal is for USACE to begin work on this plan as part of its continuing studies of flood risk reduction in New York City, based on the recommendations of this report.

Southern Brooklyn Initiative 2 Continue to work with the USACE to study strengthening the Coney Island/Brighton Beach nourishment

While immediate restoration of these beaches to pre-storm conditions with sand replacement and reshaping is critical, rising sea levels and more frequent storm surge demands more protection, focused first on areas of the beach (such as that at the end of Ocean Parkway) that were breached in the recent storm. The City will call on the USACE to develop an implementation plan containing options for strengthening the protections offered by these beaches. Additional measures could include structured dune systems, seasonal installation of "snowfencing" to control sand and sediment migration, and potential reinforcement or extension of existing groins. Working with DPR, the USACE should also explore such protective measures as part of its current comprehensive study. Certain low-cost interventions—such as temporary fencing—may be pursued or piloted by DPR in the near-term. The goal is for the USACE to begin work on this plan as part of its continuing

studies of flood risk reduction in New York City, based on the recommendations of this report.

Southern Brooklyn Initiative 3 Call on and work with the USACE to study Manhattan Beach oceanfront protections

In Manhattan Beach, an historic esplanade has been the subject of an ownership dispute and was not repaired following a 1993 nor'easter, leaving waterfront properties and the neighborhood behind them vulnerable, therefore, to Sandy's pounding waves. The City will call on the USACE to develop an implementation plan containing options for reinforcing protections along the Manhattan Beach waterfront from Corbin Place to Kingsborough Community College at the eastern tip of the Coney Island peninsula. The City will encourage private waterfront property owners to engage with the USACE and consider participating in the implementation of such protections. New or reinforced ocean-facing protections—such as sea walls, bulkheads and revetments—would serve to protect ocean-facing structures and homes from waves and upland areas from inundation. The Federal government would likely require public waterfront access in order to support additional oceanfront protections. The goal is for the USACE to begin work on this plan as part of its comprehensive study of flood risk reduction in New York City, based on the recommendations of this report.

Southern Brooklyn Initiative 4 Call on and work with the USACE to study mitigating inundation risks through Rockaway Inlet, exploring a surge barrier and alternative measures

Much of the flood damage from Sandy in the neighborhoods of Brooklyn and Queens that face Jamaica Bay came from water that flowed through Rockaway Inlet into the Bay. The extensive shoreline that surrounds Jamaica Bay supports a variety of land uses and densities, all of which are at risk of flooding. Because flood protection along the existing shoreline of Jamaica Bay would be extremely expensive and disruptive, and in some cases nearly impossible, the City will call on and work with the USACE to develop an implementation plan for a local storm surge barrier to be constructed across Rockaway Inlet approximately between Manhattan Beach in Brooklyn and Breezy Point in Queens. A Rockaway Inlet local storm surge barrier at this location could protect against significant inland flooding and wave risk in neighborhoods from Sheepshead Bay to Howard Beach, as well as JFK Airport, Broad Channel and the entire bayside of the Rockaway peninsula (provided that the barrier were completed in conjunction with dune enhancements along the oceanside of the

Rockaway peninsula and mitigation measures along Coney Island Creek). This project, in turn, would obviate the need for extensive localized coastal protections spread around the shoreline of the Bay. A preliminary feasibility assessment, to be performed by OLTPS in coordination with DEP, would examine impacts on water quality, habitat, hydrodynamics, and navigation, and would identify potential secondary coastline reinforcements.

The aforementioned study should also examine alternative approaches to coastal protection of the vulnerable areas behind this potential surge barrier, including localized options for protecting areas adjacent to Sheepshead Bay. Examples of alternative approaches could be the use of the elevated Belt Parkway as a levee with passive floodwalls at roadway underpasses; permanent levees along the perimeter of the Bay; and the "shallowing" of Jamaica Bay. As another alternative, the study should also examine the feasibility of a navigable or non-navigable surge barrier at Gerritsen Inlet, exploring costs and potential impacts to navigation and water quality.

The goal is for the USACE to begin work on this plan as part of its comprehensive study of flood risk reduction in New York City, based on the recommendations of this report.

Southern Brooklyn Initiative 5 Develop an implementation plan and preliminary designs for new Coney Island Creek wetlands and tidal barrier

Coney Island Creek presents a significant flood risk to Coney Island and Gravesend. Therefore, the City will develop an implementation plan and preliminary designs for a significant rethinking of the Creek that goes beyond the revetment project described above. This rethinking will include consideration of further protections, including edge-strengthening and edge-softening measures, such as wetland construction, and a potential up-creek tidal barrier or dam across the Creek to control tidal surge and improve water quality. A new levee and tide gate system could connect Calvert Vaux and Kaiser Parks. New culverts (pipes) that generally would allow normal tidal flow could be closed at low-tide in anticipation of a storm, converting the Coney Island Creek bed into a water detention basin

for the surrounding neighborhoods and holding back surge. Following a weather event, the culverts could be reopened and water could drain, flushing the Creek. (See graphic: *Conceptual Coney Island Creek culvert*)

While these changes would impede future navigation of the Creek, they would also present an unprecedented opportunity to mitigate flood risks for the entire Coney Island neighborhood, for much of the Gravesend neighborhood, and for sensitive infrastructure such as the MTA's Coney Island Yards, all of which were damaged by Sandy. Additionally, the Creek protections could serve to expand recreation options and public access, potentially transforming this ill-used waterway into a major public open space amenity for Southern Brooklyn. (See rendering: *Coney Island Creek*)

The implementation plan and preliminary designs, to be advanced by OLTPS and by the USACE subject to available funding, would investigate environmental impacts and benefits, hydrology, water quality issues, permitting issues, and operational considerations. The goal is for the USACE to begin work on this plan

Coney Island Creek



Conceptual rendering of Coney Island Creek wetlands and tidal barrier, with Rockaway inlet barrier

as part of its comprehensive study of flood risk reduction in New York City, based on the recommendations of this report.

Buildings

The city's buildings give physical form to New York. As Sandy demonstrated, however, the building stock citywide, including in Southern Brooklyn, is highly vulnerable to extreme weather events—a vulnerability that is expected to increase in the future. While the coastal protection measures outlined above are designed to reduce the effects of sea level rise, storm surge, and wave action on the city and Southern Brooklyn, these measures will not completely eliminate those risks. They also will take time to design, fund, and build. It is equally important, therefore, to supplement these measures by pursuing resiliency at the building level.

To achieve building-level resiliency, the City will seek to protect structures in Southern Brooklyn and throughout the five boroughs against a spectrum of climate risks, including not only flooding but also high winds and other extreme events. Among the strategies that the City will use to achieve these goals will be to construct new buildings to the highest resiliency standards and retrofit as many existing buildings as possible so that they will be significantly better prepared to handle the impacts of extreme weather events.

The initiatives described below provide important examples of how the City intends to advance building resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough building resiliency plan, please refer to Chapter 4 (*Buildings*).

Buildings Initiative 1 Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain

Though buildings constructed to modern Construction Codes generally performed well during Sandy, given the increasing risk of flooding that is likely with climate change, modifications are warranted. The City, therefore, will seek to amend the Construction Codes and Zoning Resolution to provide for strengthened requirements that will, among other things, improve the design of new buildings through the application of appropriate resiliency measures that are calibrated to the best floodplain data available over time and provide that critical building systems are better-protected from flood risks. In 2013, the City, through OLTPS, will seek to implement these code changes and the Department of City Planning (DCP) will continue to take zoning changes through the public review process, with the goal of adoption before the end of the year. If adopted, they will improve resiliency

for developments throughout Southern Brooklyn, including as many as 4,500 units of new housing that are permitted to be constructed in the Coney Island neighborhood pursuant to the rezoning of that neighborhood approved by the City Council and City Planning Commission in 2009.

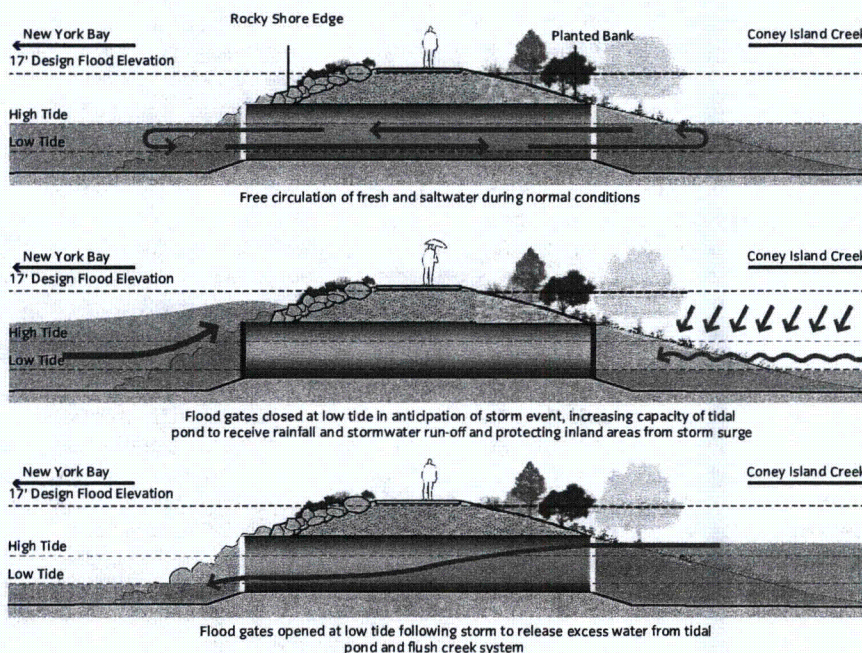
Buildings Initiative 2 Rebuild and repair housing units destroyed and substantially damaged by Sandy

Roughly 23,000 private residential buildings encompassing nearly 70,000 housing units were damaged or destroyed during Sandy. Subject to available funding, the City, therefore, through the Mayor's Office of Housing Recovery Operations (HRO), will provide financial and other assistance to owners of residential properties that were destroyed or substantially damaged during Sandy, including approximately 380 residential buildings encompassing approximately 1,500 housing units in Southern Brooklyn. To address the damages sustained and to more effectively prepare these significantly damaged buildings for future storm events, the City either will assist owners or, in limited cases meeting City criteria, will facilitate the acquisition of properties by new owners whom it will assist, in rebuilding and substantially improving these properties based on the best floodplain data available over time. Additionally, the City is seeking to incorporate resiliency measures into approximately 500 to 600 multifamily properties that sustained minor damage including many publicly-assisted properties such as those developed pursuant to the Mitchell-Lama program and other affordable housing programs. The City, therefore, will support the retrofit of these publicly-assisted buildings.

Buildings Initiative 3 Study and implement zoning changes to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year floodplain

The City, through DCP, will undertake a series of citywide and neighborhood-specific land use studies to address key planning issues in severely affected and vulnerable communities. As part of these studies, the City will identify ways to facilitate the voluntary construction of new, more resilient building stock, and to encourage voluntary retrofits of existing vulnerable buildings over time. To be undertaken in close consultation with local residents, elected officials, and other community stakeholders, these land use studies will focus on the challenges posed by the flood exposure of the applicable neighborhoods; the vulnerability

Conceptual Coney Island Creek culvert



of the building types that are found in these neighborhoods (e.g., older, 1-story bungalows); and site conditions in these areas (e.g., narrow lots) that can make elevation or retrofit of vulnerable buildings expensive or complicated. In Southern Brooklyn, DCP will examine neighborhoods including Gerritsen Beach, exploring zoning and other land use changes that, in the future, could encourage residents, if they so choose, to make changes with respect to existing homes or build new homes that would result in significantly greater resiliency. Subject to available funding, the goal is for DCP to commence this study in 2013. Thereafter, DCP would move to implement changes, if any, that it deems to be appropriate based on the results.

Buildings Initiative 4
Launch a competition to encourage development of new, cost-effective housing types to replace vulnerable stock

Subject to available funding, the City, through the Department of Housing Preservation and Development (HPD), will launch an international Resilient Housing Design Competition. This competition will offer prizes to private-sector developers who design and develop new, high-quality housing prototypes that offer owners of vulnerable building types (e.g., older, 1-story bungalows), a cost-effective path that is consistent with city building and zoning requirements, and meet the highest resiliency standards. In addition to cash prizes, the winners of this competition will be given the opportunity to put these structures into service in connection with a City-sponsored development project. Prototypes will have applicability throughout the five boroughs; including in sections of Southern Brooklyn such as Gerritsen Beach and other vulnerable bungalow communities. The goal is for HPD to launch this competition in 2013.

Buildings Initiative 5
Work with New York State to identify eligible communities for the New York Smart Home Buyout Program

The City will evaluate opportunities for collaboration with the State in connection with its home buyout program, using an objective set of criteria developed by the City, including extreme vulnerability, consensus among a critical mass of contiguous local residents, and other relevant factors. It is anticipated that these criteria will be met in a limited number of areas citywide. As of the writing of this report, no areas have been identified for this program in Southern Brooklyn.

Buildings Initiative 6
Amend the Building Code and complete studies to strengthen wind resiliency for new and substantially improved buildings

As noted above, buildings constructed to modern Building Code standards generally performed well during Sandy. Sandy, however, brought relatively weak winds, compared to other hurricanes. Given the possibility of more frequent or intense wind events in the future, modifications to the Building Code are warranted. The City, therefore, through OLTPS, will seek to amend the Building Code to provide for strengthened requirements so that new buildings citywide can meet enhanced standards for wind resiliency. The City will further study whether additional wind resiliency standards should be required going forward. The amendments will be submitted to the City Council for adoption, and the study will commence, in 2013.

Buildings Initiative 7
Encourage existing buildings in the 100-year floodplain to adopt flood resiliency measures through an incentive program and targeted mandate

Even if every structure destroyed or damaged by Sandy were rebuilt to the highest resiliency standards, this would still leave tens of thousands of existing structures in the 100-year floodplain vulnerable—with more becoming vulnerable as the climate changes. Subject to available funding, the City, therefore, will launch a \$1.2 billion program to provide incentives to owners of existing buildings in the 100-year floodplain to encourage them to make resiliency investments in those buildings. Of the up to \$1.2 billion available through the program, the City will reserve up to \$100 million for 1- and 2- family homes, up to \$500 million for distribution to the five boroughs based on each borough's share of vulnerable buildings citywide, and \$100 million for affordable housing developments. The City also will mandate that large buildings (those with seven or more stories that are more than 300,000 square feet in size) undertake certain flood resiliency investments by 2030. If the City consistently achieves its stated goal of encouraging significant resiliency retrofit investments for the vast majority of the vulnerable built floor area in the five boroughs, nearly 45,000 units encompassing approximately 55 million square feet of built space in Southern Brooklyn would, over time, be made meaningfully less vulnerable. The goal is to launch these programs in 2013.

Buildings Initiative 8
Establish Community Design Centers to assist property owners in developing design solutions for reconstruction and retrofitting, and connect them to available City programs

The City, through HRO, will establish Community Design Centers in neighborhoods across the City, potentially including Southern Brooklyn, to assist property owners in developing design solutions for reconstruction and retrofitting, and connect them to available City programs. The Centers would be managed by the City—through agencies such as HRO, HPD, DOB, DCP, and NYCEDC—with support from local partners.

Buildings Initiative 9
Retrofit public housing units damaged by Sandy and increase future resiliency of public housing

During Sandy, public housing developments owned and operated by NYCHA suffered significant damage throughout the city. Still more were not impacted by Sandy but remain vulnerable to extreme weather, with even more likely to become vulnerable as the climate changes. The City, therefore, through NYCHA, will repair public housing developments across the city that were damaged by Sandy, incorporating new flood resiliency measures. In Southern Brooklyn, 40 buildings containing over 4,000 units will be repaired. NYCHA also will undertake a planning process to identify additional resiliency investments in developments that are vulnerable to weather-related events, even if they were unaffected by Sandy. In Southern Brooklyn, NYCHA is, subject to available funding, evaluating resiliency investments in 47 buildings containing nearly 3,000 additional units.

Buildings Initiative 10
Launch a sales tax abatement program for flood resiliency in industrial buildings

As Sandy demonstrated, many industrial buildings are vulnerable to extreme weather, with more likely to become vulnerable as the climate changes. However, many industrial buildings operate on thin margins, making it challenging to invest in resiliency. The City, through the New York City Industrial Development Agency (NYCIDA), therefore, will launch a \$10 million program to provide incentives to owners of industrial buildings to encourage them to make resiliency investments in those buildings. The program will prioritize 1- to 2-story buildings with more than four feet between their actual ground elevation and the applicable BFE. In Southern Brooklyn,

approximately 25 industrial buildings with over 200,000 square feet of floor area will be eligible for this program. This program will be launched in 2013.

Buildings Initiative 11

Launch a competition to increase flood-resiliency in building systems

Many existing strategies for improving resiliency in buildings are either imperfect, expensive, or a combination of both. The City, through NYCEDC, therefore, will launch an approximately \$40 million Resiliency Technologies Competition using allocated Community Development Block Grant (CDBG) funding to encourage the development, deployment, and testing of new resiliency technologies for building systems. In Southern Brooklyn, 15,570 buildings will be eligible to benefit from this competition. The program will be launched in 2013.

Buildings Initiative 12

Clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain

The City, through the Landmarks Preservation Commission, will clarify the Commission's regulations to assist owners of landmarked buildings and properties in landmarked districts in the 100-year floodplain who are contemplating retrofit projects. In Southern Brooklyn, there are seven landmarked buildings or structures in the floodplain. The Commission will issue its clarifying regulations in 2013.

Buildings Initiative 13

Amend the Building Code to improve wind resiliency for existing buildings and complete studies of potential retrofits

As noted above, given the possibility for more frequent intense wind events in the future, modifications to the Building Code are warranted. The City, therefore, through OLTPS, will seek to amend the Building Code and expand the existing DOB Façade Inspection Safety Program for high-rise buildings to include rooftop structures and equipment. The City will further study whether additional wind resiliency standards are required going forward. These amendments will be submitted to the City Council for adoption and the study will commence in 2013.

Beyond the priority building resiliency projects described in Chapter 4, including those summarized briefly above, the City is proposing an additional building resiliency initiative that is specific to Southern Brooklyn's vulnerabilities. The initiative is described below.

Southern Brooklyn Initiative 6

Study additional resiliency initiatives for ground-floor housing within NYCHA buildings

NYCHA developments are a significant feature in Southern Brooklyn. One challenge in NYCHA's facilities is the presence of ground-floor residential units that are below the BFE, and are vulnerable to flooding. There are approximately 115 ground-floor units located in 37 NYCHA buildings in the Coney Island area.

To address this challenge, the City will explore the construction of new, resilient units in the Coney Island area to replace at-risk units. These units would be reserved for tenants of existing ground-floor units in public housing developments in Southern Brooklyn. Such a project, provided it were determined to be feasible and were funded, would include rent and occupancy protections for NYCHA residents and would allow residents to relocate into new, modern, and resilient units in their community. The study also will assess how NYCHA could best repurpose vacated ground floor units in current NYCHA buildings—exploring, for example, community or public-serving commercial uses.

The City's study will be undertaken in close consultation with the NYCHA resident community and will seek to identify new sources of capital funding and new operating resources. Such new sources of capital funding and operating resources are a necessary precondition for any project to proceed. The study will be completed by early 2014.

Insurance

Insurance can help provide residents and businesses with financial protection against losses from climate change and other types of risks. Sandy not only highlighted the importance of insurance, it also revealed that many New Yorkers are exposed to flood losses, which are not covered in standard homeowners or small business property insurance policies. Citywide, 95 percent of homeowners carry homeowners insurance, but when Sandy struck less than 50 percent of residential buildings in the effective 100-year floodplain had coverage through the National Flood Insurance Program (NFIP), a Federal program administered by FEMA that provides flood insurance to properties in participating communities like New York City. While larger properties, in particular large commercial properties, tend to purchase flood insurance through the private market, NFIP is the primary source of flood insurance for homeowners throughout the

country. The City estimates that in areas of Southern Brooklyn inundated by Sandy, less than 17 percent of residential properties typically insured under the NFIP, including 1- to 2-family homes, amongst others, actually had policies in force during Sandy. Furthermore, Sandy drew attention to the significant cost increases in flood insurance that many New Yorkers will soon face, resulting from recent reforms to the NFIP as required by the Biggert-Waters Flood Insurance Reform Act.

The City will use several strategies to encourage more New Yorkers to seek coverage and to help the NFIP meet the needs of policyholders citywide. Specifically, the City will work to: address affordability issues for the most financially vulnerable policyholders; define mitigation measures that are feasible in an urban environment such as Southern Brooklyn and create commensurate premium credits to lower the cost of insurance for property owners who invest in these measures; encourage the NFIP to expand pricing options (including options for higher deductibles) to give potential policyholders more flexibility to make choices about coverage; and launch efforts to improve consumer awareness, to help policyholders make informed choices. The initiatives described below are important examples of how the City will advance these strategies. These initiatives will have a major impact on the residents, small businesses and nonprofits in this community. For a full explanation of the following initiatives and a complete description of the City's five-borough insurance reform plan, please refer to Chapter 5 (*Insurance*).

Insurance Initiative 1

Support Federal efforts to address affordability issues related to reform of the NFIP

The City will call on FEMA to work with the National Academy of Sciences to complete the study of flood insurance affordability, as required under the Biggert-Waters Act. The City will urge its Federal government partners to comply with this provision of the Act and take swift action to enact the recommendations.

Insurance Initiative 4

Call on FEMA to develop mitigation credits for resiliency measures

The NFIP provides few incentives for property owners to protect their buildings from flood damage and reduce their premiums, other than by elevating their buildings—actually lifting structures above flood elevation levels. In an urban environment such as Southern Brooklyn, for a variety of reasons, elevation can be impractical, undesirable, and/or economically

infeasible. Fortunately, other mitigation options are available. The City, therefore, will call upon FEMA to provide appropriate premium credits for mitigation measures other than elevation.

Insurance Initiative 6

Call on FEMA to allow residential policyholders to select higher deductibles

Flexible pricing options can encourage more people, especially those not required to carry insurance, to purchase insurance coverage that suits their needs. A higher-deductible option can substantially reduce premium costs to policyholders while remaining truly risk-based. Currently under the NFIP, deductibles up to \$50,000 are allowed for commercial policies, but residential policies are limited to a maximum deductible of \$5,000. The City, therefore, will call upon FEMA to allow homeowners that are not required to carry NFIP policies to purchase high-deductible policies, protecting them from catastrophic loss; initial estimates indicate that doing so could reduce insurance premiums by about half.

Critical Infrastructure

A resilient New York requires protection of its critical services and systems from extreme weather events and the impacts of climate change. This infrastructure includes the city's utilities and liquid fuel system, its hospitals and other healthcare facilities, telecommunications network, transportation system, parks, wastewater treatment and drainage systems, as well as other critical networks—all vital to keeping the city, including Southern Brooklyn, running.

Utilities

The city's electric, natural gas, and steam systems are essential to everyday life in areas throughout the five boroughs, including Southern Brooklyn. As Sandy proved, however, these systems are highly vulnerable to extreme weather events with 800,000 customers losing electricity and 80,000 customers losing natural gas service during Sandy across the city, including approximately 160,000 that lost electricity service in the borough of Brooklyn. This vulnerability will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: call for risk-based analysis of low-probability but high-impact weather events to be incorporated into utility regulation and investment decision-making; call for capital

investments that harden energy infrastructure and make systems more flexible in responding to disruptions and managing demand; and better diversify the city's sources of energy. The initiatives described below provide important examples of how the City intends to advance utilities resiliency citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough utilities resiliency plan, please refer to Chapter 6 (*Utilities*).

Utilities Initiative 5

Work with utilities and the Public Service Commission (PSC) to harden key electric transmission and distribution infrastructure against flooding

Various transmission substations, distribution substations, utility tunnels, and underground equipment in the city are at risk of flooding during extreme weather. For example, 40 percent of transmission substations are in the 100-year floodplain today, and 67 percent are likely to be in the 100-year floodplain by the 2050s. The City, through OLTPS, will work with Con Edison and the Long Island Power Authority (LIPA) to prioritize these assets based on their roles in system reliability and to harden them as appropriate. This effort will begin in 2013.

Utilities Initiative 6

Work with utilities and the PSC to harden vulnerable overhead lines against winds

During extreme weather events, high winds and downed trees threaten overhead electric poles, transformers, and cables. The City, through OLTPS, will work with Con Edison and LIPA to manage the risk of wind and downed-tree damage through tree maintenance, line strengthening, and a line-relocation program. In some limited cases, rerouting lines underground may also be warranted, depending on the outcome of a cost-benefit analysis to be performed in partnership with the utilities. This effort will begin in 2013.

Utilities Initiative 7

Work with utilities, regulators, and gas pipeline operators to harden the natural gas system against flooding

Although the city's high-pressure gas transmission system performed relatively well during Sandy, there were instances where remote operation of parts of the system failed. Additionally, the distribution system had localized outages due to water infiltration. Seeking to limit the compromising effects of future floods on both the system's backbone and the ability of Con Edison and National Grid to control and monitor the

system, the City, through OLTPS, will work with the PSC, Con Edison, and National Grid to harden control equipment against flooding. In addition, the City will call upon Con Edison and National Grid to take steps to prevent water from infiltrating its gas pipes. This effort will begin in 2013.

Utilities Initiative 21

Work with public and private partners to scale up distributed generation (DG), including microgrids

The city's DG systems, including microgrids, have the potential for significant expansion—but are constrained by regulations, financing challenges, and lack of information. The City, through OLTPS and the New York City Distributed Generation Collaborative—a stakeholder group convened by the City in 2012—will continue efforts to achieve a PlaNYC goal of installing 800 megawatts of DG citywide by 2030. These efforts will include reform of PSC tariffs and other regulatory changes, expansion of low-cost financing, and provision of technical assistance to property owners and developers. This ongoing effort will continue in 2013.

Beyond the priority utilities resiliency projects described in Chapter 6, including those summarized briefly above, the City is proposing additional utilities resiliency initiatives that are specific to Southern Brooklyn's vulnerabilities. These initiatives are described below.

Southern Brooklyn Initiative 7

Support CUNY launch of study and pilot of new technologies for high-rise buildings

The City University of New York's Building Performance Lab intends to launch a study and pilot program in Southern Brooklyn to place backup renewable energy systems and on-site renewable energy generation at high-rise residential buildings, in part to aid resiliency. The City will provide technical assistance, as needed, for CUNY's study and the eventual launch. Such technologies may provide building-specific solutions for energy resiliency and help ease pressures on the grid in times of peak demand, while also producing cost savings for the relevant consumers. The CUNY Building Performance Lab will advance this study and pilot in the next two years.

Southern Brooklyn Initiative 8

Study options to ensure resiliency of private cogeneration facilities in the area

Several residential and commercial developments in Southern Brooklyn have on-site private cogeneration facilities that supply energy to certain buildings. Many of these facilities were damaged

during the recent storm, and are vulnerable to future extreme weather events. The City, through OLTPS, will explore changes to the Construction Codes or other regulations to ensure proper protection measures are in-place at these facilities. This effort will begin with a study of cogeneration facilities and their vulnerabilities.

Liquid Fuels

The liquid fuel supply chain is essential for everyday life throughout the five boroughs, including in Southern Brooklyn. Sandy demonstrated the vulnerability of this system to extreme weather events. In the aftermath of Sandy, citywide—and particularly in Southern Brooklyn—there were long lines at gas stations and other challenges for drivers, including emergency responders. The vulnerability of this system will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: develop a strategy for the hardening of liquid fuels infrastructure along the supply chain; increase redundancy and fuel supply flexibility; and increase supply availability for vehicles critical to the city's infrastructure, safety, and recovery from significant weather events. The initiatives described below provide important examples of how the City intends to advance its liquid fuel resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough liquid fuels resiliency plan, please refer to Chapter 7 (*Liquid Fuels*).

Liquid Fuels Initiative 1

Call on the Federal government to convene a regional working group to develop a fuel infrastructure hardening strategy

The fuel supply shortage after Sandy was caused mainly by damage to infrastructure in New Jersey and other states, where the City and State of New York have no regulatory or legislative authority or oversight. The City, through OLTPS, will call on the Federal Hurricane Sandy Rebuilding Task Force and the United States Department of Energy to convene regional stakeholders to develop a strategy for hardening key infrastructure against future extreme weather. This effort will be launched in 2013.

Liquid Fuels Initiative 4

Work with New York State to provide incentives for the hardening of gas stations to withstand extreme weather events

New York State's 2013–2014 budget required that "certain" retail fuel stations invest in equipment that would allow them to connect generators quickly in the event of a power loss, and enter into supply contracts for emergency generators. The City, through OLTPS, will support the State in the design and implementation of this generator program, an effort that will include working with the New York State Energy Research and Development Authority (NYSERDA) to develop an incentive program to minimize the financial impact of the requirements on the businesses involved. In addition, OLTPS will work with the State to develop incentives to encourage retail fuel stations to implement resiliency measures other than backup power capability. This effort will be launched in 2013.

Liquid Fuels Initiative 5

Enable a subset of gas stations and terminals have access to backup generators in case of widespread power outages

Gas stations are vulnerable to widespread power outages resulting from extreme weather events, which could prevent them from dispensing fuel. In New York State's 2013–2014 budget, NYSERDA was directed to develop a generator pool program for gas stations. The City, through its Office of Emergency Management (OEM), will work with NYSERDA, FEMA, and the USACE in 2013 and beyond to develop such a pool and to create a pre-event positioning plan to enable the ready deployment of generators to impacted areas in the wake of a disaster.

Liquid Fuels Initiative 8

Develop a package of City, State, and Federal regulatory actions to address liquid fuel shortages during emergencies

Various regulations relating to the transportation and consumption of fuels in New York City limit the flexibility of the market to respond to disruptions, including following extreme weather events. The City, through OEM, will work with the State and Federal governments to prepare an "off-the-shelf" package of regulatory measures for use in the event of a liquid fuels shortage to allow supply-demand imbalances in the fuel supply to be mitigated more quickly. This effort will be launched in 2013.

Liquid Fuels Initiative 9

Harden municipal fueling stations and enhance mobile fueling capability to support both City government and critical fleets

The City must be able to respond quickly to a fuel supply disruption, providing continuous fueling to vehicles that are critical for emergency response, infrastructure rebuilding, and disaster relief. The City, through the Department of Citywide Administrative Services (DCAS), will procure fuel trucks, generators, light towers, forklifts, and water pumps to permit the City to put in place emergency fueling operations immediately following a disruption in the fuel supply chain. DCAS also will issue a Request for Expressions of Interest (RFEI) to potential suppliers of liquid fuels to evaluate options for sourcing such fuel during emergencies. The procurement effort will be launched in 2013, with the RFEI to follow in 2014.

Healthcare

The city's healthcare system is critical to the well-being of New Yorkers throughout the five boroughs, including in Southern Brooklyn. This system is also a major economic engine for the city as a whole. This is especially true for Southern Brooklyn, where a major New York City Health and Hospitals Corporation (HHC) hospital, numerous nursing homes and adult care facilities, and a network of community-based facilities, doctors' offices, and pharmacies support the local area. Sandy exposed this system's vulnerabilities, which are expected to grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: build new hospitals, nursing homes, and adult care facilities to higher resiliency standards and harden existing facilities to protect critical systems; seek to keep lines of communication open between patients and providers, even during extreme weather events; and enable community-based providers to reopen quickly after a disaster. The initiatives described below provide important examples of how the City intends to advance its healthcare resiliency agenda citywide. These initiatives will have a positive impact on the residents and healthcare providers of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough healthcare resiliency plan, please refer to Chapter 8 (*Healthcare*).

Healthcare Initiative 2 **Require the retrofitting of existing hospitals in floodplains**

Many existing hospital buildings in the floodplain remain vulnerable to the impact of storm surge, with more likely to become vulnerable as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Code to require existing hospital buildings in the 500-year floodplain—including Coney Island Hospital—to meet by 2030 a subset of the amended Construction Code standards for flood-resistant design. To minimize the risk of emergency evacuations and extended closures, these hospitals will be required to protect their electrical equipment, emergency power system, and domestic water pumps to the 500-year flood elevation. These hospitals also will be required to install backup air-conditioning service for inpatient care areas in case of utility outages, pre-connections for temporary boilers and chillers if primary equipment is not elevated, and pre-connections for external generators as a backup power source. Coney Island Hospital already has begun exploring a number of these and other flood mitigation measures as part of its post-Sandy rebuilding process. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 3 **Support the HHC's efforts to protect public hospital emergency departments from flooding**

Emergency departments (EDs) are critical access points for patients in need of hospital services, and at three public hospitals citywide—including Coney Island Hospital—EDs are at risk of flooding due to storm surge. Subject to available funding, the City, therefore, through HHC, will invest in measures to flood-protect these vulnerable EDs so they can remain available to provide care during extreme weather events. HHC has already begun exploring strategies to protect their EDs and will continue to develop their mitigation plans through 2013.

Healthcare Initiative 4 **Improve design and construction of new nursing homes and adult care facilities**

New nursing homes and adult care facilities are at risk of power failures due to storm surge, which could result in patient evacuations. The City, through OLTPS, therefore, will seek to amend the Construction Codes to require that new facilities are constructed with additional resiliency measures for their emergency power systems. New nursing homes also will be required to have emergency generators and

electrical pre-connections for external stand-by generators. Adult care facilities will be required to install either emergency generators that are adequately protected or pre-connections to external stand-by generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 5 **Require retrofitting of nursing homes in floodplains**

Many existing nursing home facilities in the five boroughs are vulnerable to storm surge—a vulnerability that will only grow as the climate changes. The City, through OLTPS, therefore, will seek to amend the Construction Codes to require nursing homes in the 100-year floodplain—including five facilities in Southern Brooklyn—to meet standards for the protection of electrical equipment, emergency power systems, and domestic water pumps (if applicable) by 2030. These systems will be protected to the 100-year flood elevation, in accordance with specifications already in the Construction Codes, and will help enable patients to shelter in place safely or reoccupy quickly after a storm. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 6 **Require retrofitting of adult care facilities in floodplains**

Nineteen adult care facilities in the city are vulnerable to storm surge, including six in Southern Brooklyn alone. The City, through OLTPS, will seek to amend the Construction Codes to require existing adult care facilities located in the floodplain to elevate or protect their electrical equipment to the 100-year flood elevation by 2030, in accordance with the specifications in the Construction Codes. In addition, the City will seek to require these providers to have either emergency generators that are adequately protected or electrical pre-connections to external generators. OLTPS will propose these requirements to the City Council in 2013.

Healthcare Initiative 7 **Support nursing homes and adult care facilities with mitigation grants and loans**

The primary challenge for most nursing homes and adult care facilities in implementing mitigation measures is obtaining financing. Subject to available funding, the City, through NYCEDC and the New York City Department of Health and Mental Hygiene (DOHMH), therefore, will administer competitive grants and subsidized loans to assist providers with mandated retrofit projects. The goal is for NYCEDC and DOHMH to launch the program when proposed

Construction Code amendments applicable to nursing homes and adult care facilities proposed in this report go into effect, likely in 2013.

Healthcare Initiative 8 **Increase the air conditioning capacity of nursing homes and adult care facilities**

Nursing homes and adult care facilities typically do not have enough emergency power capacity to run their air conditioning systems following the loss of power. This could cause some providers to evacuate during power outages that occur during hot summer months. The City will offer sales tax waivers totaling \$3 million citywide to assist eligible nursing homes and adult care facilities that install emergency power solutions for air conditioning systems.

Healthcare Initiative 9 **Harden primary care and mental health clinics**

In communities such as Southern Brooklyn that are at risk of extensive flooding during extreme weather events, primary care and mental health services may be compromised for weeks after a disaster due to extended facility closures. Subject to available funding, the City, through DOHMH and a fiscal intermediary, therefore, will administer a competitive financing program to harden large clinics providing primary care and mental health services in Southern Brooklyn and other high-need communities. The program will include grants and interest-free loans for capital investments that enable faster recovery of services—for example, installation of emergency power systems, protection of other critical building systems, and wet flood-proofing of facilities. The goal is for this effort to be launched in late 2013 or early 2014.

Healthcare Initiative 10 **Improve pharmacies' power resiliency**

Pharmacies dispense life-saving medicines essential for those with chronic conditions. However, without power, pharmacists cannot access the necessary patient records or insurance information to dispense these medicines. The City, through DOHMH, will work with pharmacies to improve their ability to leverage generators for power resiliency and address their other emergency preparedness needs—including the launch of an emergency preparedness website for pharmacies. This effort already has begun and will continue throughout 2013.

Healthcare Initiative 11

Encourage telecommunications resiliency in the healthcare system

In the aftermath of a disaster, it is important that New Yorkers be able to speak to their doctors for guidance on needed medical care. The City, through DOHMH, therefore, will develop a best practice guide and outreach plan to help community-based providers understand the importance of telecommunications resiliency. Resiliency solutions could include using backup phone systems (such as a remote answering service that would not be affected by local weather hazards), Voice over Internet Protocol (VoIP) technology that allows office phone lines to be used off-site, and pre-disaster planning to inform patients of available emergency phone numbers. This effort will begin in 2013.

Healthcare Initiative 12

Encourage electronic health record-keeping

Doctors rely on patients' medical records to provide and track care, but paper records may be compromised or destroyed due to extreme weather events. The City, through existing DOHMH programs, therefore, will call upon community-based providers located in the 100-year floodplain and other disaster-prone areas to implement electronic health records (EHR) systems for resiliency. DOHMH's Primary Care Information Project will sponsor initiatives to provide primary care and mental health providers citywide with EHR technical assistance. This effort will begin in 2013.

Beyond the priority healthcare resiliency projects described in Chapter 8, including those summarized briefly above, the City is proposing an additional healthcare resiliency initiative that is specific to Southern Brooklyn's vulnerabilities. This initiative is described below.

Southern Brooklyn Initiative 9

Construct new Coney Island Hospital outpatient clinic to replace the destroyed Ida G. Israel facility

Hurricane Sandy wreaked havoc on Coney Island Hospital's outpatient facility, the Ida G. Israel Clinic, which was located north of Neptune Avenue along Coney Island Creek. Instead of rebuilding the clinic in its existing flood-prone location, HHC has identified a likely permanent site at a higher elevation. In order to restore these vital outpatient services as soon as possible, the City, through HHC, will construct an interim clinic on City-owned property located on

Surf Avenue in Coney Island. This interim facility could be completed before the end of 2013.

Telecommunications

The city's telecommunications system is essential to individuals and businesses throughout the five boroughs, including in Southern Brooklyn. While this is true at all times, it is especially true during emergencies. As Sandy demonstrated, however, this system is highly vulnerable to extreme weather events—precisely when telecommunications are most needed. Citywide and in Southern Brooklyn, Sandy resulted in outages to landlines and mobile service, as well as to data service. The vulnerability of this system likely will grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents, businesses, and nonprofits of Southern Brooklyn and other parts of the city will be to: increase accountability among providers to promote resiliency; use strengthened City regulatory powers and stronger relationships with providers to ensure rapid recovery after extreme weather events; encourage hardening of facilities to reduce weather-related impacts; and increase redundancy to reduce the impact of outages. The initiatives described below provide important examples of how the City intends to advance its telecommunications resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough telecommunications resiliency plan, please refer to Chapter 9 (*Telecommunications*).

Telecommunications Initiative 1

Establish an office within the Department of Information Technology and Telecommunications (DoITT) to focus on telecommunications regulation and resiliency planning

While the City has regulatory authority over some aspects of telecommunications service, it has no entity focused broadly on ensuring the resiliency of the public communications networks. The City, therefore, will form within DoITT a new Planning and Resiliency Office (PRO) that will have the resources needed to develop, monitor, and enforce resiliency standards, in close cooperation with State and Federal regulators and providers. DoITT will launch the new office in 2013.

Telecommunications Initiative 2

Establish new resiliency requirements for providers using scheduled renewals of the City's franchise agreements

Flooding caused outages during Sandy in facilities that did not follow the Federal Communication Commission's recommended best practices for resiliency, including flood protection measures. The City, through DoITT, therefore, will encourage and enforce resiliency standards for telecommunications providers through the franchise renewal process and, through other agreements into which such providers enter with the City, explore options to increase conduit infrastructure redundancy and resiliency. The City will also seek to require standardized outage reporting and publishing. DoITT will launch this effort in 2014, in advance of 2020 franchise renewals.

Transportation

Without the city's expansive transportation system, New York would grind to a halt. This was illustrated starkly during Sandy when outages occurred across the system during and immediately following the storm. These outages severely impacted Southern Brooklyn, which found itself isolated by the shutdown of subway and other public transit systems, as well as by flooding on arterial and secondary roads. The vulnerability of this system will only grow as the climate changes.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: make the system more flexible and more resilient; protect critical elements of the system from damage; and seek to maintain system operations during extreme weather events; and, following extreme events, to enable quick recovery, while also putting in place plans for backup transportation options until regular service can be restored. The initiatives described below provide important examples of how the City intends to advance its transportation resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough transportation resiliency plan, please refer to Chapter 10 (*Transportation*).

Transportation Initiative 1
Reconstruct and resurface key streets damaged by Sandy

Sandy's waves and flooding caused significant damage to area roadways. The City, through the Department of Transportation (NYCDOT), will reconstruct 60 lane-miles of streets that were damaged severely, and will repave approximately 500 lane-miles of streets with damaged surfaces. In Southern Brooklyn, this will include over a linear mile of reconstructed streets and over six linear miles resurfaced throughout the area. Wherever feasible, the reconstructed streets also will include resiliency features to prevent future damage. NYCDOT will launch this initiative in 2013 with funding from Federal and City sources.

Transportation Initiative 3
Elevate traffic signals and provide backup electrical power

New York's traffic signals—and particularly the controllers that operates these signals and communicate with the NYCDOT Traffic Management Center—are vulnerable to damage from flooding as well as to power loss from various extreme weather events. Accordingly, the City, through NYCDOT, will raise controllers at approximately 500 intersections in flood-vulnerable locations across the city, including in Southern Brooklyn. In tandem with this effort to place electrical hardware above the 100-year floodplain elevation, NYCDOT also will install power inverters in approximately 500 NYPD vehicles to allow these vehicles to provide backup electrical power to critical traffic signals. This effort will begin in 2013.

Transportation Initiative 8
Call on non-City transportation agencies to implement strategies to address climate change threats

Many non-City agencies that own and operate critical portions of New York City's transportation system have already announced resiliency and protection initiatives appropriate to their system. Without such action, the critical facilities managed by these agencies will remain vulnerable to damage and disruption from future weather-related events. The City, therefore, will call on these agencies to implement the initiatives that they have announced and take additional steps to protect their major transportation assets from climate change threats and prepare for quick restoration following an extreme weather event. Assets that may require hardening and/or preparation measures in Southern Brooklyn include: Coney Island Yard, the lower level of the Stillwell Avenue station, and the limited portions of the subway infra-

structure located at grade in the area. The City will work with these agencies to advance these plans in 2013.

Transportation Initiative 9
Plan for temporary transit services in the event of subway system suspensions

When major portions of the subway system are out of service, there simply is not sufficient capacity in the rest of the transit network or the roadway system to carry the increased volume of commuters and other travelers. The City, through NYCDOT, therefore, will work with the MTA and other transportation partners to develop and regularly update formal plans to provide temporary transportation services in such an event, including following extreme weather. These services could take the form of temporary, high-capacity "bus bridges" of the type implemented during Sandy, linking, for example, Southern Brooklyn to Midtown Manhattan via the Nostrand Avenue Select Bus Service route (see Initiative 16, below) or temporary point-to-point ferry services, for example connecting Coney Island and Lower Manhattan. This planning effort will begin in 2013.

Transportation Initiative 10
Identify critical transportation network elements and improve transportation responses to major events through regular resiliency planning exercises

Many of the facilities critical to the City's ability to respond effectively to a disaster are vulnerable to disruption and damage during extreme weather events, potentially impairing delivery of emergency services and supplies, as well as impairing the restoration of critical non-transportation infrastructure and economic activity. This vulnerability is expected to increase as the climate changes. To respond better to a variety of different possible transportation outage and restoration scenarios, the City, through NYCDOT, will work with transportation agencies around the region to identify the critical elements of the surface transportation network that need to be available quickly following different types of events. The key tool to identify these networks will be an ongoing series of detailed and multi-disciplinary resiliency planning exercises that will allow NYCDOT and its partners to understand where resources need to be focused before, during, and after an event. This effort will begin in 2013.

Transportation Initiative 16
Expand the city's Select Bus Service (SBS) network

Parts of the city lack subway access or have slow and unreliable public transportation. In these areas, the City and the MTA have been deploying SBS routes to improve general mobility. These routes can form the backbone of high-capacity bus service in the event of major subway outages, including following extreme weather events. The City, through NYCDOT, will work with the MTA to expand the SBS network significantly, building on a plan developed jointly in 2010. Implementation of this plan has already begun, with a new SBS route that will go into effect this year on Nostrand Avenue in Brooklyn.

Beyond the priority transportation resiliency projects described in Chapter 10, including those summarized briefly above, the City is proposing an additional transportation resiliency initiative that is specific to Southern Brooklyn's vulnerabilities. This initiative is described below.

Southern Brooklyn Initiative 10
Call for the USACE to develop an implementation plan for the reinforcement of existing Belt Parkway edge protections

The coastal edges along portions of the Belt Parkway not only protect this key piece of transportation infrastructure, but also have the potential to provide additional flood protection to mainland neighborhoods throughout Southern Brooklyn. The City and State have an opportunity to incorporate resiliency design measures into future roadway and bridge reconstruction projects along the highway. The City, therefore, will call on the USACE to develop an implementation plan containing various options for reinforcing and strengthening existing edge protections along the Belt Parkway beyond the immediate repairs underway. The Belt Parkway is maintained by the NYCDOT, but its coastal edges are generally maintained by the Parks Department, as is the surrounding parkland. The New York State Department of Transportation is also involved in certain capital work. The goal is for USACE to begin work on this plan by 2015.

Parks

During Sandy, it became clear that, in addition to serving as neighborhood front yards and recreation centers, in many places (including Southern Brooklyn), the City's parks serve as the city's front line of defense when extreme

weather events hit, buffering adjacent neighborhoods. As the climate changes, it will be even more critical that the city's parks are able to play all of these roles.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and elsewhere in the City will be to: strengthen the city's parks so that they are able to survive weather-related events more effectively and can act as stronger buffers for adjacent communities; and pursue technologies and approaches that will enable the City to monitor, analyze, and prepare the park system for its many roles in an era of increasing change. The initiatives described below provide important examples of how the City intends to advance its parks resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough parks resiliency plan, please refer to Chapter 11 (*Parks*).

Parks Initiative 1 **Restore city beaches**

Beaches play an important recreational role in Southern Brooklyn and also are a vital component of the area's coastal defenses, but they cannot protect adjacent areas without being "renourished" (replenished with new sand to replace that lost to erosion) from time to time. Subject to available funding, the City, through DPR, will collaborate with Federal and State partners—including the USACE—to implement plans quickly to restore sand lost after extreme storm events and to conduct regular nourishment of beach and regular monitoring to detect the early signs of erosion. This will focus on key beaches, including Southern Brooklyn beaches such as Plumb Beach, Manhattan Beach, Brighton Beach and Coney Island. The goal is to begin this effort in 2013. To restore the beaches following Sandy, the City, in cooperation with many other City, State and Federal partners, conducted an expedited program of projects to provide new and elevated lifeguard stations and public bathrooms and improvements to other beachfront amenities in advance of Memorial Day 2013. This impressive achievement comprised the first phase of restoring the city's beaches. In the coming months and years, DPR will continue its efforts to provide emergency sand nourishment and to expedite planning, evaluation, and design work for long-term plans to restore the beaches, boardwalks, and other beachfront amenities of Southern Brooklyn.

Parks Initiative 2 **Harden or otherwise modify shoreline parks and adjacent roadways to protect adjacent communities.**

Approximately 24 percent of DPR parks and other open spaces are in the 100-year floodplain, which is expected to expand as sea levels rise—including in areas where parks front residential and commercial districts. Subject to available funding, the City, through DPR, will study and identify mitigation strategies, including cost-effective ways to use its park system to protect adjacent neighborhoods and the parks themselves. Strategies could include hardening or elevating park infrastructure, construction of levees or floodwalls to minimize flooding and attenuate waves, and using flood-tolerant materials in the construction of parks. Target sites in Southern Brooklyn include especially Marine Park, Manhattan Beach, Calvert Vaux Park, Kaiser Park, and other shoreline parks in the area. The goal is to complete this study in 2014.

Parks Initiative 4 **Expand the City's Greenstreets, including for Jamaica Bay**

Increased localized flooding is likely from more frequent heavy downpours in the future. Subject to available funding, the City, through DPR and in partnership with DEP, will expand its efforts to build more and larger Greenstreets to absorb stormwater, mitigate local flooding, improve urban heat island effects, increase pedestrian and traffic safety, and beautify neighborhoods. This will expand the installation of green infrastructure at appropriate locations in the City's streets, with technology similar to the NYC Green Infrastructure Plan, which improves water quality in combined sewer areas. The first phase of this expansion would focus on fourteen neighborhoods with the greatest potential for improvement, areas that are not slated for CSO improvements through the City's Green Infrastructure Plan, but could be well suited for greenstreets based on best available data showing low bedrock and ground water. An early priority for this effort will be the area surrounding Jamaica Bay, where DPR will collaborate with DEP and NYCDOT to reduce localized flooding and stormwater runoff, directly improving the health of the Bay. The goal is to begin with pilot projects in and around Coney Island, Marine Park, the Rockaways, and Canarsie Park, including greenstreets and parkland installations by 2014.

Parks Initiative 11 **Improve the health and resiliency of the city's urban forest**

The city's forests and trees provide an array of health and environmental benefits but are vulnerable to a variety of climate change-related impacts, including storm surge, wind, and even changes in average temperatures. Subject to available funding, the City, through DPR, will undertake a variety of efforts to protect trees—whether located in natural areas and parks, or along streets. This would include adding forest management crews, identifying locations in which to expand tree beds, and modifying regular tree inspection and pruning efforts to prioritize trees in areas vulnerable to extreme weather events. The goal is for DPR to launch this effort in 2013.

Beyond the priority park resiliency projects described in Chapter 11, including those summarized briefly above, the City is proposing an additional parks resiliency initiative that is specific to Southern Brooklyn's vulnerabilities. This initiative is described below.

Southern Brooklyn Initiative 11 **Restore recreational infrastructure along Southern Brooklyn beaches**

DPR will work to restore recreational infrastructure along Southern Brooklyn beaches, including facilities (comfort stations, lifeguard stations, and administrative buildings) at Plumb Beach, Manhattan Beach, Brighton Beach, and Coney Island. In each case, these replacement facilities will be more resilient than the structures that preceded them. DPR has also already begun the reconstruction of damaged playgrounds, ball fields, courts, neighborhood parks, and other park facilities. DPR will complete this restoration and reconstruction work by 2014.

Water and Wastewater

The city's water and wastewater system is one of the most complex in the world, not only supplying millions of New Yorkers with safe drinking water in all conditions, but also treating wastewater to ensure that the area's waterways remain clean, while draining rainwater to minimize flooding. Sandy demonstrated the system's vulnerability to a whole host of weather-related threats, ranging from surge and sea level rise, to heavy downpours—threats that are expected to worsen as the climate changes.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: protect wastewater facilities from storm surge; improve and expand drainage infrastructure; and promote redundancy and flexibility to make available a constant supply of high-quality drinking water. The initiatives described below provide important examples of how the City intends to advance its water and wastewater resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough water and wastewater resiliency plan, please refer to Chapter 12 (*Water and Wastewater*).

Water and Wastewater Initiative 1 **Adopt a wastewater facility design standard for storm surge and sea level rise**

Sandy damaged wastewater treatment plants and pumping stations even though the design of City wastewater facilities has taken into account the highest historically recorded water height of nearby water bodies or the BFEs identified in FEMA maps. The City, therefore, will adopt an increased level of protection for design and construction of all wastewater facilities based on the latest FEMA maps, modified to reflect sea level rise projections for the 2050s. DEP will adopt the new design guidelines in 2013.

Water and Wastewater Initiative 2 **Harden pumping stations**

Many of the city's pumping stations are located in low-lying areas and are necessary to convey wastewater and stormwater out of communities; however, their location also increases their vulnerability to storm surge. Therefore, subject to available funding, the City, through DEP, will retrofit these pumping stations to improve their resiliency. These retrofits will include raising or flood-proofing critical equipment, constructing barriers, and installing backup power supplies. Preliminary estimates indicate that there are currently 58 at-risk pumping stations, of which several are already scheduled for capital improvements. Subject to available funding, DEP will pursue implementation of resiliency projects in conjunction with repairs and planned capital work, and as appropriate based on the level of risk, historical flooding, and potential community impacts, among other criteria. The goal is to begin implementation in 2014.

Water and Wastewater Initiative 3 **Harden wastewater treatment plants**

All 14 of the City's wastewater treatment facilities are located along the waterfront and are therefore at risk in the event of a coastal storm. Subject to available funding, the City, through DEP, will protect these critical treatment facilities by raising or flood-proofing assets that are critical to the treatment process, constructing barriers, improving waterfront infrastructure, or implementing redundancy measures to avoid failure of these critical treatment systems. DEP will initially target facilities that have been identified as either most at-risk, or most likely to create issues for adjacent communities and waterways, based on the findings of an in-depth study by DEP. These facilities include the Coney Island Wastewater Treatment Plant. The goal is for DEP to begin implementation of adaptation measures for these and other facilities in 2014 as part of repairs and other planned capital projects.

Water and Wastewater Initiative 8 **Reduce combined sewer overflow (CSO) with Green Infrastructure**

As climate change brings increasing rainfall volume to the New York area, the city may also experience shifts in the frequency and volume of CSOs. The City will continue to implement its Green Infrastructure Plan and CSO Long-Term Control Plans (LTCs) to reduce such CSOs. For this purpose, DEP, working with DPR and NYC-DOT, will continue to pursue its plan to capture the first inch of runoff in 10 percent of impervious surfaces citywide by 2030. At the same time, DEP also will continue to develop LTCs to evaluate long-term solutions to reduce CSOs and improve water quality in New York City's waterways. DEP will issue an LTC for Alley Creek in Queens in 2013, with nine additional waterbody-specific LTCs and one citywide LTC to follow through 2017—including for Coney Island Creek, the Gowanus Canal, Newtown Creek, and Jamaica Bay.

Beyond the priority water and wastewater resiliency projects described in Chapter 12, including those summarized briefly above, the City is proposing additional water and wastewater resiliency initiatives that are specific to Southern Brooklyn's vulnerabilities. These initiatives are described below.

Southern Brooklyn Initiative 12 **Complete planned drainage improvements in Coney Island to mitigate flooding**

DEP has identified Coney Island as an area where existing stormwater and other related infrastructure systems require upgrades based, in part, on anticipated new development in the area. In conjunction with robust coastal defenses, expanded drainage infrastructure may assist in protecting against damage from weather-related flooding. In Coney Island, the City, therefore, will complete approximately \$137 million in planned upgrades to stormwater and sewer infrastructure, including enlarging pipes and outfalls to handle additional flow. These projects are now being undertaken by DEP and the Department of Design and Construction (DDC), and are scheduled for phased completion over the next six years.

Southern Brooklyn Initiative 13 **Provide technical assistance to support Sea Gate in repairing Sandy-damaged infrastructure**

The Sea Gate community, where a private housing association owns and maintains the streets, parks, and sewer infrastructure, is outside of DEP's jurisdiction and thus faces unique challenge in the aftermath of Sandy. The neighborhood's Sandy-damaged infrastructure, which eventually ties into the City's sewer system, impacts not only Sea Gate but also poses downstream risks from clogs and back-ups. The City, through DDC, therefore, will work with the Sea Gate Association to assist it in obtaining all Federal funding for repairs for which it is eligible. The Sea Gate Association has engaged an engineering firm to study the condition of the area's infrastructure and suggest a scope for repairs, and the City will provide technical assistance in connection with that effort.

Other Critical Networks: **Solid Waste**

On a daily basis, the solid waste collection system in New York disposes of more than 12,000 tons of waste and recycling in a safe and sanitary fashion. Unlike many other critical City systems, during Sandy this one proved remarkably resilient, resuming many of its normal functions almost immediately after the storm. In fact, thanks to the efforts of the City's Department of Sanitation, even as the agency was dealing with its own storm-related challenges, it was able to assist with the recovery of Southern Brooklyn and the larger city by collecting the debris left by the storm in an organized and efficient manner.

However, the system does face real issues. For example, during Sandy, the city's solid waste disposal system experienced interruptions that interfered with its ability to convey refuse out of the city to its ultimate destination. Additionally, as the climate changes, it is likely that this system will become more vulnerable to extreme weather.

Among the strategies that the City will use to address these challenges for residents of Southern Brooklyn and other parts of the city will be to: harden critical City-owned solid waste assets to protect them from extreme weather-related impacts; and seek to improve the resiliency of the broader solid waste network—both City- and third-party owned—enabling it to resume operation quickly should disruptions occur. The initiatives in Chapter 13 describe how the City intends to advance its solid waste resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a complete description of the City's five-borough solid waste resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

Other Critical Networks: Food Supply

Though the food supply chain generally emerged intact following Sandy, in certain local areas (including parts of Southern Brooklyn), residents found themselves without access to basic sustenance after the storm. In addition, had Sandy played out just a little differently, it is possible that significant links in the food supply chain—including the food distribution center in Hunts Point in the Bronx—could have been seriously threatened. As the climate changes, it is likely that risks such as these will grow.

Although initiatives outlined in several other sections above are important contributors to the overall resiliency of the food supply network (including especially those addressing utilities, liquid fuels, and transportation), the City also will pursue food-specific strategies to meet this goal for the benefit of residents of Southern Brooklyn and other parts of the city. These strategies will involve calling for resiliency investments at the most significant food wholesaling and distribution centers in the city and addressing issues relating to retail access in the event of extreme weather. The initiatives in Chapter 13 describe how the City intends to advance its food supply resiliency agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a complete description of the City's five-borough food sup-

ply resiliency plan, please refer to Chapter 13 (*Other Critical Networks*).

Environmental Protection and Remediation

Sandy showed that extreme weather events—which are likely to increase in severity with climate change—not only have the potential to impact the city's people, built environment, and critical systems; they also can have a deleterious impact on the natural environment. To help minimize the impact of future extreme weather on the environment, the City will advance a range of initiatives to protect open and enclosed industrial sites containing hazardous substances in an economically feasible way, and to encourage the cost-effective remediation and redevelopment of brownfields in a resilient fashion. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn, which is home to approximately 130 industrial companies and one site designated under the New York City Brownfield Cleanup Program. For a complete description of the City's five-borough environmental protection and remediation plan, please refer to *Environmental Protection and Remediation*.

Community and Economic Recovery

New York is a city of neighborhoods, and these neighborhoods vary widely in size and nature. Notwithstanding this variety, successful neighborhoods across the city tend to share certain traits. Two of these are: a formal and informal network of community members who help and support one another in good times and bad; and vibrant commercial and nonprofit sectors that employ and provide goods and services to the people of the community.

As Sandy demonstrated, however, both the network of community-based organizations and the commercial and nonprofit sectors in New York's neighborhoods can be sorely tested when extreme weather hits. During these times (when contributions from these networks and sectors are desperately needed) these organizations and businesses themselves are frequently coping with the same set of challenges that the community at large is—a circumstance that can push even the most well-run organization or business to the breaking point. Even with these pressures, during and in the immediate aftermath of Sandy, New York's commercial and nonprofit sectors overcame many of their own difficulties, playing a critical role in the recovery of neighborhoods

across the city, including Southern Brooklyn. However, as the climate changes, difficulties such as these will likely arise more frequently, testing institutions mightily.

Among the strategies that the City will use to achieve the goal of making its neighborhoods and their critical institutions more resilient will be to: help build grassroots capacity and foster community leadership; help businesses and nonprofits impacted by Sandy to recover; help businesses and nonprofits in vulnerable locations to make resiliency investments that will better prepare them for future extreme weather; and bring new economic activity to neighborhoods recovering from the impacts of Sandy to enable these neighborhoods to come back even stronger than before.

The initiatives described below provide important examples of how the City intends to advance its community and economic recovery agenda citywide. These initiatives will have a positive impact on the residents, businesses, and nonprofits of Southern Brooklyn. For a full explanation of the following initiatives and a complete description of the City's five-borough community and economic recovery plan, please refer to *Community and Economic Recovery*.

Community Disaster Preparedness Initiative 1

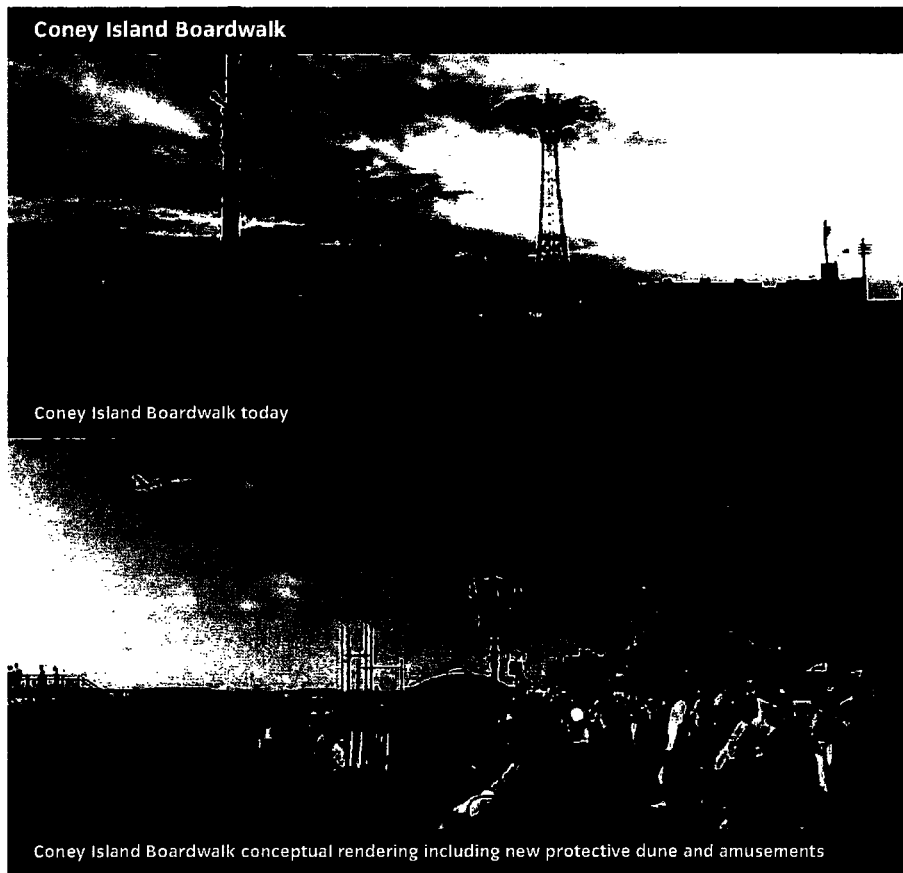
Identify and address gaps in community capacity

The capacity of a community to organize to aid businesses and residents after an extreme weather event or other disaster is a strong predictor of the success of that community's recovery. To improve the capacity of vulnerable communities, OEM, working with the NYC Center for Economic Opportunity (CEO), will undertake a pilot assessment of the strengths and weaknesses of a Sandy-impacted community—which could be a neighborhood in Southern Brooklyn—to inform the creation of a plan to address needs uncovered by the assessment. Subject to available funding, the City, through OEM and CEO, will choose a pilot community and begin their study in 2013.

Community Disaster Preparedness Initiative 2

Continue and expand OEM's Community Emergency Response Teams

OEM currently trains 54 teams of 1,500 volunteers across the city, which staff Community Emergency Response Teams (CERTs). Before, during, and after disasters, including extreme weather events, members of these teams help to organize community disaster preparedness and participate in emergency response and recovery. In light of Sandy, OEM will work with



communities to create additional teams, ensuring that the volunteers are as representative as possible of the communities that they serve. Towards the same end, OEM, working with CEO, will identify low-income young adults to be trained to lead their communities in disaster preparedness. OEM and CEO will launch this program by 2014.

Economic Recovery Initiative 1
Launch business recovery and resiliency programs

During Sandy, over 27,000 businesses citywide, including over 5,500 in Southern Brooklyn, were impacted by the storm. For many, recovery has been challenging. To assist with this recovery, immediately after the storm, the City launched a series of programs described in *Community and Economic Recovery* including a \$25 million loan and grant program and a \$25 million sales tax waiver program designed to help businesses get back on their feet. Building on the momentum of these programs, which have assisted over 2,500 businesses as of the writing of this report, the City, through NYCEDC, will launch the CDBG-funded Business Resiliency Investment Program of up to \$100 million to help vulnerable businesses throughout the city make resiliency investments in their buildings and equipment, and the Business Loan and Grant

Program of up to \$80 million will assist businesses with recovery and rebuilding efforts. NYCEDC will launch these programs in 2013.

Economic Recovery Initiative 2
Launch the Neighborhood Game-Changer Competition

The recovery of many of the communities impacted by Sandy, including Southern Brooklyn, has been hampered by a lack of opportunities for economic advancement and employment among significant populations that were impacted by the storm. In many cases, these challenges existed even before Sandy, but have been exacerbated by the impacts of the storm. To address this, the City, through NYCEDC, will launch the CDBG-funded Neighborhood Game Changer Competition to invest up to \$20 million in public money in each of the five communities on which this report focuses, including Southern Brooklyn. This funding will be available on a competitive basis to help finance transformational projects. To win the competition, a project will have to spur incremental economic activity, generate new employment opportunities, and match public funding with significant private capital. Projects that would be eligible to be funded in Southern Brooklyn through this competition could include new attractions bringing new visitors, significant new opera-

tions of a major business or non-profit, the revitalization of important commercial corridors, the expansion of an existing neighborhood institution, or a major new transportation option. NYCEDC will launch this program in 2013.

Economic Recovery Initiative 3
Launch Neighborhood Retail Recovery Program

At the core of many Sandy-impacted neighborhoods are the local commercial corridors that provide employment opportunities and services to those who live and work around them. They include local retailers, institutions, and service providers—such as food markets, pharmacies, social service organizations, laundromats, and others. In many cases, though, these corridors were devastated by the storm. To address this, the City will call on the PSC and Con Edison to amend the preferential Business Incentive Rate (BIR) program, which offers a discount on Con Edison's electric delivery charges, to allow it to be extended to impacted small businesses in the five communities on which this report focuses, including Southern Brooklyn. Businesses and nonprofits with 10 or fewer employees that have received support from City-sponsored loan and grant programs will be eligible for the discount for five years up to a maximum discount of \$50,000 per business or nonprofit. The maximum aggregate benefit available across Southern Brooklyn will be \$1 million. The goal is for NYCEDC to launch this effort in 2013. Among the corridors where the benefit could be available in Southern Brooklyn include:

- Brighton Beach Avenue (between Ocean Parkway and West End Avenue)
- Coney Island, including Neptune, Mermaid, and Surf Avenues
- Coney Island Avenue (between Avenue X and Brighton Beach Avenue)
- Emmons Ave. (between West End Avenue and Knapp Street)
- Gerritsen Avenue (between Ave. U and Seba Avenue)
- Nostrand Avenue (between Avenue Z and Avenue U)
- Ocean Avenue (between Avenue W and Emmons Avenue)
- Sheepshead Bay Rd. (between Avenue Z and Emmons Avenue)

Economic Recovery Initiative 4
Support local merchants in improving and promoting local commercial corridors

As mentioned above, Sandy highlighted the important role played by local commercial corridors in many communities impacted by the storm. The City, through the Department of Small Business Services (SBS), will provide finan-

cial and/or technical assistance to area business improvement districts (BIDs), merchant associations, and other groups that work to improve, market, maintain, and otherwise promote primarily commercial corridors. Subject to review of applications received, SBS will prioritize allocating its resources, including its CDBG funding, to Sandy-impacted commercial corridors. Such funding could be used for a variety of purposes, including capacity building, façade improvement programs, streetscape improvements, and business recruitment and marketing efforts. In Southern Brooklyn, corridors that could receive this additional assistance include corridors in Brighton Beach, Sheepshead Bay, Gerritsen Beach, Coney Island, and Gravesend. SBS will provide this assistance beginning in 2013.

Economic Recovery Initiative 5 **Continue to support the FRESH program to increase the number of full-line grocers in underserved neighborhoods**

Even before Sandy, the residents of many communities impacted by Sandy, including parts of Southern Brooklyn, lacked adequate access to fresh fruits, vegetables, and other healthy foods. Noting this challenge, especially in underprivileged areas of the city, in 2009, the City launched the FRESH (Food Retail Expansion to Support Health) program, a series of zoning and financial incentives available to supermarkets to fill this gap in neighborhoods underserved by grocery retail. To promote the recovery of commercial corridors in these areas, the City will continue to support the FRESH program, with a particular focus on Sandy-impacted neighborhoods, including those in Southern Brooklyn.

Economic Recovery Initiative 6 **Reassess commercial properties citywide to reflect post-Sandy market values**

After Sandy, many commercial properties were worth less than before the storm. To reflect this fact and to help with recovery from the storm, the City has reassessed more than 88,000 properties impacted by the storm citywide. Overall, these reassessments have lowered the tax burden on Sandy-impacted properties—including both commercial and residential properties—by over \$90 million, with commercial properties in neighborhoods impacted by Sandy receiving a reduction, on average, of approximately 10 percent off of their pre-storm assessed values.

In addition to the measures described above, the City will advance the following initiatives to address Southern Brooklyn's community and economic recovery needs:

Southern Brooklyn Initiative 14 **Work with Brooklyn Chamber of Commerce to assist in organizing Sheepshead Bay businesses**

Strengthened local civic infrastructure can prepare communities for disaster response. In Sheepshead Bay, where no existing merchant group exists, increased cooperation among area merchants and stakeholders would result in multiple benefits. Since early 2013, the Brooklyn Chamber of Commerce has been working to convene local merchants and support the potential establishment of a new merchant association. Additionally, the FEMA Community Planning and Capacity Building program has identified the area as a potential recipient of technical assistance in connection with the development of a tailored revitalization strategy. The City will support this effort by providing technical assistance of its own and, through existing programs, potential financial support coordinated by the SBS to match local business investments.

Southern Brooklyn Initiative 15 **Support area recovery through the rebuilding and expansion of the entertainment district**

The entertainment attractions in Southern Brooklyn are an important symbol of the area. More significantly, they contribute to area business activity, enhance local quality of life, and drive visitor activity that benefits the local economy. The entertainment areas have witnessed growth in recent years, and this momentum must be sustained to anchor area recovery.

The City will support enhancement of key area attractions to anchor recovery and growth, including construction of major new amusements, construction of a new seasonal amphitheater and community arts center, and expansion of the New York Aquarium, the most-visited attraction in Brooklyn and a year-round asset in the entertainment district. The City also will support enhanced programming, marketing, and district improvements to set the stage for economic growth, and will continue to support programs to link this growth to the local residential neighborhood through workforce development and other initiatives.

Costs to enhance and expand the entertainment district—including the construction of a new state-of-the-art steel rollercoaster between West 15th and West 16th Streets on the Boardwalk—will be borne primarily by private operators. For the New York Aquarium, the repair of damages from Sandy and the planned expansion of the campus including the Ocean Wonders project

will be a joint effort of the Department of Cultural Affairs, the Wildlife Conservation Society, and FEMA. (See rendering: Coney Island Boardwalk)

Southern Brooklyn Initiative 16 **Study opportunities along Coney Island Creek to generate economic activity and facilitate resiliency investments**

In areas that contain particularly vulnerable buildings, vacant or underutilized properties, or unprotected privately owned waterfront edges, encouraging new construction can help to spur economic activity and achieve resiliency goals. The City will work to identify waterfront redevelopment and edge improvement opportunities along Coney Island Creek. Focusing on sites where existing utility and road infrastructure may be able to accommodate new development, the City will study opportunities to generate economic activity through resilient new construction, which could house a range of potential commercial and residential uses. By 2014, NYCEDC will launch and complete an economic development study of these potential sites along Coney Island Creek that will examine specific sites, regulatory constraints and infrastructure capacity.

Southern Brooklyn Initiative 17 **Implement planned and ongoing investments by the City and private partners**

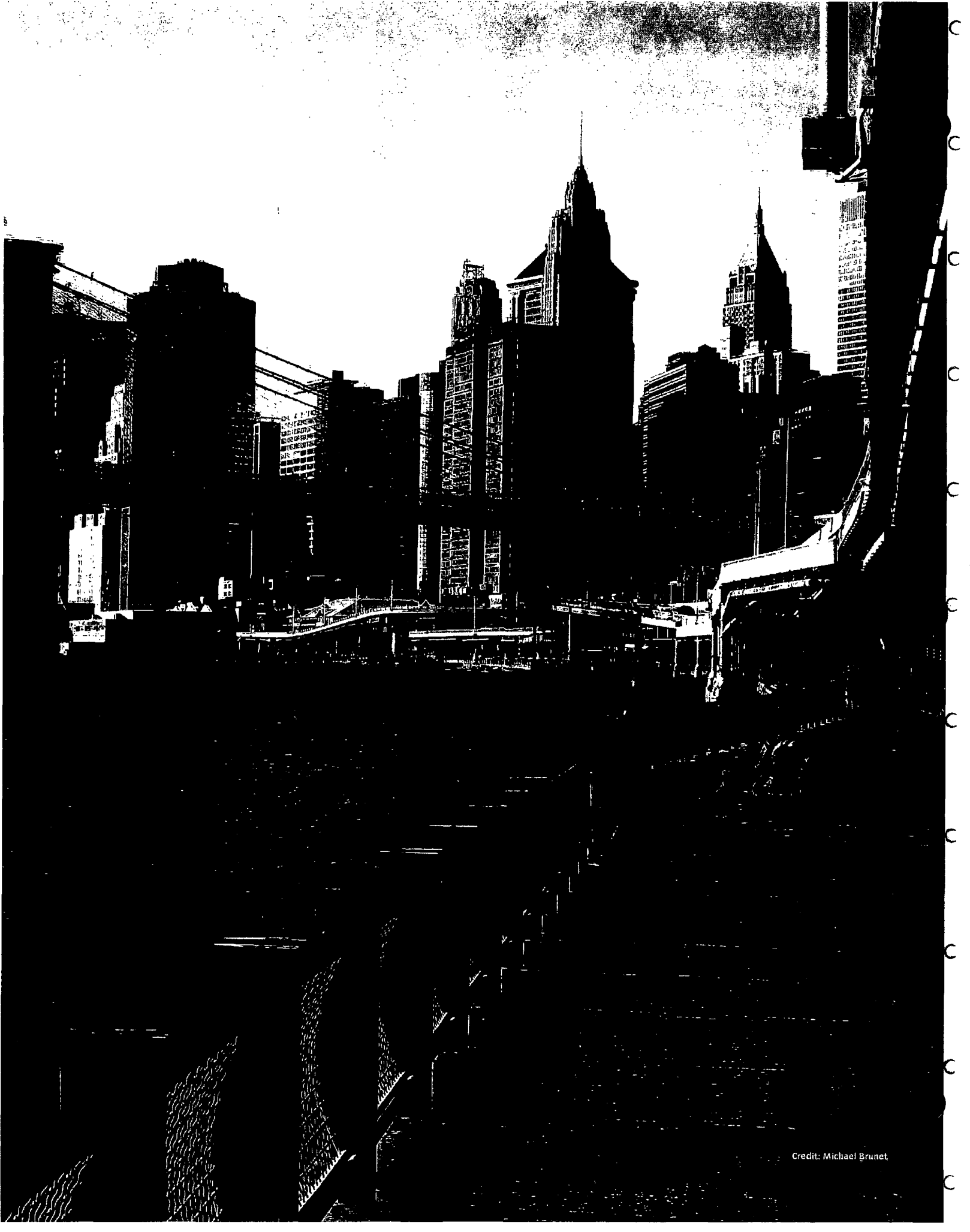
Preservation and revitalization of neighborhoods most impacted by Sandy will be furthered by keeping planned development projects on-track. Among the development projects that the City will continue to pursue are the following:

Parks and Open Space

- *Calvert Vaux Park*, an enhancement project that includes new artificial turf fields, new coastal habitat along the shoreline, and other park improvements.
- *The West 8th Street Access Project*, a project to improve access from the W. 8th Street subway station by demolishing an extant pedestrian bridge and creating a new boardwalk entry at W. 10th Street.

Economic Development

- *Coney Island Commons and YMCA*, a mixed-use development project that will create over 190 units of affordable housing and Southern Brooklyn's first YMCA, opening in 2013.
- *Coney Island Comprehensive Plan*, including the development of the Coney Island amusement and entertainment district, including the new Luna Park, Scream Zone, and Steeplechase Plaza, the re-lighting of the iconic Parachute Jump, and the construction of a new seasonal amphitheater, as well as new housing and neighborhood amenities.



Credit: Michael Brunet