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Attributions
This document was developed by the NYRCR Massapequas Planning Committee as part of the NY Rising Community Reconstruction (NYRCR) Program within the Governor’s Office of Storm Recovery. The NYRCR Program is supported by NYS Homes and Community Renewal, NYS Department of State, and NYS Department of Transportation. The document was prepared by the following consulting firms:
Ove Arup & Partners, P.C.
Sasaki Associates
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CAS Group
VJ Associates
Pratt Institute

Cover: Brady Park (source: Village of Massapequa Park)
Foreword

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

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

Program Overview

The NYRCR Program, announced by Governor Cuomo in April of 2013, is a more than $650 million planning and implementation process established to provide rebuilding and resiliency assistance to communities severely damaged by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Drawing on lessons learned from past recovery efforts, the NYRCR Program is a unique combination of bottom-up community participation and State-provided technical expertise. This powerful combination recognizes not only that community members are best positioned to assess the needs and opportunities of the places where they live and work, but also that decisions are best made when they are grounded in rigorous analysis and informed by the latest innovative solutions.

One hundred and two storm-affected localities across the State were originally designated to participate in the NYRCR Program. The State has allocated each locality between $3 million and $25 million to implement eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant–Disaster Recovery (CDBG-DR) program.1

Forty-five NYRCR Communities, each comprising one or more of the 102 localities, were created and led by a NYRCR Planning Committee composed of local residents, business owners, and civic leaders. Members of the Planning Committees were identified in consultation with established local leaders, community organizations, and in some cases municipalities. The NYRCR Program sets a new standard for community participation in recovery and resiliency planning, with community members leading the planning process. Across the State, more than 500 New Yorkers represent their communities by serving on Planning Committees. More than 400 Planning Committee Meetings have been held, during which Planning Committee members worked with the State’s NYRCR Program team to develop community reconstruction plans and identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 125-plus Public Engagement Events attracted thousands of community members, who provided feedback on the NYRCR planning process and proposals. The NYRCR Program’s outreach has included communities that are traditionally underrepresented, such as immigrant

1 Five of the 102 localities in the program—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.
populations and students. All planning materials are posted on the NYRCR Program’s website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on materials in progress.

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

With the January 2014 announcement of the NYRCR Program’s expansion to include 22 new localities, the program comprises over 2.7 million New Yorkers and covers nearly 6,500 square miles, which is equivalent to 14% of the overall State population and 12% of the State’s overall geography.

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allocated over $650 million of funding to the program for implementing projects identified in the NYRCR Plans. NYRCR Communities are also eligible for additional funds through the program’s NY Rising to the Top Competition, which evaluates NYRCR Communities across eight categories, including best use of technology in the planning process, best approach to resilient economic growth, and best use of green infrastructure to bolster resilience. The winning NYRCR Community in each category will be allocated an additional $3 million of implementation funding. The NYCR Program is also working with both private and public institutions to identify existing funding sources and create new funding opportunities where none existed before.

The NYRCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has leveraged the Regional Economic Development Council’s State Agency Review Teams (SARTs), comprised of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Communities. The SARTs review projects with an eye toward regulatory and
permitting needs, policy objectives, and preexisting agency funding sources. The NYRCR Program is continuing to work with the SARTs to streamline the permitting process and ensure shovels are in the ground as quickly as possible.

On the pages that follow, you will see the results of months of thoughtful, diligent work by NYRCR Planning Committees, passionately committed to realizing brighter, more resilient futures for their communities.

**The NYRCR Plan**

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

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

NYCR Massapequas is eligible for up to $26.0 million in CDBG-DR implementation funds.

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

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

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

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2 The following localities’ allocations comprise the NYCR Community’s total allocation: Massapequa I - $14.4 million; Massapequa Park - $3.0 million; Massapequa II - $8.7 million.
<table>
<thead>
<tr>
<th>Featured Project</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Redevelopment Study (Eastern Massapequa)</td>
<td>106</td>
</tr>
<tr>
<td>Downtown Master Plan</td>
<td>108</td>
</tr>
<tr>
<td>Emergency Preparedness and Disaster Action Planning</td>
<td>110</td>
</tr>
<tr>
<td>Transit-Oriented Development Infill Study</td>
<td>112</td>
</tr>
<tr>
<td>Voluntary Acquisition Program</td>
<td>114</td>
</tr>
<tr>
<td>Emergency Cell Phone Service</td>
<td>116</td>
</tr>
<tr>
<td>Integrated Communication Network</td>
<td>118</td>
</tr>
<tr>
<td>Emergency Parking</td>
<td>119</td>
</tr>
</tbody>
</table>

**Section V: Additional Materials**

A. Additional Resiliency Recommendations | 122
B. Master Table of Projects | 126
C. Public Engagement Process | 138
D. Community Asset Inventory | 142
E. End Notes | 147
F. Glossary | 149
Massapequa, Massapequa Park, and East Massapequa comprise the NY Rising Community Reconstruction (NYRCR) Massapequas Community (Community). The Hamlet of Massapequa, which includes Massapequa and East Massapequa, is in the Town of Oyster Bay, and Massapequa Park is in an independent incorporated village. The Community is on the south shore of Long Island in Nassau County. These bedroom communities with a population of nearly 58,000 and an area of 9.3 square miles are best known for their waterfront homes on peninsulas jutting into South Oyster Bay, charming shopping streets near Long Island Rail Road (LIRR) stations, and the Westfield Sunrise Shopping Center. Other assets include nine public schools, two libraries, and nine parks and reserves of varying sizes. They are bounded to the north by Jerusalem road and the Southern State Parkway, to the east by County Line Road, and to the west by Seafood Creek.

The NYRCR Program is funded by the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. NYRCR Massapequas has been allocated up to $26.0 million (Massapequa I $14.4 million, Massapequa II $8.7 million, and Massapequa Park $3.0 million).

In late October 2012, Superstorm Sandy devastated the Community destroying homes and businesses, particularly south of Merrick Road. When the storm arrived on October 29, the Community suffered the impacts of storm surge and flooding. Since the storm exceeded the Federal Emergency Management Agency’s (FEMA) 100-year flood zones, the Community was unprepared for the extent of the flooding brought on by the storm. Within the Community, more than 4,000 housing units were damaged by the flood; trees, power lines, and utility poles were downed; and major roads and evacuation routes were flooded, blocking both residents and first responders. For some residents, the power outages lasted as long as 16 days and cellular communication was significantly disrupted. Gas stations with fuel were unable to pump without back up power. Coastal parks were severely damaged as well with heavy debris and erosion. Directly or indirectly, the lives of everyone in the region were, and continue to be, affected by the storm’s aftermath.
Geographic Scope

Data Sources
ESRI, NOAA, US Census, Nassau County, NYS DOS
Created March 2014

Legend
- NYRCR Boundary
- Long Island Rail Road
- LIRR Station
- Water
- Main Roads
- Local Roads
- Existing Parks and Open Space
In response to the storms that have impacted New York State (NYS) in recent years, the NY Rising Community Reconstruction (NYRCR) Program was established to provide support to communities impacted by the storm. Superstorm Sandy, as well as Hurricane Irene, exposed many vulnerabilities of the Community related to its ability to mitigate and respond to major storm events, climate change, or sea level rise. Although recovery and reconstruction started in the immediate aftermath of the storm and continue to this day, the overall success of these reconstruction efforts will depend upon whether they merely restore the pre-storm status quo or leverage the opportunity that the NYRCR Program has provided the Community to determine its own resilient future. The program provided an opportunity for the residents and business owners of the Community to actively participate in planning for a stronger future—to reflect, to learn, and to build back better and stronger in all areas and aspects of life.

The NYRCR Massapequas Plan (NYRCR Plan), which developed out of seven months of community stakeholder engagement, reflects the goals and aspirations of the Community for the future. It honors the unique qualities and assets of the Community while ensuring that NYRCR Massapequas will be safer, more resilient, and more sustainable in the face of storm- and climate change-related impacts. The NYRCR Plan presents a series of strategies and projects that respond to critical issues and ensure that the Community builds back better.

NYRCR Massapequas Critical Issues
- Inconsistent Shoreline
- Drainage
- Communication
- Housing
- Economics
- Regional Connections
- Resilient Planning, Design, and Construction

While local issues are paramount, it is imperative to recognize NYRCR Massapequas’ relationship to its neighboring communities and the broader region. Communities on Long Island’s south shore have similar patterns of development, interconnected infrastructure systems and road networks, overlapping municipal service provision areas, and a common coastline. This dynamic demands a regional perspective on the challenges facing the Community so that local solutions can take into account and leverage regional considerations for reconstruction, recovery, and resiliency. Through a thorough review of regional plans and studies, meetings with neighboring communities, and sessions with town and village officials, a series of regional considerations was developed and used to expand upon local projects as well as to inform the development of shared projects with neighboring communities.

Regional Considerations
- Infrastructure Investment
- Water Resources
- Emergency Preparedness and Response
- Energy Prices
- Equitable and Supportive Communities
- Housing
- Governance
- Transit-Oriented Development (TOD)
Community-Driven Process
All of the material presented in the NYRCR Plan has been developed collaboratively by residents of the NYRCR Massapequas Community, NYS Planners, and NYS-provided Consultants. The NYRCR Program provided the Community with an unprecedented opportunity to participate in a bottom-up planning effort. There were eight key steps to the process (see sidebar) that took place between September 2013 and March 2014.

Key Steps/Milestones to the NYCR Planning Process

<table>
<thead>
<tr>
<th>Organize for Action</th>
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<tbody>
<tr>
<td>Inventory Assets</td>
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<tr>
<td>Determine Needs and Opportunities</td>
</tr>
<tr>
<td>Prepare and Present Concept Plan</td>
</tr>
<tr>
<td>Conduct Risk Assessment</td>
</tr>
<tr>
<td>Engage in Regional Planning Process</td>
</tr>
<tr>
<td>Develop Strategies for Investment &amp; Action</td>
</tr>
<tr>
<td>Deliver Final NYCR Plan</td>
</tr>
</tbody>
</table>

Community representatives played an integral role every step of the way providing overall direction and guidance; generating material; reviewing, revising, and responding to components of the plan; and deliberating on the initiatives that will bring the greatest recovery and resiliency value to NYCR Massapequas. Fourteen community representatives dedicated their time, passion, and expertise as NYRCR Planning Committee (Committee) Co-Chairs and Members. The Committee met seven times as a group and twice more with Committees from neighboring NYRCR Communities to guide the development of the NYRCR Plan. More than 150 residents and stakeholders participated in three public engagement events and shared their opinions and ideas through online surveys, business surveys, and key informant interviews. At public engagement events, community members provided feedback on the Vision and Values, Community Assets, Needs and Opportunities, Strategies, and Projects. The Vision and Goals of the Community developed primarily at the first public engagement event are as follows:

Vision for a Resilient Future
The vision for NYRCR Massapequas is to rebuild an attractive, sustainable, and resilient waterfront community for generations of residents to enjoy with robust residential neighborhoods, vibrant business districts, exemplary leadership, a well-managed coastal zone, and the capacity to effectively manage adverse storm and environmental conditions.

Community Goals
Community Planning & Capacity Building
- Emergency preparedness plans in place to safeguard people and property
  - Fully equipped local emergency shelters
  - Designated shelters for pet owners
  - Evacuation during power outages
  - Traffic light plan for mobility during extended power outages
  - Distribution of filtered water and food during extended power outages
  - Plan to prevent flood damage to vehicles
- Clear and effective lines of communication and coordination between agencies and with public before, during, and after emergencies
  - Revitalize neighborhoods
  - Improve parks, community centers, recreation and open space opportunities
  - Improve mobility (transit, auto, pedestrians, bicycles, and boaters)

Economic Development
- Beautify commercial areas
- Enhance and revitalize local businesses
- Private facilities that provide critical goods or services have backup power generation
Health & Social Services

- Proximity to medical facility
- Community centers that serve the needs of residents young and old generally and during emergency situations

Housing

- Effectively protect homes from future storm impacts
- Post storm security for neighborhoods after evacuation
- Maintain property values
- Affordable flood insurance
- Provide a range of housing options

Infrastructure

- Storm resistant power distribution
- Effective backup power systems
- Improve stormwater management
- Enhance shoreline and flood protection
- Uninterrupted mobile phone service
- Provide emergency infrastructure

Natural and Cultural Resources

- Prevent erosion of parks
- Examine and improve canal hydraulics
- Protect the community from future storm threats, sea level rise, while strengthening and protecting our natural resources

NYRCR Plan as Blueprint for Implementation

The NYRCR Plan focused both on addressing existing needs of and mitigating potential future risks in the Community. The planning and engagement process identified the needs and opportunities of the Community for each of six Recovery Support Functions: community planning and capacity building, economic development, health and social services, housing, infrastructure, and natural and cultural resources. In addition, an inventory of the Community’s critical assets and potential risk to those assets from future storms was documented. Detailed information of these analyses can be found in Section II and served to underpin the recovery and resiliency strategies which led to development of projects.

Five strategies were identified in order to support the two main goals of reconstruction and resiliency. Reconstruction focuses on restoring, repairing, or rebuilding what was damaged or destroyed by Superstorm Sandy and Hurricane Irene. Resiliency is about strengthening the ability of NYRCR Massapequas to rebound quickly when confronted with challenges of all kinds in the future. These strategies, which were developed iteratively by the Committee, address and balance regional concerns, an analysis of problem areas, and community feedback. Reconstruction and Resilience Strategies for the Community are listed below and described in detail in Section 3 of the NYRCR Plan:

- Improve transportation and communication connectivity;
- Invest in hard infrastructure and generators to prepare for future storm events;
- Use green infrastructure and waterfront parks to absorb floodwater and stormwater;
- Plan for business continuity and growth; and
- Provide resiliency resources to existing and future residents.
The strategies will be executed by projects which were identified and refined through the planning and engagement process. The projects included in the NYRCR Plan are organized into three categories, which are as follows:

- **Proposed Projects** are discrete projects that are affordable within the Community’s allocation of Community Development Block Grant Disaster Recovery (CDBG-DR) assistance.

- **Featured Projects** are innovative projects where an initial study or discrete first phase of the project is proposed for CDBG-DR funding or other funding resources. Featured projects also may include regulatory reforms and other programs that do not involve capital expenditure.

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

Listed below are the Proposed and Featured Projects organized by strategy. The projects have not been ranked or prioritized. Detailed descriptions of each project can be found in Section IV of the NYRCR Plan and Additional Resiliency Recommendations can be found in Section V.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Category</th>
<th>Regional</th>
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</thead>
<tbody>
<tr>
<td>Lifeline Road Network Study</td>
<td>This study will determine the critical 25–30 mile access routes, or “lifeline roads”, within the community to ensure that evacuation and emergency service routes are maintained as safe, secure, and passable before, during, and after major storm events.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Signage (Lifeline Road Network)</td>
<td>This project will develop and install ‘Lifeline Network’ signage along lifeline roads to direct residents to Community Resource Centers—community centers and other centralized public locations with back-up power.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Street Lighting (Lifeline Road Network)</td>
<td>In order to maintain functionality during power outages, this project will retrofit streetlights and signals along lifeline roads to operate on solar power and with back-up battery power. Priority will be given to Merrick Road, Sunrise Highway, and intersections.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Roadway Elevation (Lifeline Road Network)</td>
<td>This project will elevate approximately one mile of key streets susceptible to tidal flooding or storm surge, particularly those south of Merrick Road.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Regional Lifeline Transportation Network</td>
<td>This is a regional study in conjunction with NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and the Massapequas developing a “Lifeline Network” of resilient streetscape design, such as redundant power and improved drainage systems, to provide maximum accessibility in and out of residential neighborhoods for first responders and residents before, during, and after a storm.</td>
<td>Proposed</td>
<td>Y</td>
</tr>
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</table>
The Massapequas NY Rising Community Reconstruction Plan

Table 02: Projects to Invest in Hard Infrastructure and Generators to Prepare for Future Storms

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Category</th>
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<tbody>
<tr>
<td>Flood Diversion and Control</td>
<td>This project will address flooding throughout the Community by evaluating the condition of existing sumps (drainage basins), determining where improvements can be made through removal of built-up debris, fine soil, and vegetation, and strategically locating structural and natural drainage features to divert flood waters into designated catchment areas.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Permanent Generators for Critical Community Facilities</td>
<td>This project will ensure that critical facilities, including emergency shelters, have backup power during and after major storm events by installing permanent generators on the roofs or upper floors of critical assets and evacuation sites to prevent flood damage during storm events. Note: McKenna Elementary (used by the Red Cross) and Massapequa Park Village Hall already have generators in place.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Preparedness and Disaster Action Planning</td>
<td>This project will better protect the community by creating a network for checking on and contacting seniors and other vulnerable groups in the event of an emergency, purchasing and installing tidal gauges to better prepare for storms and initiate evacuation, and purchasing additional resources such as 5-ton army fire response vehicles, communication equipment, a muscle wall mitigation system, additional sand bags, chain saw, large portable water pumps, heavy duty boat trailers and an emergency boat for Bay Constables.</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Parking</td>
<td>This project designates safe areas outside of flood zones to be used by residents in evacuation zones for off-street parking and storage during emergencies and major storm events.</td>
<td>Featured</td>
<td>N</td>
</tr>
</tbody>
</table>
### Table 03: Projects to Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Category</th>
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<tbody>
<tr>
<td>Green Infrastructure Pilots</td>
<td>This study will develop potential infiltration and open channel bio-swale pilot approaches for three project types: public realm (roads), private realm (parking lots) and open space (parks and preserves). Possible Pilot locations include: Broadway (tree pits and right of way swales), Birch Lane Elementary (infiltration pond), McKenna Elementary School &amp; Nassau County Police Academy (infiltration pond), and John Burns Town Park (wetlands or pond).</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Redesign of Parks and Open Space Plan</td>
<td>The study will create a plan that ensures that parks and open spaces in the community serve to increase resilience, enhance economic development, improve the quality of life, and add value to the surrounding homes. Unique projects will focus on improvements to Alhambra Park, Bayfront Park, and Colleran Park.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Alhambra Park</td>
<td>The project will redesign the waterfront park by installing a new playground, permeable parking area, gazebo, kayak-launching area, and a new bulkhead in the recently expanded and remediated Alhambra Park. Additionally, the development of walking paths with permeable paving around bio-swales and storm water retention ponds, and the installation of energy-efficient lighting and signage would make the park more environmentally sustainable and better able to withstand future storm damage.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Bayfront Park</td>
<td>The project will repair defensive infrastructure along the water’s edge (rip-rap or bulkhead to-be-determined) to address damage from Superstorm Sandy. Additionally, the Town will add walkways with permeable paving around bio-swales and stormwater retention ponds, rest area for cyclists, fitness stations, an expanded pier and energy efficient lighting.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Colleran Park</td>
<td>The project will stabilize the shoreline with bulkhead and riprap to prevent further erosion. With a beach landing, the park will also be linked to the proposed regional Blueway, and the existing Bethpage Bikeway.</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>South Shore Stormwater System Modeling and Analysis</td>
<td>The project will be a hydrologic and hydraulic (H&amp;H) model to provide a catchment-wide understanding of where stormwater run-off is coming from, how water much there is, specific areas where the current system is inadequate, and what regional improvements could be made.</td>
<td>Proposed</td>
<td>Y</td>
</tr>
<tr>
<td>Massapequa South Shore Shoreline Conditions Analysis and Restoration</td>
<td>The project will include a survey of the existing shoreline conditions to identify opportunities to increase the efficiency of the existing drainage system and recommend innovative materials and techniques to help minimize coastal erosion and flooding. The shoreline survey will focus on critical areas prone to flooding and on inspection of all existing edge conditions along the coastline, including bulkheads, rip-rap, and natural conditions.</td>
<td>Proposed</td>
<td>N</td>
</tr>
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**Table 04: Projects to Plan for Business Continuity and Growth**

<table>
<thead>
<tr>
<th>Project Name</th>
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<tbody>
<tr>
<td>Business Continuity Program</td>
<td>The program ensures that businesses have the capability to maintain essential functions during a range of potential emergencies and could be implemented immediately. The assistance provided by a Business Continuity Program would include planning assistance, access to alternative spaces or facilities, communications provisions, and provisions for vital records backup and management.</td>
<td>Proposed</td>
<td>Y</td>
</tr>
<tr>
<td>Commercial Redevelopment (Eastern Massapequa)</td>
<td>The study will identify costs and benefits for a new LIRR station at an Eastern Massapequa location and its potential to attract new development. Feasibility factors include infrastructural impediments such as power transmission and sewage management. Possible programs could include a full service medical hospital with emergency care and expanded housing options for seniors, first time home buyers, and the local workforce.</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Downtown Master Plan</td>
<td>This project will develop a Downtown Master Plan that includes the provision of incentives to stimulate the redevelopment of vacant, abandoned, and underused properties with strategies such as streamlined approval processes and updated land use regulations.</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Transit-Oriented Development Infill Study</td>
<td>This study will consider the potential for transit oriented infill development near the Massapequa and/or Massapequa Park Long Island Rail Road (LIRR) stations, as well as the potential for a new station in Eastern Massapequa near the Westfield Sunrise Shopping Center, an area that is currently underserved by transit. The study should include housing options for seniors and first time home buyers as well as housing alternatives to residents who want to relocate from extreme and high risk zones. Building structured parking could act as emergency parking during a flood event.</td>
<td>Featured</td>
<td>N</td>
</tr>
</tbody>
</table>
### Table 05: Projects to Provide Resiliency Resources to Existing and Future Residents

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Category</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Communication and Education Gap Analysis</td>
<td>This project will evaluate existing emergency communication systems and determine additional needs, with an emphasis on coordination across multiple jurisdictions allowing community members to communicate with each other, and emergency readiness education. This initial study will provide recommendations for addressing gaps in communication and education and will identify potential public/private partnerships to implement the study’s recommendations.</td>
<td>Proposed</td>
<td>Y</td>
</tr>
<tr>
<td>Voluntary Acquisition Program</td>
<td>A voluntary property acquisition pilot would assist homeowners with severely damaged properties along canals, with waterfront access, or in low-lying areas through an incentivized housing acquisition program. All damaged properties will be purchased above pre-storm values and could be used for redevelopment as resilient green housing or to be reestablished as ecological features.</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Cell Phone Service</td>
<td>This project proposes to work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power. Cell phone networks should be improved and protected for operation under normal and emergency circumstances.</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Integrated Communication Network</td>
<td>This project will improve local disaster action planning for emergency preparation and readiness, evacuation, recovery efforts, and coordinated services across the region by promoting a single source for comprehensive information and emergency assistance and developing non-digital systems for sharing community news in the event of an emergency.</td>
<td>Featured</td>
<td>N</td>
</tr>
</tbody>
</table>
Section I: Community Overview

The Massapequas communities were settled in the 1950’s along the south shore of Long Island. Primarily residential communities with retail areas and some local businesses, Massapequa, Massapequa Park, and East Massapequa comprise the NY Rising Community Reconstruction (NYRCR) Massapequas Community (Community). The Community is home to a vast natural preserve and a mix of neighborhoods with different architectural styles and tree-lined streets. South of Merrick Road, the Community sits on peninsulas with houses lining the South Oyster Bay shoreline, five creeks, and numerous canals. This part of the Community remains susceptible to damage from flooding and major storms. In addition to thriving residential areas, the Community contains abundant resources including vibrant downtown shopping streets, two Long Island Railroad (LIRR) stations, nine public schools, two libraries, and the Westfield Sunrise Shopping Center.
On October 29, 2012, the New York Tri-State Region was devastated by Superstorm Sandy, the most destructive storm of the 2012 Atlantic Ocean hurricane season. The south shore of Long Island suffered massive storm damage, power outages, sewer line overflows, and utility and transportation disruption. NYRCR Massapequas was no exception—no one was prepared for the extent of the storm’s impacts. Homes and businesses were flooded, roadways were made impassable by flooding and downed power lines, and some parts of the Community were without power for more than two weeks. Recovery and reconstruction efforts in the Community started immediately after the storm and continue to this day. Directly or indirectly, the lives and well-being of virtually everyone in the region were, and continue to be, affected by the storm’s aftermath.

With the introduction of the NYCR Program, the NYCR Massapequas Planning Committee (Committee), comprised of community representatives, has been actively assisting the state in the identification of issues and the development of strategies to enhance the long-term resiliency of the Community. As part of the public engagement process, approximately 150 residents and stakeholders from the Community actively participated in the NYCR planning process to address storm-related impacts to their community. The result of their efforts is this NYCR Massapequas Plan (NYCR Plan). The NYCR Plan presents a series of strategies and projects that respond to critical issues and community aspirations, and contribute to building a more resilient, safer, and sustainable future for the Community.

This section of the NYCR Plan, the Community Overview, includes the following sub-sections.

- **Geographic Scope of the NYCR Plan** defines the physical boundaries of the NYCR Plan and includes a description of the NYCR Massapequas Community to provide context for the planning effort.

- **Description of Storm Damage** summarizes the impacts of Superstorm Sandy on residents, homes, businesses, services, and public and government facilities.

- **Critical Issues** briefly describes the key concerns facing the community as it relates to major storm events. These issues are further detailed in Section II: Assessment of Risk and Needs.

- **Community Vision** includes the NYCR Massapequas Community’s aspirations for a more resilient future.

- **Relationship to Regional Plans** describes the regional perspectives considered in the preparation of this plan to address shared challenges and issues.

All of the material presented in this plan has been developed collaboratively by residents of The NYCR Massapequas Community in cooperation with local, state, and federal agencies. Fourteen community representatives dedicated their time, passion, and expertise as Committee members to guide the development of the NYCR Plan from its inception. Residents and business people participated in three Public Engagement Events and shared their opinions and ideas through online platforms, business surveys, and by responding to outreach efforts made by Committee members.

### Recurring Themes

A number of critical issues emerged through the planning process. These issues significantly impacted the formulation of the Reconstruction and Resiliency Strategies as well as the Proposed and Featured Projects presented in later sections of this NYCR Plan. They are described in detail in Section I, Part C: Critical Issues. The issues are as follows: energy infrastructure; flooding and drainage; housing in high risk areas; information and communication; resilient planning, design, and construction; regional connections; shoreline protection; and small businesses.
A. Geographic Scope of the NYRCR Plan

The geographic scope of the NY Rising Community Reconstruction (NYCRCR) Plan includes the hamlet of Massapequa in the Town of Oyster Bay and the Village of Massapequa Park. Since the hamlet of Massapequa is divided by the Village of Massapequa Park, it represents two Census Designated Places—Massapequa (Massapequa I) and East Massapequa (Massapequa II). These three communities will be referred to in this planning effort as the NYCRCR Massapequas Community (Community).

As shown in Figure 01, the Geographic Scope of the Community extends north from the South Oyster Bay to Jerusalem Avenue west of the Massapequa Preserve (Preserve), and up until the Southern State Parkway to the east of the Preserve. The Preserve is omitted from the scope except for the areas surrounding the Massapequa Reservoir and Massapequa Lake which are located south of Clark Boulevard. The area is bounded to the east by County Line Road and to the west by Seaford Creek in the Tackapausha Nature Preserve.

Part of the greater New York City metropolitan area, the Community is located approximately 27 miles east of Manhattan and 10 miles east of the Nassau-Queens border. According to the 2010 Census, the combined population of these three communities was 57,762. The combined population density was 6,211 people per square mile over a total area of 9.3 square miles. The demographic makeup was 91.2% White, 4.4% Black or African American, 1.8% Asian American, and 2.6% identifying with another race. Additionally, 6.2% of the residents identify as Hispanic. The population's median age was 43.4 years.

Predominant industries within the Community are: retail and trade; finance and insurance; public administration; construction; transportation and warehousing; and professional, scientific, and technical services. Educational and information services are also major employment sectors within the Community. According to the U.S. Census Bureau’s American Community Survey the population-weighted average median household income in the three communities is approximately, $93,000, which is slightly higher than Nassau County median household income.

The Community is located in the Town of Oyster Bay, which is governed by a town supervisor and a six-member town council. Residents also elect a town clerk and a receiver of taxes. The incorporated Village of Massapequa Park is governed by a village board consisting of a mayor and four trustees. Most of the area is served by the Massapequas Public School District, which includes six K-6 elementary schools, one 7th-8th grade middle school, a 9th grade high-school annex, and one 10th-12th grade high school. Additionally St. Rose of Lima, Massapequa Grace Episcopal Day Schools, and Our Lady of Lourdes serve as private school alternatives. Some students in Massapequa II attend school in Amityville because the district lines are different from those of the municipalities.

The Community is served by a combination of road and rail transportation infrastructure. Its major east-west roads are Sunrise Highway and Merrick Road as well as the Southern State Parkway to the north. Other major routes include Hicksville Road, Broadway, and Park Boulevard. The Long Island Railroad (LIRR) Babylon line, which runs from Pennsylvania Station in Manhattan to the Village of Babylon in Suffolk County, has stops in Massapequa and Massapequa Park. The Massapequa station averages 5,919 passenger trips daily and the Massapequa Park station averages 3,345. Express train commute times to Manhattan average 55 and 57 minutes, respectively. The Communities are also served by five bus routes in the Nassau Inter-County Express (NICE) system.

A majority of businesses within the Community are located along Merrick Road, Sunrise Highway, on and between Hicksville Road and Broadway near the LIRR Massapequa Station, and along Park Boulevard. There is a high density of commercial activity in eastern Massapequa at Westfield Sunrise Shopping Center and at two large strip malls nearby. With the exception of the retail corridors and areas around the LIRR stations, land use is mainly residential. Marine uses, such as beach clubs and boat sales and storage, are somewhat common along the South Oyster Bay shoreline; however, the canals and creeks that extend into residential communities are typically lined with homes and only accessible to waterfront property owners.
The NYRCR Massapequas Community was significantly impacted by Superstorm Sandy as well as by Hurricane Irene. During Superstorm Sandy, flooding from the storm reached and surpassed the Federal Emergency Management Agency’s (FEMA) 100-year flood zones in the Community. Large swaths of land were flooded, particularly south of Merrick Road, where homes were damaged, heavy debris littered yards and blocked roadways, and compromised power lines impeded travel and left the entire community facing power outages. Committee members and site visits have revealed that some businesses have not reopened and some residents have not yet been able to return to their homes or restore them to levels where they can be lived in comfortably.

This section provides an overview of the damage related to both of these storm events.

**Hurricane Irene**

Although Superstorm Sandy was the most destructive storm to make landfall in the Community in recent history, Hurricane Irene caused significant damage to the Community only 14 months prior. Starting on Friday, August 26, 2011, Nassau County issued an evacuation order for residents living in areas lying 10 feet and less above sea level.5 On August 28, 2011, Hurricane Irene made landfall in the Community as a Category 1 hurricane, and then quickly weakened to a tropical storm. Heavy rains and storm surge caused flooding in NYRCR Massapequas particularly south of Merrick Road. It is estimated that the surge raised the Atlantic by eight feet as it swept into Long Island during high tide, sending saltwater spilling into communities south of Merrick Road. Many local streets were impassable by car. High winds caused trees to fall, compromising power lines and leading to widespread power outages. The total cost for preparation, clean up and damage repair in Nassau County was approximately $12 million.

**Evacuating for Superstorm Sandy**

An evacuation order issued by Nassau County went into effect at 2:00 PM on October 28, 2012, a day before Superstorm Sandy was expected to make landfall. The order required the mandatory evacuation of all residents living in a flood or storm surge zone, an area defined as south of Merrick Road from Rockville Centre to the Nassau-Suffolk border.6 The order instructed residents to utilize coastal evacuation routes, which include: Peninsula Boulevard, Long Beach Road, Meadowbrook State Parkway, and the Seafood-Oyster Bay Expressway. It also instructed those requiring public transportation to evacuate by 7:00 PM when NICE Bus and the MTA would begin shutting down public transportation. The Long Island Rail Road (LIRR) also began suspending service on October 28, 2012.7

For those who followed the evacuation order many chose to stay with friends or family according to community participants. For those who were not able to find an alternative place to stay, the following public shelters were opened on October 28, 2012, at 1:00 PM by the American Red Cross in partnership with Nassau County at: Nassau Community College, Levittown Memorial High School, Locust Valley High School, SUNY Old Westbury, and Manhasset High School. At 3:00 PM, a Pet Shelter opened at Nassau County Mitchel Athletic Complex in Uniondale. At 4:00 PM, a Special Needs Shelter opened at Nassau Community College. At 7:00 PM, an Orthodox Shelter opened at West Hempstead High School. The order requested residents to evacuate prior to winds reaching 55 mph and reminded all residents throughout Nassau County to tie down and secure all items outside their homes.8 Some residents chose not to evacuate prior to the storm, which put their lives and those of first responders in danger. Fortunately, no fatalities were reported in the Community.

**Superstorm Sandy**

During Superstorm Sandy, houses on East Hamilton Avenue burned while firefighters attempted to battle the fires in five-foot high floodwaters and strong winds.9 A total of six homes were destroyed by fires in the Community as a result of the storm. Boats landed in yards; gutters, siding, porches, and shingles were ripped off, and interior flooding caused further damage to homes. Residents who did not evacuate initially were trapped by flooded roadways as the waves surged over the bulkheads and into the coastal neighborhoods. Even as floodwaters receded, mud-caked roads and excessive debris remained to show the extent of the damage. Power
Figure 01: Geographic Scope

Legend
- NYR CR Boundary
- Long Island Rail Road
- LIRR Station

Data Sources
ESRI, NOAA, US Census, Nassau County, NYS DOS
Created March 2014
Figure 02: Extent of Flooding

Legend
- NYCR Boundary
- Long Island Railroad
- LIRR Station
- Water
- Superstorm Sandy extent of storm surge
- Hurricane Irene extent of storm surge

Data Sources
ESRI, NOAA, US Census, Nassau County, NYS DOS
Created March 2014
outages in the Community and the Long Island Region lasted nearly two weeks after transmission wires and transformers were knocked over by trees and strong winds. Residents lost land line phone service and cellular phone service.

“During Sandy, power was out too long, no communication from LIPA. Cell service was nonexistent south of Merrick Road… Houses flooded from sewage backups.” - Community Member

In the months after Superstorm Sandy, residents on Division Avenue discovered sink holes on their properties. Homeowners began the process of reaching out to the Federal Emergency Management Agency (FEMA) and their homeowner’s insurance providers. The majority of the damage in the Community was sustained south of Merrick Road, while north of Merrick Road the Community was less impacted by the combination of coastal flooding and other storm affects allowing this area to rebound more quickly after utility service was restored. While most of the peninsulas were affected, damage was particularly severe along Crooks Road and Pirate Cove in Massapequa II and on Alhambra Road and Beach Road in western Massapequa I, where homes are at lower elevations. Similarly, some smaller houses along low lying roads on the interior of the peninsulas suffered more flooding damage than elevated houses along canals.

Even now, more than sixteen months after the storm, damage in the Community caused by Superstorm Sandy is still visible in some areas with homes destroyed and some businesses still vacant. Southern portions of the Community in particular are still recovering, and in a few cases the rebuilding has not yet begun. At least a third of structures south of Merrick Road were damaged by the storm, including the Town of Oyster Bay’s Bay Constable building in John Burns Park, according to estimates by the Committee.

Preparing for Future Storms

Prior to Superstorm Sandy, the Town of Oyster Bay (Town) adopted a Hurricane/Coastal Storm Response Plan to outline the responsibilities of the Town government during each phase of a possible weather emergency, from initial forecasts to cleanup and recovery. It also provides guidance for improved interaction between the Town and other agencies, such as fire and police departments, and neighboring municipalities. Massapequa Park, an incorporated village within NYCR Massapequas, does not maintain a separate plan.

As a result of lessons learned from Hurricane Irene and Superstorm Sandy, Nassau County is currently in the process of implementing a revised hurricane preparedness strategy including plan updates, stakeholder outreach, and community training initiatives. The Nassau County Office of Emergency Management (OEM) is in the process of completing its 2014 County Hazard Mitigation Plan Update in collaboration with participating stakeholders. Since local mitigation plans must be reviewed and reapproved by FEMA every five years for Nassau
The Massapequas NY Rising Community Reconstruction Plan

County to remain eligible for federal aid, this work has been ongoing over the past two years. The current Multi-Jurisdictional Hazard Mitigation Plan, released in 2007, establishes county-wide mitigation goals and provides strategies for implementing a set of actions selected by each of the participating jurisdictions.13

The Nassau County OEM has also developed a Multi-Jurisdictional Disaster Debris Management Plan to facilitate and coordinate the management of debris following an emergency or disaster, specifically a hurricane or nor’easter event in response to Hurricane Irene. The plan provides guidance for the county and its municipalities to organize and oversee debris clearance, removal, and disposal. In the event of a disaster, debris management measures are implemented through the Nassau County Emergency Operations Center by a Debris Management Team composed of members from the Department of Public Works, the Health Department, and other county offices.14 Based on comments received during the NYRCR public engagement process, residents in the NYRCR Massapequas said that this plan worked effectively after Superstorm Sandy. In the NYRCR Massapequas, residents continuously observed that debris removal was impressively efficient in their community.

Economic Response

Most of the commercial areas in NYRCR Massapequas were north of the flood extents during Superstorm Sandy. Commercial properties in Massapequa Park had limited effects from flooding during Superstorm Sandy since most of the businesses are located along or north of Sunrise Highway, beyond the reach of the storm surge. Similarly, businesses in Massapequa I and Massapequa II had little inundation, with only the area of Merrick Road along Cameron Creek suffering damage. Only the limited number of marine service businesses along the creeks, canals, and inlets leading to South Oyster Bay suffered serious flooding. Businesses that were not inundated were most affected by power and transportation restraints resulting from flooded roadways and downed utility lines.

According to data from the U.S. Small Business Administration (SBA), 124 NYRCR Massapequas’ businesses with 366 employees applied for disaster management assistance after Superstorm Sandy. These applications verified a total of $3.7 million in real property damage, $1.3 million of machinery damage, an inventory loss of $249,188, and a leaseholder improvement loss of $624,995. Of these applications, only 32 (25.8%) were approved for an amount which totaled just under $2.2 million, representing approximately one third of the $6 million in verified damage assistance applied for.15

Downtown corridors along Park Boulevard, Broadway, and Hicksville Road have remained active. Meanwhile, strip malls and other commercial businesses along the major east-west roads have been declining with vacant store fronts becoming increasingly common along Merrick Road, particularly in Massapequa II. Westfield Sunrise Shopping Center, located along Sunrise Highway north of the previous storm surge extents, is a major commercial and retail hub that for many years has served the Community and Long Island Region for goods, services, and employment. It was built in 1973 and remodeled in 1991, and has the potential for redevelopment.

Many gas stations throughout Long Island were without a source of backup power and were closed after the storm as a result. In conjunction with the shutdown of two major east coast oil refineries, these shutdowns led to a serious fuel shortage. Although some gas stations did not lose power and remained operational, many wholesale gasoline suppliers did not, and were unable to pump fuel into tanker trucks for distribution. Wholesalers that did have power had difficulty keeping up with demand, as service stations that were open had to be refueled at faster rates. The Community, like many others across Long Island, struggled with the need to obtain fuel to run generators and automobiles in the aftermath of Superstorm Sandy.

Overall, the Community’s tax base has been diminished on account of property values that have declined in the wake of the storm. In parallel, regional economic analysis has shown that NYCR Massapequas and adjacent communities have followed the regional trend of stagnant job growth.16
**Health and Housing**

During the NYRCR public engagement process, NYRCR Massapequas residents reported a lack of access to medical facilities during storm events and expressed concerns that the nearest hospitals were effectively too far away during a crisis like Superstorm Sandy. As the local population ages, demand for healthcare is likely to increase in the area.

The social determinants of health can impact individuals’ and families’ ability to respond to and recover from future disaster events. In these situations, pre-existing social vulnerabilities resulting from low incomes, language barriers, and other health disparities within the community will be amplified, putting strain on the entire health services system. While there has been significant progress in the restoration of many basic care services after Superstorm Sandy with local health centers fully reopened, gaps still exist. Community members expressed a desire to have more comprehensive medical care facilities in or near the Community. Additionally, vulnerable groups such as elderly adults, non-English speakers, and adolescents within the Community continue to face challenges accessing health and social services.

Housing damage as a result of Superstorm Sandy occurred primarily on the peninsulas south of Merrick Road along numerous South Oyster Bay canals including: Massapequa Cove, Jones Creek, and Carman Creek. 4,900 homeowners registered FEMA Individuals and Households Program (IHP) claims as of July 2013. FEMA assessed total damages to owner-occupied housing at $91.9 million and approved assistance to nearly 3,400 property owners. More than 600 renters also filed claims; FEMA assessed an undisclosed amount of rental housing damage, and provided assistance to approximately half of those renters registered.

As of July 2013, the total amount of approved funds dispersed by FEMA under the IHP was $35.5 million to homeowners and $1.9 million to renters. An additional $97.6 million was lent to homeowners by the federal SBA disaster loan program, as of September 2013.

**Infrastructure**

As Superstorm Sandy's flood waters surged up towards Sunrise Highway and receded, roadways remained under several feet of water in the southern portion of NYRCR Massapequas. Not only were streets in low-lying areas completely inundated, the floodwaters left roadways littered with heavy debris such as boats, cars, tree branches, and the contents of houses. Heavy winds knocked down trees, traffic signals, and utility lines leaving the roads darkened at night and making intersections even more dangerous. While the New York State Police were able to reopen Long Island’s major highways north of Merrick Road shortly after the storm, several roads to the south remained closed until they could be cleared of obstructions.

The LIRR began suspending service the night before Superstorm Sandy was expected to make landfall. The storm left tracks covered in debris and tunnels flooded. Substations feeding the train’s third rail had
to be powered on incrementally. Partial service was restored to the Babylon branch on Friday, November 2, 2012, four days after the storm hit. By Monday, November 5, 2012 trains were operating on a modified weekday schedule, and service was almost completely restored within the next week.\(^{17}\)

Cellular communication networks were down for days after the storm, as many cell phone towers had insufficient backup power to maintain service. Flooding also affected internet switching centers. Facilities that did have reserve power capacity were forced to go offline to prevent damage. Above ground communication lines on shared utility poles were affected by heavy winds and falling trees, and could only be accessed after initial utility line repairs were made. Because of these widespread outages, emergency notification systems were rendered ineffective for many NYRCR Massapequas residents.

At the peak of Superstorm Sandy’s impact, more than 90% of the Long Island Power Authority’s (LIPA, now Public Service Electric and Gas Company, PSEG) 1.1 million electricity customers lost power. The utility’s transmission and distribution system sustained damage at more than 40,000 locations, including 51 substations, 4,400 distribution poles, 2,500 transformers and 400 miles of power lines. Outages were expected to last no longer than ten days. However, on November 7th, Long Island was hit by a Nor’easter and restoration efforts were set back several days. Service was ultimately restored within 16 days for all customers, excluding those in flooded areas who could not safely accept power.\(^{18}\)

Cedar Creek Water Pollution Control Plant (WPCP), which is located in Wantagh, remained in operation throughout the storm, but the flood and rain waters caused peak flows to be more than twice their normal values. The storm surge overwhelmed the facility causing damages to internal and external equipment and materials, as well as clogging up systems with debris which required extensive cleaning according to the damage assessment report by Nassau County.\(^{19}\)

Aging outfall pipes along the NYCR Massapequas Community waterfront were compromised further by Superstorm Sandy’s storm surge leading to cracked concrete in the pipes and outfalls and increased flooding issues that continue to affect the community after heavy rainfall. Few repairs have been made to this stormwater management infrastructure since the recent major storms (Hurricane Irene and Superstorm Sandy), and they would be seriously endangered by another major storm.

**Parks and Natural Areas**

The natural wetlands in the Massapequa Preserve and other parks were flooded but generally sustained the impact of Superstorm Sandy. Constructed elements such as paths, docks, and park equipment were damaged by mud, flooding, and debris. Beaches that were susceptible to erosion were degraded by the storm surge where aging bulkheads or needed reinforcement failed to preserve the shoreline.

In response to Superstorm Sandy Damage, the Feasibility Report for Erosion Stabilization along the Park Shore was completed to look at ways to secure the beach through a variety of technical engineering strategies. This report includes plans for the Colleran Park shoreline in Massapequa Park, already affected by erosion that was precipitated by the Superstorm Sandy. Bayfront Park in Massapequa II and Alhambra Park in Massapequa I were littered with debris and severely damaged during Superstorm Sandy. John Burns Park flooded damaging the fields and the Bay Constable building there.
C. Critical Issues

Recent storm events including Superstorm Sandy and Hurricane Irene have uncovered critical issues with the Community’s natural and built environment. Storm damage directly and indirectly impacted residents, homes, businesses, sewers, stormwater and energy infrastructure, public facilities, and natural resources in the Community. At the Public Engagement Events, Community members reported on the issues that they have encountered as a result of the storms. It is crucial that these issues be addressed to make the Community more resilient to potential future disasters. The strategies and projects that are detailed in Sections III and IV of this NYCR Plan have been designed to tackle these issues.

The following are critical issues facing the NYCR Massapequas Community. The issues are discussed further in the report and the list below represents a summary of the critical issues

- **Inconsistent Shoreline:** As with many nearby communities on the south shore of Long Island, NYCR Massapequas has seen a steady decline in natural wetlands and dunes as decades of development have replaced the ecological systems along the South Oyster Bay. Extensive private bulkhead construction and channeling have created a hard shoreline that resists regular tidal movement but does little to soften the blow of major storms. This hardening has also prevented natural water filtration. Moreover, inconsistent bulkhead height and irregular maintenance have allowed water to seep in at sporadic intervals that cannot be removed without pumping and other efforts. A softer shoreline would allow for natural protections from storm surge while consistent bulkhead heights would more effectively protect areas now affected by regular tidal flooding.

- **Drainage:** The high proportion of impermeable surfaces, particularly large surface parking lots, has limited the natural drainage system of the Community. Elements of the natural drainage system include natural basins like those in Massapequa Preserve and Tackapausha Nature Preserve. Debris from the storm has left drains clogged in many areas. Flooding made it very difficult for many residents and first responders to travel on main arteries as well as local roadways in the southern peninsulas of the community. Back-up occurs in storm drains during small storms and high tides. Outfall pipes and sumps need additional maintenance.

In addition to developing and improving the maintenance plan for existing infrastructure, hard infrastructure projects, such as new back flow preventers and updated pump stations, may be installed in conjunction with new or supplemental green infrastructure, such as bio-swales. These interventions have the potential to dramatically improve drainage within NYCR Massapequas. Tidal check valves, outfall pipes, and pipe linings would control some of the flooding.

- **Communication:** Cellular service is limited under normal conditions by local resistance to additional cell towers. Improved cellular services during and after emergencies is important for the NYCR Massapequas Community. There is also demand for improved early and continuous emergency communication systems for major storm events with more detailed and up-to-date information about shelter options and locations, where emergency services will be provided, and directions for how local residents and businesses can prepare for the storm more readily available on the web. There is a need for additional signage within the community to direct residents to designated storm surge resilient local transportation access routes with connections to emergency shelters, alternative transportation, safe short and long term parking areas, and to additional information available at community resource centers. Along with providing information, residents must be educated on the importance of heeding evacuation notifications. The Town hopes that additional tidal gauges will also improve communication about storm threats at a more granular level.
**Housing:** The challenges of rising flood insurance and rebuilding or retrofitting housing to make it more resilient will ultimately drive up the cost of housing. Installing roof straps and storm shutters as well as elevating homes are effective but costly ways to prepare for future storms and a major financial burden for people struggling to simply rebuild. Declining home values in the wake of the housing crisis of 2008 have made it challenging to maintain or sell homes in the area. The housing market for homes north of Sunrise Highway seems to be recovering; however, the previously high-valued property south of Merrick Road is now too costly for many homebuyers when coupled with high insurance rates.

**Economics:** In NYRCR Massapequas, vacant store fronts have become increasingly common along the eastern end of Merrick Road and Sunrise Highway, particularly in strip malls and at closed car dealerships. This trend began before Superstorm Sandy, but has continued in the aftermath. Westfield Sunrise Shopping Center is also aging. By contrast, commercial areas in Massapequa Park are thriving, and storefronts near both of the LIRR train stations remain active and filled.

The existing state of the regional economy, which has steadily lost manufacturing jobs, limits the number of jobs within the NYRCR Massapequas and adjacent communities, particularly outside of the service industry sector.

**Energy Infrastructure:** While flooding caused the most obvious, extensive destruction in the Community, loss of power during Superstorm Sandy was a significant issue for local residents and businesses, and threatened life and safety. Streets were dark at night and un-signalized for the two week interim before power was fully restored. Critical energy infrastructure remains vulnerable. Much of the power loss was due to fallen trees that affected above-ground power lines. A lack of switches within the electrical grid meant that many homes and businesses not affected by flooding were impacted when other parts of the grid were down. Many critical public and private facilities were not adequately equipped with emergency backup power supplies. Upgrading the energy infrastructure would dramatically improve the Community’s resilience.

**Regional Connections:** Many coastal communities on Long Island experienced similar impacts during the recent major storm events (Hurricane Irene and Superstorm Sandy). Most of these coastal communities rely on inland communities for shelter and services in an emergency. Due to Long Island’s development patterns and governmental structure, many communities’ infrastructure networks and service districts are closely interconnected. A shared or regional approach could be more effective in many cases.

**Resilient Planning, Design, and Construction:** Existing land use, buildings, infrastructure networks, and marinas—many of which were planned, designed, and built more than 50 years ago—are not well-suited to deal with changing climate and weather patterns. They also do not reflect current best practices with regards to green building. Many facilities that could serve as support centers for the Community to provide shelter and assistance to storm-victims could be better equipped to support displaced residents if they had reserve power and backup supplies.
D. Community Vision

Through a combination of input received from the community during Public Engagement Events and the work of the NYRCR Planning Committee (Committee), a vision statement and goals was developed to reflect the Community’s aspirations for the future. These statements provide the foundation for the NYRCR Massapequas Plan. They have been used to guide the development of the NYRCR Plan’s strategies and projects and should serve as an ongoing reminder of what the community aims to achieve for long-term resiliency. The goals are organized by Recovery Support Function (RSF) reflecting the National Disaster Recovery Framework’s approach to recovery and resiliency.

Community Vision

Vision for a Resilient Future

The vision for NYCR Massapequas is to rebuild an attractive, sustainable, and resilient waterfront community for generations of residents to enjoy with robust residential neighborhoods, vibrant business districts, exemplary leadership, a well-managed coastal zone, and the capacity to effectively manage adverse storm and environmental conditions.

Community Goals

Community Planning & Capacity Building

- Emergency preparedness plans in place to safeguard people and property
  - Fully equipped local emergency shelters
  - Designated shelters for pet owners
  - Evacuation during power outages
  - Traffic light plan for mobility during extended power outages
  - Distribution of filtered water and food during extended power outages
  - Plan to prevent flood damage to vehicles
- Clear and effective lines of communication and coordination between agencies and with public before, during, and after emergencies

- Revitalize neighborhoods
- Improve parks, community centers, recreation and open space opportunities
- Improve mobility (transit, auto, pedestrians, bicycles, and boaters)

Economic

- Beautify commercial areas
- Enhance and revitalize local businesses
- Private facilities that provide critical goods or services have backup power generation

Health & Social Services

- Proximity to medical facility
- Community centers that serve the needs of residents young and old generally and during emergency situations

Housing

- Effectively protect homes from future storm impacts
- Post storm security for neighborhoods after evacuation
- Maintain property values
- Affordable flood insurance
- Provide a range of housing options

Infrastructure

- Storm resistant power distribution
- Effective backup power systems
- Improve stormwater management
- Enhance shoreline and flood protection
- Uninterrupted mobile phone service
- Provide emergency infrastructure

Natural and Cultural Resources

- Prevent erosion of parks
- Examine and improve canal hydraulics
- Protect the community from future storm threats, sea level rise, while strengthening and protecting our natural resources
- Protect water resources
E. Relationship to Regional Plans

Many Long Island communities, particularly those on the south shore proximate to the NYRCR Massapequas Community, share common issues and concerns related to reconstruction, recovery, and resiliency. These communities have similar patterns of development, interconnected infrastructure systems and road networks, overlapping municipal service provision areas, and a common coastline. This dynamic demands a regional perspective on the challenges facing the Community so that local solutions take regional considerations into account and leverage opportunities to build on existing initiatives.

The NYRCR Massapequas Plan is therefore informed by numerous existing planning documents and efforts, several of which offer relevant strategies, projects, and actions. A list of the regional and sub-regional plans reviewed can be found in Table 01. Although the geographic scope covered by some of these documents is beyond the boundaries of the Community, many of the strategies identified are pertinent to Nassau County’s south shore and can be applied at a local level.

In addition to the holistic document review, there were two Joint Committee Meetings held with neighboring communities—Baldwin, Bellmore-Merrick, Seaford-Wantagh, and the Village of Freeport—to promote understanding of regional issues and develop shared projects.

The Committee has identified a set of key themes that outline common issues and opportunities within the region. Each of these themes served to inform the preparation of strategies and projects in Sections III and IV of this NYRCR Plan.

- **Infrastructure Investment:** Long Island’s aging infrastructure is struggling to accommodate previous population growth while adapting to the increasing threat of storm events and sea level rise. Roads, bulkheads, and power and gas lines have been particularly affected by flooding and storm damage. Additionally, the transportation network no longer best serves Long Island’s present-day commuting patterns with a majority of residents traveling north to other parts of Nassau County and the single largest group commuting to New York City. Transportation infrastructure should be re-evaluated to better accommodate both regional and local mobility. Infrastructure investment has consistently been identified as critical to the region’s growth and economic viability.

- **Water Resources:** Groundwater contamination from pollution and saltwater intrusion is an issue in Nassau County where potable water is supplied solely by aquifers. Real estate development to facilitate and attract population growth, combined with sea level rise, threatens the future drinking water and consumptive water resources on Long Island. The need for flood management, water conservation, and environmental protection is a recurring theme in many of the documents studied. Replacing impervious surfaces such as roads and roofs with vegetated areas are noted as ways to increase groundwater supplies, filter toxins and combat saltwater intrusion of aquifers.

- **Emergency Preparedness and Response:** To date, most emergency preparedness programs have been developed and implemented at the regional level, either town-wide or county-wide. For example, the Nassau County OEM is responsible for the County Hazard Mitigation Plan. They have also developed a Multi-Jurisdictional Disaster Debris Management Plan to facilitate and coordinate the management of debris following an emergency or disaster, specifically a hurricane or nor’easter event. County-wide mitigation provide strategies for implementing a set of actions selected by each of the participating jurisdictions. The experiences of Community residents during Superstorm Sandy have heightened their desire for greater access to information and resources before, during, and after a similar emergency.

- **Energy Prices:** Electricity rates for Long Island residents are among the highest in the nation, and much of its energy supply depends on off-island resources. Many of the documents reviewed favored investment in energy efficiency and conservation, renewable energy sources,
and distributed energy generation strategies to increase energy independence and reduce ratepayer costs.

- **Equitable and Supportive Communities:** Providing equitable social, educational, housing and workforce opportunities for all of Long Island’s residents is essential to the long-term sustainability of the Island. Long Island’s population is increasingly diverse: 24% of Long Islanders are Black, Latino, or Asian. At the same time, Long Island remains highly segregated with the populations of many communities more than 90% white. According to the Long Island Sustainability Plan, 54% of the population will be non-white by 2035. In addition, the population is also aging. It is therefore important that Long Island welcome newcomers, and provide opportunity and a high quality of life to all racial, ethnic and age groups, including meeting the health needs of an aging and diverse population.

- **Housing:** Nassau County is dominated by single family housing, with a majority of units more than 50 years old. Housing costs and property tax levels limit the stock of housing available for the County’s young and aging population, low-income residents, and those displaced by previous storms. Many plans have recommended an increase in smaller, affordable housing and rental developments often targeted as “next generation” (first time) home buyers and options for senior living. However, following the impacts of Superstorm Sandy it is uncertain whether home prices will remain at their current level.

- **Governance:** Long Island’s mesh of administrative divisions can reduce public sector efficiency and limit coordination, while creating an inconsistent regulatory landscape for its residents and businesses. Residents have expressed confusion and frustration when navigating the many governmental layers of county, town, and village systems, in addition to special districts and school districts which make further tax assessments. Many plans incorporate recommendations for consolidating overlapping or duplicated services, streamlining permitting processes, and establishing more comprehensive land use regulations. A lack of digital records is also a limiting factor for more efficient 21st century service delivery.

- **Transit-Oriented Development (TOD):** Transit-Oriented Development is development that occurs in close proximity to major points of public transportation access and options. Recent development in Nassau County has not consistently planned or coordinated in a manner that supports economic and environmental sustainability. Transit-oriented development (TOD) and transit-supportive development (TSD) have been suggested as an opportunity to preserve the quality of life of communities while allowing for future growth. Some notable examples have already begun construction on what will be important local precedents for good integration of transit in planning and development.

- **Local Plans and Studies:** A limited number of plans and studies address issues specific to the Community. Most are focused on the south shore line and the harbor of Oyster Bay. The Feasibility Report for Erosion Stabilization along the Park Shore (May 2013, Massapequa Park) looks at ways to secure the beach through a variety of technical engineering strategies. The South Oyster Bay Harbor Management Plan (August 2006, Town of Oyster Bay) focuses on the water quality and dredging of areas adjacent to the Community.
### Table 01: Existing Regional Plans, Reports, and Studies

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Date Published</th>
<th>Author</th>
</tr>
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<tbody>
<tr>
<td>Blue Water Trail Master Plan</td>
<td>October 2013</td>
<td>Nassau County</td>
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<tr>
<td>Cleaner Greener LI Regional Sustainability Plan</td>
<td>April 2013</td>
<td>AECOM for consortium of Long Island counties, towns, and organizations</td>
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<td>Community Profiles</td>
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<td>Census Data</td>
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<td>Draft Nassau County Master Plan</td>
<td>October 2010</td>
<td>Nassau County</td>
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<td>LI 2035 Visioning Initiative</td>
<td>December 2009</td>
<td>Long Island 2035 Study Team</td>
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<td>Nassau County Consolidated Plan</td>
<td>2010</td>
<td>Nassau County</td>
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<td>Nassau County Infill Redevelopment Feasibility Report</td>
<td>September 2013</td>
<td>Parsons Brinckerhoff, Nassau County Dept of Public Works, Regional Plan Association and NY-CT Sustainable Communities Consortium</td>
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<tr>
<td>Nassau County Storm Water Management Plan</td>
<td>2009</td>
<td>Nassau County</td>
</tr>
<tr>
<td>New Vision for the LI Economy</td>
<td>November 2011</td>
<td>Long Island Regional Economic Development Council</td>
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<tr>
<td>North Atlantic Coast Comprehensive Study (NAACS) Draft</td>
<td>Document in Process</td>
<td>United States Army Corps of Engineers</td>
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<tr>
<td>NYS Coastal Management Program</td>
<td>1982</td>
<td>NYS Department of State</td>
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<td>Places to Grow – An Analysis of the Potential for Transit-Accessible Housing and Jobs in Long Island's Downtowns and Station Areas</td>
<td>January 2010</td>
<td>Regional Plan Association (RPA)</td>
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<tr>
<td>Significant Coastal Fish and Wildlife Habitat Narratives</td>
<td></td>
<td>NYS Department of State</td>
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<tr>
<td>South Shore Estuary Reserve Comprehensive Management Plan</td>
<td>2001</td>
<td>South Shore Estuary Reserve Council with assistance provided by NYS Department of State</td>
</tr>
<tr>
<td>South Shore Estuary Reserve Workplan Implementation- Estuary Public Use and Tourism Study</td>
<td>September 2010</td>
<td>Cashin Associates for Town of Oyster Bay &amp; DOS</td>
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</table>
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Section II: Assessment of Risk and Needs

The assessment of risk and needs describes the assets that have or could be affected by hazards associated with coastal flooding. As part of developing the NYRCR Massapequas (Community) Plan, an asset inventory and risk assessment process evaluated the vulnerability of community assets to future storm damage, specifically from storm surges and flooding. The assessment provides a quantitative risk analysis of community assets to supplement the qualitative information collected at Planning Committee (Committee) Meetings and Public Engagement Events.

An assessment of needs and opportunities provided a basis for the strategies and projects proposed for the Community. Many of the Needs and Opportunities addressed in the NYRCR Massapequas Plan (NYRCR Plan) are connected to recent storm damage within the community and consider the ongoing risk faced by community assets. These include lost economic opportunities attributed to storm damages, opportunities for rebuilding or expanding the local economy, and opportunities to make new and existing assets more resilient.

This section considers the assessment in the following subsections:

• Description of Community Assets and Assessment of Risk includes a description of all community assets by asset type which is distilled down to a key asset inventory and an assessment of risk to key assets and systems together with the asset risk scores and findings.

• Assessment of Needs and Opportunities describes the existing needs in the community, both pre-existing and exacerbated by recent storm events.
A. Description of Community Assets and Assessment of Risk

Community assets are specific places or general areas where economic, environmental, and social functions of communities take place. Assets may be part of the built or the natural environment and may include transportation systems, schools and libraries, hospitals and social service centers, parks, and commercial areas. The aim of this process was to provide a quantitative risk analysis of community assets to supplement the information collected through public engagement and outreach.

Community assets were initially identified through data collected from New York State and Nassau County Geographic Information System (GIS) databases. Using GIS software, County and State data were filtered to include only assets within the geographic scope of the Community. Attribute information was used to categorize individual assets by asset class based on the recovery support functions: Economic, Health and Social Services, Housing, Infrastructure Systems, and Natural and Cultural Resources. Descriptions of these asset classes can be found on page 21.

Asset information was combined with New York State Department of State (NYS DOS) hazard maps to identify individual assets in each risk zone. Hazard maps incorporate a full range of coastal risks, and consider both the frequency and impact of flooding. These maps, prepared for the NYRCR Program by NYS DOS with assistance from the National Oceanic and Atmospheric Administration Coastal Services Center (NOAA-CSC) and the Federal Emergency Management Agency (FEMA), identify three levels of risk based on aggregated information for multiple hazards. These risk areas are qualified as subject to extreme, high, and moderate risk from inundation compounded by erosion from future storm event and sea level rise. New York Department of State Risk Areas within the Community are identified in Figure 03.

- **Extreme Risk Areas**: Areas currently at risk of frequent inundation, vulnerable to erosion in the next 40 years, or likely to be inundated in the future due to sea level rise. This includes FEMA designated Zone V Coastal High Hazard Areas (CHHA), areas subject to Shallow Coastal Flooding per the National Oceanic and Atmospheric Administration’s (NOAA) National Weather Service’s (NWS) advisory threshold, areas prone to erosion or natural features susceptible to erosion, and areas subject to future sea level rise.

- **High Risk Areas**: Areas outside the Extreme Risk Area that are currently at infrequent risk of inundation or at future risk from sea level rise. High Risk areas include geography within FEMA Zone V and A Special Flood Hazard Areas (SFHA), also known as 1% annual risk (100-year) flood zones, and areas subject to future sea level rise.

- **Moderate Risk Areas**: Areas that are outside the Extreme and High Risk Areas but are currently at moderate risk of inundation from infrequent events or at risk in the future from sea level rise. This includes areas within 0.2% annual risk (500-year) flood zones and areas within the NOAA’s Sea, Lake and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zones.
Figure 04: Economic Land Uses

Legend
- NYRCR Boundary
- Long Island Railroad
- LIRR Station

Land Uses
- Mixed-use
- Office
- Retail
- Industrial
- Other Land Use

Data Sources
- ESRI, NOAA
- US Census, Nassau County
- NYSCB, Long Island Railroad

Created March 2014
i. Description of Community Assets

A summary of community assets, organized by asset class, that have been affected by previous storms or are at risk of future impacts is presented below. Assets were identified through a combination of research, data analysis, meetings with local officials and the NYCR Massapequas Committee, and Community feedback. Asset information was periodically reviewed at Committee Meetings, and residents were asked to annotate or amend asset maps presented during the first two Public Engagement Events. Table 02 and Table 03 at the end of this section identify the total number of assets in each asset class located in extreme, high, and moderate risk areas as defined above.

### Economic

Assets in this category include office buildings, businesses and industrial parks, manufacturing, warehouses, storage facilities, grocery, restaurants, banks, lodging, storefronts, downtown centers, and seasonal or tourism destinations.

### Health and Social Services

These assets include schools, health care, day care, elder care, emergency operations, government and administrative services, media and communications, police, and fire and rescue.

### Housing

Assets include single-family and multi-family dwellings, supportive housing or group homes, senior housing, and affordable housing.

### Infrastructure Systems

Includes pedestrian, bicycle and vehicular ways, transit, bridges, airports, rail, ferries, gas stations, water distribution and supply, stormwater and wastewater systems, and solid waste and recycling services.

### Natural and Cultural Resources

Includes natural habitats, wetlands and marshes, recreation facilities, parks, public open spaces, religious establishments, libraries, museums, historic landmarks, and performing arts venues.

### Economic

The primary commercial areas in NYCR Massapequas include the Westfield Sunrise Shopping Center, commercial corridors along Merrick Road, Sunrise Highway, Broadway, and Park Boulevard; and the concentration of commercial development at the Massapequa and Massapequa Park Long Island Rail Road (LIRR) stations.

According to the Nassau County Land Use and 2012-2013 assessment data overlaid on the hazard maps, the majority of commercial property value in NYCR Massapequas (64.8%) is located in moderate risk areas, with only 1.5% in extreme risk areas and 0.6% in high risk areas. A full third (33.1%) of commercial property value is located outside of hazard areas. Both industrial and office land uses are most at risk, with a respective 5.8% and 5.5% of property value in extreme risk areas. However, a significant share of industrial property value (54.0%) is located outside of hazard areas, with a majority (60.1%) in moderate risk areas. A full 92.9% of office value is found in moderate risk areas or outside of hazard areas. Only 1.2% of retail property value is found in extreme or high risk areas.
Health and Social Services

Health and social service assets within NYRCR Massapequas encompass both emergency and life safety assets such as police and fire stations, together with administrative assets such as schools and government facilities, libraries, and community centers.

Fortunately, almost all of Massapequas’ Health and Social Services assets are located north of Merrick Road and were largely unaffected by flooding during recent storm events. They are more likely to be impacted by power loss. One exception to this is John Burns Park community center on the Jones Creek which was badly damaged. The community centers at Brady Park and Marjorie Post Park are adjacent to Massapequa Reservoir and Unqua Lake, respectively, but did not flood during the storm.

There are four schools, Birch Lane Elementary, Berner Middle School, Fairfield Elementary, and Massapequa High School that sit on the periphery of the high risk areas, and have encountered limited effects based on nearby flooding. McKenna Elementary School is well-north of the risk areas and serves as an emergency shelter for Nassau County. The Massapequa Library Bar Harbor sits just outside the high risk area and provides internet access for portions of the population who do not have internet access at home and is proximate to senior housing making it a valuable community asset during normal conditions and an ideal location for a community resource center during a storm event.

Although it sits in a moderate flood risk area, the Massapequa Fire Department East End Fire House, services the Massapequa Park and Massapequa II area, a high to extreme risk flood area. When Merrick Road and other roads south of Merrick flood, as they did during Superstorm Sandy, the fire department has limited access to residences on the South Shore peninsulas. In addition to emergency response services, it could serve as a community resource center within walking distance of the part of the community with the highest density of low income families and seniors. Both Massapequa Park Village Hall and Oyster Bay’s Town Hall Annex are outside of the risk areas.

Housing

NYCR Massapequas is primarily a bedroom community for New York City and other business centers on Long Island. Its housing stock is predominantly post-war construction, with the majority built in the single largest decade of Nassau County settlement, between 1950 and 1960. For the Massapequas, construction during that period resulted in 56.1% (11,333 units) of the existing housing, while the following decade added another 15.9% (3,202 units) of today’s stock. Development slowed considerably after 1970 with only 2,371 homes added, or 11.7% of the current stock.

From 2007 to 2011, NYCR Massapequas’ housing stock increased by only 4.3%, to 20,196 units of which 19,336 were occupied by households and 860 were vacant. The housing stock was dominated by 18,462 detached single family homes, with more townhouses, duplexes, and triplexes than units in multifamily structures of 5 apartments or more. Compared to the other four southeast NYRCR Communities in Nassau County or to the country as a whole, the NYCR Massapequas had a much higher proportion of single family homes at 91.4%. The home ownership rate is 93.1% in NYCR Massapequas.

While rental housing represents a relatively low proportion of the housing stock, the majority of the rental housing available lies within the extreme and high risk flood areas as seen in Figure 05.

According to a Housing and Urban Development (HUD) Office of Policy and Research report, Superstorm Sandy resulted in heavy damage to 3,500 housing units in NYCR Massapequas, causing damage in excess of 50% or more of their value. Another 600 units were damaged to between 20% and 50% of their value, and 270 more had damages amounting to less than 20% of their value. Damage was caused mostly by flooding which exceeded four feet in 500 units, ranged between one and four feet in more than 2,100 units, and was less than a foot in 800 others. While most of the peninsulas were affected, damage was particularly severe along Crooks Road and Pirate Cove in eastern Massapequa and on Alhambra Road and Beach Road in western Massapequa.
Figure 05: Rental Housing

Legend
- NYCR Boundary
- Long Island Railroad
- LIRR Station

US Census Blocks, 2010
- < 6 Renter Households
- 6 - 19 Renter Households
- 20 - 49 Renter Households
- 50 - 149 Renter Households
- 150 - 218 Renter Households
- No Data

Data Sources
- ESRI, NOAA
- US Census, Nassau County, NY
- NYS DOS

Created March 2014
Since most modern building codes went into effect in the 1980s, the vast majority of housing is not built to modern code, although conforming alterations and renovations have occurred. In some neighborhoods, land was built up before homes were constructed but others were built at sea level. After Superstorm Sandy, more housing is being elevated in preparation for future storm events.

**Infrastructure Systems**

With the exception of roadways, almost all of the NYRCR Massapequas’ critical infrastructure assets lay outside of the extreme and high flood risk areas. Key infrastructure assets which lie within these areas are restricted to the sewage pump stations. Other infrastructure within the extreme and high risk areas are the outfall pipes, street lights, signals, utility lines, and cell towers.

The LIRR tracks and stations skirt the northern edge of the moderate risk area with gas and oil tanks situated just to the north.

**Natural and Cultural Resources**

Natural assets include habitats, wetlands, and marshes, as well as parks and open spaces. Many of the natural resources have been slowly degraded over the last 100 years, as the population of Nassau County’s south shore communities has nearly tripled from 200,000 in 1940 to more than 1.3 million today. This, along with the intensification of development along the shoreline, has contributed to coastal wetland loss, degradation of tidal marshes, the loss of oyster reefs, and the near total elimination of the beaches and dunes that made up the natural edge of the shoreline.

The Community has several parks located in or adjacent to extreme and high risk flood areas—Alhambra, Colleran and Bayfront Park on South Oyster Bay. Marjorie Post Park and John Burns Park abut Jones Creek and its tributaries. John Burns Park is the most actively used public space, and there are a limited number of other options for the young and old to gather, exercise, socialize, and casually mingle with other members of the community.

Field of Dreams Park on Old Sunrise Highway in Massapequa II also contains athletic facilities and Massapequa Preserve has walking and cycling paths, but John Burns Park is centrally located, easily accessible, and contains one of the only public boat launches in the Community. Most of the other cultural resources, such as religious institutions, museums, libraries and public assembly halls, are located along or near Merrick Road and Sunrise Highway. These are only accessibly by car or on foot, although there are some sidewalk accessibility issues that need to be addressed.
<table>
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<tr>
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<th>Asset Sub-Class</th>
<th>Moderate</th>
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<th>Extreme</th>
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<td>Emergency Services</td>
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<td>Library</td>
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<td>Other Medical</td>
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### Table 03: Summary of Community Assets Located in Risk Areas

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<td>8</td>
<td>0</td>
<td>67</td>
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<td>Natural and Cultural (wetland acres)</td>
<td>24 (17)</td>
<td>7 (59)</td>
<td>7 (34)</td>
<td>38 (110)</td>
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<td>Infrastructure (road miles)</td>
<td>20 (82)</td>
<td>4 (29)</td>
<td>3 (24)</td>
<td>27 (136)</td>
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<td>Housing</td>
<td>5,935</td>
<td>1,976</td>
<td>2,852</td>
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<td>Economic</td>
<td>483</td>
<td>20</td>
<td>38</td>
<td>541</td>
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The Community has more than ten thousand at-risk assets, as illustrated in Table 02 and 03. It was considered impractical to run a quantitative risk assessment for every one of these assets. For this reason, the list of assets examined by the NYS DOS risk assessment tool was refined to consider only key assets that were identified using the critical asset criteria established by FEMA or that were highlighted by Committee member feedback and at Public Engagement Events.

Assets defined by the Committee include schools, pharmacies, libraries, gas stations, community centers, medical facilities and health services, and cell towers. Critical assets defined by FEMA guidelines include buildings, infrastructure, and facilities that are deemed essential to the health and welfare of the community's population and the protection of which is important during and following hazard events. Community Asset locations identified through this methodology are shown in Figure 06.

For each key asset, a community value was assigned based on Committee member input and feedback from Public Engagement Events. A designation of high, medium, or low community value was ascribed based on a number of qualitative measures. These were applied individually and collectively. It should be noted that similar assets in different communities may vary as a result. Qualitative measures for establishing community value include economic benefits (e.g. a key business or employer), services provided (e.g. a grocery store, medical office, pharmacy, or gas station), or a function provided during emergencies (e.g. a library or community center used for food distribution). Generally, community value is identified as:

- **High Value:** Assets that provide multiple important services or functions which could not be easily and quickly replicated in whole or in part, or assets whose loss would impact both long and short term community function.

- **Medium Value:** Assets whose function could be duplicated or replaced by similar assets in adjacent areas, or whose loss could be temporarily tolerated.

- **Low Value:** Assets which play an important role in the community, but whose loss could be tolerated in the short to medium term.

Additionally, each key asset was also screened based on its importance to the Community’s socially vulnerable populations. The finalized key asset inventory is located in Section V, Part D: Community Asset Inventory.
Figure 06: Community Assets

Legend
- NYCR Boundary
- Long Island Rail Road
- LIRR Station
- Parks/Parks
- Retail Commercial Corridor
- Downtown Core
- Identified Asset

New York Department of State Risk Areas
- Extreme
- High
- Moderate

Data Sources
- ESRI, NOAA, US Census, Nassau County, NYS DOS
- Created March 2014
Figure 07: Risk Assessment Map

Legend
- NYROR Boundary
- Long Island Railroad
- LIRR Station
- ESRI, NOAA, US Census, Nassau County, NYS DOS
- Created March 2014

New York Department of State Risk Areas
- Extreme
- High
- Moderate
- Not Assessed
- Downtown Core
- Asset Risk Scores
  - Severe Risk Score (>53)
  - High Risk Score (24-53)
  - Medium Risk Score (6-23)
  - Residual Risk Score (<6)

Data Sources
- ESRI, NOAA, US Census, Nassau County, NYS DOS
- Created March 2014
Assessment of Risk to Assets and Systems

**Assessment Process**

Risk is the potential for an asset or system to be damaged or destroyed in some future event. The Risk Assessment process utilized a quantitative risk tool provided by New York State to assess the risk (primarily flood risk) to each of the key assets identified for the Community. This tool evaluates risk by considering a combination of three factors: hazards, exposure, and vulnerability. These three factors are used to calculate a risk score, based on the formula:

\[ \text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability} \]

- **Hazard**: Hazard is a measure of the likelihood and magnitude of future storm events. Hazards are based on the aggregated risk maps used for the asset inventory, which identify and rate geographic areas susceptible to future inundation or erosion. Risk areas are categorized as Extreme, High, or Moderate based on the frequency and magnitude of coastal threats.

- **Exposure**: Local topographic and shoreline conditions can increase or decrease the effect of hazards on assets. Exposure is the measure of this influence on potential storm impacts. The tool assesses landscape attributes such as erosion rate, beach width, and the presence and condition of natural or engineered protective features to determine asset exposure.

- **Vulnerability**: Vulnerability reflects the level of impairment or consequences that assets may experience during and after a storm event. It is the measure of an asset’s ability to resist damage. In the context of vulnerable populations, it reflects the difficulty of evacuation or relocation relative to population size. Vulnerability was determined by studying previous storm impacts and using local knowledge to develop an estimate of future effects.

The hazard and vulnerability scores for each asset were assessed based on guidance provided with the risk assessment tool and augmented with input from the NYRCR Massapequas Planning Committee. The risk assessment tool was also modified slightly to reflect the fact that the Community does not have significant beach-type coastal defenses, and the tool’s designated landscape attributes could not be applied to individual assets. For more information on the NY State Risk Assessment Tool, please see Guidance for NY Rising Community Reconstruction Plans: A Planning Toolkit for CR Planning Committees (2013).

**Findings**

Flooding is a significant risk for the areas of NYRCR Massapequas that abut the bay. The Community has almost 5,000 assets in the high and extreme risk areas which are a large proportion of the areas south of Merrick Road. In NYRCR Massapequas, these are predominantly residential streets of single family homes and waterfront parkland together with the pump stations that support each neighborhood. Clearly providing as much flood risk protection to these assets as can be reasonably afforded and maintaining access for household evacuation are critical requirements for the community.

Through the public engagement process, more than 50 key assets were identified and the risk assessment process helped to identify which of those assets had increased potential for storm damage. These assets are identified in Table 04 categorized by asset class and were used to help develop projects for the NYCR Plan. It should be noted that Risk Scores include some subjective analysis, and rely on previous experience to determine future risk. The Risk Score calculated for each key asset represents risk relative to other assets in the Community, and can range from 1.5 (negligible) to 75 (severe).

The location of at-risk assets and their respective risk scores can be seen in Figure 07.
<table>
<thead>
<tr>
<th>Asset Name</th>
<th>Asset Class</th>
<th>Critical Facility</th>
<th>Community Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Station - Alhambra &amp; Park Ln</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Pump Station - Roosevelt &amp; Spray St</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Pump Station - Cedar &amp; Highland St</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Fire Department East End</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Fire Department Headquarters</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa LIRR</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Park LIRR</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Downtown Essential</td>
<td>Economic</td>
<td>No</td>
<td>High</td>
</tr>
<tr>
<td>Peninsula Golf Club</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>Low</td>
</tr>
<tr>
<td>Pump station - Biltmore &amp; Beverly Rd</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Pump Station - Kings Walk &amp; Whitewood</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Colleran Park</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Cell Tower - 40 Cammans Rd</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Cell Tower - Sunrise Hwy &amp; Rt 107</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Cell Tower - Village Hall 151 Front St</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Cell Tower - Water Utility Massapequa Ave &amp; May Pl</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Downtown Cultural</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa High School</td>
<td>Health &amp; Social</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa Library Bar Harbor</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>High</td>
</tr>
<tr>
<td>Town of Oyster Bay Yard</td>
<td>Infrastructure</td>
<td>Yes</td>
<td>Medium</td>
</tr>
<tr>
<td>Temple Sinai Of Massapequa</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Alhambra Marine Services</td>
<td>Economic</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Alhambra Park / Kayak Launch</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Bayfront Park</td>
<td>Natural &amp; Cultural</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Sunrise/Park Mobility</td>
<td>Economic</td>
<td>No</td>
<td>Medium</td>
</tr>
</tbody>
</table>
B. Assessment of Needs and Opportunities

The needs and opportunities identified in this section provide a basis for the strategies and projects proposed for Massapequa I, Massapequa Park, and Massapequa II to improve local economic growth and enhance resiliency to future storms. Needs and opportunities were identified through a combination of research, analysis, and community input. They have been organized according to the FEMA National Disaster Recovery Framework’s six Recovery Support Functions: Community Planning and Capacity Building, Economic Development, Health and Social Services, Housing, Infrastructure, and Natural and Cultural Resources. The strategies and projects proposed within the plan combine repair efforts with long-range planning for recovery and growth.

<table>
<thead>
<tr>
<th>Recovery Support Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Reconstruction and Resiliency Strategies in the NYRCR Massapequas Plan were developed in accordance with FEMA’s National Recovery Framework’s six Recovery Support Functions, which include both traditional repair efforts and long-term planning goals.</td>
</tr>
<tr>
<td><strong>Community Planning and Capacity Building</strong>: This recovery function addresses a community’s ability to implement recovery actions while planning for future storm events. It includes public education and preparedness, legislative and regulatory concerns for vulnerable populations, and building code and land use regulations that may influence future rebuilding and recovery.</td>
</tr>
<tr>
<td><strong>Economic Development</strong>: A disaster can severely disrupt economic and business activities and the development of new economic opportunities. This recovery function considers the needs of local business and institutions to recover or relocate following a storm event and identifies development plans that may have been stalled as a result. It should also highlight investments that can provide both economic growth and greater resilience in the community.</td>
</tr>
<tr>
<td><strong>Health and Social Services</strong>: This recovery function considers the strategies and management measures needed to ensure that health care facilities and essential social services are accessible at an appropriate level. These measures are specifically important to protecting the health and wellbeing of socially vulnerable populations. Long-term effects are also relevant, such as post-disaster health impacts on residents and recovery workers.</td>
</tr>
<tr>
<td><strong>Housing</strong>: The housing recovery support function establishes needs and opportunities relative to community housing goals, prioritizing damaged and at-risk areas. The type and location of housing should consider current and expected demand, the availability of rental and non-rental units, and the range of housing available relative to community income levels. The effects of previous events on building code requirements can also significantly impact housing-related needs.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong>: Infrastructure recovery and support includes upgrades to a range of essential services, from flood control measures to wastewater treatment facilities. These issues should closely align with the community assets identified by the asset inventory, and recovery efforts should focus on opportunities to rebuild in a way that decreases vulnerability to future impacts.</td>
</tr>
<tr>
<td><strong>Natural and Cultural Resources</strong>: This recovery function addresses damage to natural and cultural resources and the actions that should be taken to preserve, rehabilitate, or restore these assets or services to their initial state. Natural systems have been shown to mitigate storm impacts and offer significant environmental and commercial benefits such as stormwater management and recreational opportunities.</td>
</tr>
</tbody>
</table>
Community Planning and Capacity Building

NYRCR Massapequas’ community planning and capacity building is focused on the Community’s ability to implement recovery actions while planning for future storm events. The primary emphasis is on the need for public education and preparedness, legislative and regulatory reform, and building code and land use regulation updates that reflect current vulnerabilities and recent storm experience.

Community Planning and Capacity Building Needs

Emergency communication and response issues were frequently mentioned by the community at the NYRCR Massapequas’ Public Engagement Events. Nassau County, the Town of Oyster Bay, and the Village of Massapequa Park have established emergency notification systems to deliver information by email, phone, and text message to individuals in affected areas. These notification systems are based on publicly listed telephone numbers and require residents to register for text message or email updates. In addition, the Town of Oyster Bay and Nassau County OEM assists residents with hurricane preparedness by distributing pamphlets annually. Although there is emergency preparedness information on their websites, immediately prior to and during major storm events the local and county governments rely primarily on media outlets to disseminate the most current information about designated evacuation areas and shelter locations.

During Superstorm Sandy, many residents stated that they were not aware of emergency evacuation routes and shelter locations within their community, and they did not know what to do to secure their properties and vehicles against damage prior to evacuation. Based on the Public Engagement Events and an NYRCR business survey in the NYRCR Massapequas, home and business owners did not, and may still not, understand the degree to which they are at risk from a storm event like Superstorm Sandy; therefore, they may not take the appropriate measures to protect themselves and their property.

Public education and a more effective emergency information system are needed to help minimize losses from future storms.

Currently, Nassau County maintains four designated evacuation routes for south shore residents, which run from Long Beach and Jones Beach Islands to public shelters opened by the American Red Cross in partnership with Nassau County in Garden City and Farmingdale. After Superstorm Sandy, additional shelters were established in Levittown, Manhasset, New Hyde Park, Plainview, and Syosset. At the time of the storm, local access to major evacuation routes had not been established. Residents who did not adhere to the mandatory evacuation struggled to navigate unlit and flooded streets when leaving their homes as downed trees and utility lines prevented passage on commonly used routes. Although plain clothes Police Officers were stationed in unmarked cars to watch for looters, community members also commented that the combination of unlit streets and sense that there was a lack of Nassau County Police Department presence in damaged and evacuated areas left the community feeling insecure.

Residents commented that municipal services and utility companies were slow to respond in the immediate wake of Superstorm Sandy, but that local sanitation, fire, and school districts were relatively quick to resume operations shortly thereafter, and debris removal was perceived as being very effective under the circumstances. Community members also voiced concerns that electric and gas utilities were slow to address potentially dangerous leaks and outages.

Based on reports by the Committee, flooded roadways and communication issues made it difficult for emergency responders to effectively identify areas of need and provide aid to community members affected by Superstorm Sandy. Community Resource Centers were open and accessible by residents in their cars from 9:00 AM to between 3:00 PM and 4:30 PM in public facilities throughout the Town of Oyster Bay, including the Oyster Bay Senior Center, Our Lady of Lourdes School in Massapequa Park, and the Massapequa Park Senior Center. During and after the storm, a Red Cross Shelter was opened at McKenna Elementary School.
Community Planning and Capacity Building Opportunities

After Superstorm Sandy, residents expressed interest in citizen engagement opportunities to better protect themselves and their communities against future storms. In response to the growing interest in preparedness and resiliency education, the Governors Citizen Corps Initiative/Training was established and the Governor, in coordination with Nassau County, hosted a Citizen Corps training on February 22, 2014 at the Bethpage High School. This was the third training in this initiative which brought more than 500 residents to the course. Tapping into a comprehensive public education program like this one could help community members understand the risks they may face during a storm event as well as the benefits of various flood mitigation measures. These include safety measures for property owners during and after major storm events.

NYRCR Massapequas has a number of facilities such as community resource centers at Marjorie Post and Brady Parks and libraries that could be adapted for use during an emergency. Tapping into these facilities as official community assistance centers and outfitting the buildings with permanent generators and a stock of emergency supplies. These facilities could also be used as sites for public outreach and education and as central locations for all resiliency-related information services.

Community Needs

Community Planning and Capacity Building

- Coordination among emergency notification services to better provide residents with adequate information for storm preparation and evacuation procedures.
- Additional educational opportunities for community members who may be unaware of the degree to which they are at risk and failed to take the proper measures for personal security and property protection from future storms.
- Evacuation routes, and a sufficient number of designated emergency shelters and community resource centers, are not clearly highlighted in the community.
- Robust communication between municipalities and utility companies during times of disasters or storm related events.
- More effective communication between emergency response services and community members affected by Superstorm Sandy.

Community Opportunities

Community Planning and Capacity Building

- Coordinated emergency notifications among Nassau County, the Town of Oyster Bay, the Village of Massapequa Park, and private entities during emergency events.
- Expanded and improved existing comprehensive public education programs to teach residents and business owners about resilience, recovery, and emergency preparedness.
- Utilization of facilities such as community resource centers and/or resiliency education centers equipped with generators and stocked with emergency supplies.

Downed power lines caused by Superstorm Sandy (source: Robert Beckerle)
Economic Development

A disaster can severely disrupt economic and business activities and hinder the development of new economic opportunities. This section reviews the economic damage caused by Superstorm Sandy and the associated needs and opportunities tied to future economic prosperity.

Economic Development Needs

According to the U.S. Small Business Administration, only 32 of the 124 businesses in NYCR Massapequas that were severely affected by Superstorm Sandy received aid. According to members of the Committee, many business owners have either used their own funds to reopen while waiting for government grants and insurance payments or have tried to sell their damaged property. Many small businesses have worked quickly to restore operations and recover revenue flows, and in the rush to rebuild they may not have considered measures for resilience. Rebuilding and redevelopment plans with a focus on mitigation activities are needed to protect NYCR Massapequas’ commercial sector from future storm damage, particularly along Merrick Road. This includes incentives for flood protection measures in new and existing properties, and development policies that promote growth outside of risk areas.

High taxes are commonly cited as an impediment to doing business in the Massapequas and elsewhere in Nassau County. According to assessment data provided by Nassau County, non-residential parcels in NYCR Massapequas number 960 (4.8%), and account for 49.0% of the total assessed value in the area. Unfortunately, the largest and most valuable of these properties are either institutional properties or open space use types that are exempt from property taxes. Consequently, while these institutional and open space uses provide value to the community, the $19 million of non-residential assessed value does not contribute to municipal tax rolls. Retail, industrial, mixed-use, vacant commercial, and vacant industrial properties constitute 720 of NYCR Massapequas’ non-residential parcels. While these properties represent 3.6% of all parcels within the community, they provide 16.8% of assessed land value and 17.1% of total assessed value. Residents have expressed concern that those commercial properties damaged by the storm that have remained vacant risk acquisition by non-taxable owners. Increased commercial development would help to offset the prevalence of tax exempt properties which result in limited property tax revenue and increasing tax rates for property owners.

In 2002, employers in NYR Massapequas employed 12,974 workers. Despite job losses in 2006 and 2009, local employment has increased by 1,654 (12.7%) from 2002 to peak at 14,628 workers in 2011. The majority of the local workforce commutes in to Massapequa and Massapequa Park from elsewhere in the region. Less than one in every five local jobs is held by a NYR Massapequas resident (18.7%), with the single largest share of workers (13.8%) coming from New York City. Most Massapequa and Massapequa Park residents work outside of the community in high paying service industries. More than half (54.9%) of residents earn more than $3,333 per month, compared with a quarter (27.3%) of regional workers employed locally. Local residents were largely unaffected by the national recession, and the number of working residents has expanded from 27,321 in 2002 to 30,705 in 2011, a gain of 3,384 jobs (12.3%) over the nine-year period. A large majority of residents are employed in service sectors (71.1%), followed by trade, transportation and utility (20.4%), and finance and insurance sectors (6.2%). Regional employment projections indicate growing demand for workers in both unskilled service occupations and skilled professions and more than half of these jobs will pay less than $20 per hour.
Community Needs

Economic Development
- Incorporation of resiliency measures by local businesses as they rebuild and reopen, to better protect them against future storms.
- Help for local business owners who experienced storm damage to their homes and businesses to help them repair both properties.
- Increased commercial development to offset the prevalence of tax exempt properties which result in limited property tax revenue and increasing tax rates for property owners.
- Increased affordable housing options for local workers being paid less than $20 per hour.

Economic Development Opportunities

Largely due to the presence of the Westfield Sunrise Shopping Center, NYRCR Massapequas reported $1.15 billion in retail sales in 2012, $244 million more than expected given its population and disposable income. Despite overall coverage across all sectors, there are still opportunities to capture existing market demand and strengthen local commercial corridors. In particular, there is an estimated $31 million in annual unmet demand for food and drink places, $25 million for grocery stores, and $23.6 million in unmet demand for health and personal care stores. Additionally, demand exists for larger ticket items such as furniture and furnishings and electronics.

The 1.2 million square foot Westfield Sunrise Shopping Center was constructed in 1973 along the Sunrise Highway in the Town of Oyster Bay. It is estimated that the mall had more than $367 million in sales in 2013 from clothing and department stores alone. It is a significant economic driver in the community and located outside of any hazard areas. The area surrounding the mall presents a great opportunity for additional commercial development, as most parcels are vacant and accessible from the highway. The areas immediately surrounding the mall contain the highest minority and proportionally lower-income populations in NYCRC Massapequas, as well as the greatest number multifamily housing units such as the Oakley Avenue apartments in Massapequa II.

Despite being located along the LIRR, there is no nearby station and the area is currently only served by the intra-county bus. Transportation access for the socially vulnerable populations in Massapequa II would be significantly enhanced by introducing a new local LIRR station. A new station would also provide increased access for the rest of the community to the mall and enhance the future redevelopment potential in the area.

Both the Massapequa and Massapequa Park LIRR stations are surrounded by concentrations of commercial development with the character of a traditional village downtown. Although mostly single story, these areas are generally compact and walkable, and connect the station area and Sunrise Highway to the north-south retail corridors of Broadway, Hicksville Road, and Park Boulevard. Compact transit oriented development (TOD) including a mix of uses such as “next generation” housing for first time home buyers and young professionals along with commercial properties around both station areas could stimulate economic growth and diversify the commercial tax base without disrupting existing residential areas. Based on existing demand, there is potential to add and expand local retail services as well as medical services.

There is also an opportunity to integrate workforce readiness programs with already established programs such as local schools or job training facilities and to work with local businesses to create opportunities for job placement.
Community Opportunities

Economic Development

- Creation of a new LIRR Station at the Westfield Sunrise Shopping Center to provide public transportation access to the mall and incentivize development in adjacent vacant commercial properties.
- Commercial and residential infill development near the Massapequa and Massapequa Park LIRR stations with new businesses and additional housing options to expand and diversify the commercial tax base.
- Workforce development initiatives modeled on Connect Long Island’s Strategic Regional Implementation Plan.

Health and Social Services

Health and social service strategies and management measures focus on the need to ensure that NYRCR Massapequas’ healthcare facilities and essential social services can meet needs of all community members. This includes the immediate and long-term needs of aging populations and individuals affected by previous disasters as well as opportunities to promote health and wellbeing for all members of the Community.

Health and Social Services Needs

Better communication is necessary to ensure that the healthcare needs of NYRCR Massapequas’ residents are met. Many residents are not aware of the resources available to them, despite the efforts of healthcare organizations to ensure effective outreach across all population groups. Sources of accurate information can be difficult to identify, and may be not be updated regularly. Stronger connections with underserved communities, through both formal and informal networks such as local community organizations and religious institutions and their constituencies, are needed to help distribute public health information to all of NYRCR Massapequas’ residents.

Before Superstorm Sandy, NYRCR Massapequas already lacked a significant local medical facility. Half of the smaller facilities, such as dental offices and physical therapists are located in areas of moderate risk. New medical and health facilities should be located outside of risk areas, in particular the community would benefit from additional medical options for seniors during emergencies.

Social services at publicly accessible parks and community centers that serve all members of the communities as community resource centers during emergencies can also provide benefits to young adults and the elderly on a regular basis.

Older adults have encountered many challenges accessing health and social services, homecare, food, and social support in the aftermath of Superstorm Sandy. These challenges may contribute to physical and cognitive decline. The storm’s effects on the informal home care and home service economy have also disadvantaged senior residents, especially those who are homebound or require minor assistance to perform daily living activities. Funding for these resources has either diminished or remains unchanged in the post-storm environment.

Low-income residents may lack resources to evacuate, and are more likely to be under-insured. Geographic isolation can also contribute to these barriers, as residents without access to a car and with limited access to public transportation are less able to obtain the services they need. Language and cultural barriers may prevent affected community members from seeking help, while citizenship or legal status may discourage individuals from accessing care due to fear of interacting with authority figure or public institutions.
Health and Social Services Opportunities

NYRCR Massapequas should improve and expand public open spaces and recreational assets for all age groups as a means to promote the well-being of its community members, building on assets at John Burns, Brady, and Marjorie Post Parks; Massapequa Preserve; and numerous smaller parks. By making use of its existing public spaces such as parks, community centers, libraries, places of worship and schools, the community can foster activities that promote social interaction. These facilities can be used for community outreach and education campaigns and appropriate sites can be repurposed for use as emergency shelters and information centers. Outreach events should be provided in multiple languages to increase attendance and participation. As the senior population in NYRCR Massapequas expands, programs to foster social connection and physical activity become more important.

Housing

This section outlines the impact of recent storm damage to the local housing stock and the trends or events which may affect the housing stock in upcoming years.

Housing Needs

Many damage estimates and subsequent payouts have not accurately captured the extent of repair work needed. Despite the numerous sources of Federal and State recovery funding, it is unknown if these programs have provided sufficient aid to meet the needs of recovering property owners in the community. It is likely that a significant fraction of the costs were borne by homeowners, as many residents are not covered by disaster assistance or private insurance.

In response, the NY Rising Housing Recovery Program began to provide aid to homeowners in January 2014, with aid going to an increasing number of individuals in subsequent months. FEMA provides assistance based upon the estimated costs to make critical repairs, not the cost to fully restore a property to its prior condition. Compared to U.S. Small Business Administration (SBA) estimates for

Community Needs

Health and Social Services

- Improved communication about available resources for health care and local organizations providing health and social service resources.
- Improved access to health care and social interaction for senior community members with limited mobility.
- Improved access to health and social services for low-income and minority groups, particularly for non-English speaking residents who face social and geographic isolation.

Community Opportunities

Health and Social Services

- Increased coordination and partnerships among hospitals and community based organizations to ensure that all community members have access to recovery resources.
- A program to investigate and address post-storm health issues and provide support for households and community members that are vulnerable to post-storm health impacts.
- Increased community recreation options to promote physical activity and provide play spaces for children within walking distance of schools and residential neighborhoods.
- Utilization of public spaces, community centers, and places of worship for community outreach, education campaigns, and as local disaster centers in emergency situations.
- Programs to provide support and assistance to elderly residents, especially those who are homebound.
real property damage in New York State, FEMA dramatically underreports the value of damages to homeowners.36 Since FEMA aid is directed primarily to owner-occupied properties, its estimates underestimate damage to rental housing stock. Of the 1,339 rental units in the Community, 331 rental units received FEMA aid for Superstorm Sandy recovery. The rental units receiving assistance represented only 8.9% of NYRCR Massapequas’ FEMA assisted housing stock. In high and extreme risk areas, where inundation during Superstorm Sandy was the highest, there are 180 rental units, which represent 6.5% of all housing stock in those areas. It is not known how many affected households relocated temporarily to rental stock in NYRCR Massapequas during reconstruction, or left the community to stay elsewhere.

Rental housing options should also be expanded to include more diversity in age and income groups. Currently 77% of rental households are low income residents.37 The Governor’s Office of Storm Recovery currently operates the NY Rising Housing and Recovery Program, which issues housing reconstruction assistance to eligible owners of homes that suffered substantial damage during Hurricane Irene or Superstorm Sandy. Homeowners receive grants to repair or reconstruct homes to minimum standards and receive certain improvements to increase resiliency. This grant also pays for home elevation for properties located within the 100-year floodplain. As of March 11, 2014, $201 million had been distributed to 4,650 Nassau County residents. The deadline for all applications was April 11, 2014.38

NYRCR Massapequas’ housing market has seen a sharp decline in asking prices in the wake of Superstorm Sandy, a rise in vacancies, an increase in housing foreclosures, and the demolition of properties, particularly south of Merrick Road. While some houses in the Community have been repaired, and in some cases improved and raised, others remain damaged and uninhabitable. These units pose a risk to the health and safety of residents, and can negatively impact neighborhood property values. The community’s tax base has lost value, and residents have lost equity in housing assets that, coupled with repair costs, have severely constrained their budgets. With the potential for destruction caused by another storm of the magnitude similar to Superstorm Sandy’s, many homeowners may not have the resources to recover again. NYRCR Massapequas is expected to experience modest growth over the next five years, increasing in population by only about 1.7%.39 As new housing is built, it is critical that development is guided by strategies for community resilience with a focus on housing built outside of hazard areas and storm-resistant housing if rebuilding happens in the southern part of the Community.

### Community Needs

**Housing**

- Programs to support public disaster relief and adequate support from private insurance to repair and restore damaged properties to pre-storm conditions.
- Expanded rental options that are outside of extreme and high risk areas.
- Increased economic stability to repair a weakened housing market and relieve the financial strain caused by high taxes on individual property owners already burdened with repair costs.
- More resilient housing options for a growing demand for owner-occupied housing for a predominantly middle-aged and elderly population.
Housing Opportunities

Although feedback from the NYRCR public engagement process expressed mixed levels of support for multifamily housing development and infill, large surface parking lots in upland areas along Sunrise Highway at Westfield Sunrise Shopping Center, as well as the Massapequa and Massapequa Park LIRR stations make up the few remaining sites available for multi-family and rental developments. Developments at these locations would present transitioning opportunities for some older residents who no longer want to maintain large homes or bear the associated costs of maintenance, but who wish to remain in the Community. The market scan conducted during this study indicates that NYRCR Massapequas is forecast to expand by more than 330 households over the next decade. Given the NYRCR Massapequas’ vision statement and desire to retain a long-term residential base, younger residents can be attracted by multifamily options linked to transit and near to commercial developments at the Massapequa and Massapequa Park LIRR stations. Low income renters may also choose to relocate from apartments damaged by Superstorm Sandy or at risk for future storm events.

Based on 2010 U.S. Census data, a majority of NYRCR Massapequas’ renters are low income. Most of this rental housing is located within the risk zones. In order to protect socially vulnerable populations, priority should be given to acquiring or repairing buildings, relocating households, and assisting the owners of buildings where a disproportionate share of units are occupied by low income residents. If Low Income Housing Tax Credits (LIHTC) are used in the construction of multifamily Transit-Oriented Development (TOD) buildings, a fixed percentage of units will be designated for low income occupants in the development or off-site in resilient housing. For properties damaged beyond repair, an incentivized housing acquisition program could be implemented to return residential land in extreme risk areas to a natural undeveloped state. The existing NY Rising Acquisition Programs could be further promoted and leveraged to acquire houses that are still substantially damaged and are at high risk due to repeated flooding. Currently, Nassau County participates in HUD’s HOME Investment Partnerships Program (HOME), which enables municipalities to buy and/or rehabilitate homes to provide decent and affordable housing. However, the program could be amended to offer acquisition of housing at above pre-storm values for demolition of damaged structures and retention of land as a coastal buffer zone. An additional incentive to encourage the acquisition of clusters of contiguous properties could be included. These opportunities are likely to increase the flood resilience of the overall Community while providing recreational opportunities. In high risk zones, property acquisitions could be offered at pre-storm value for redevelopment as resilient green housing.

Future development plans should consider targeting undeveloped land and surface parking lots within a quarter-mile of the Massapequa and Massapequa Park LIRR stations in order to improve walkability and access to transit. These undeveloped parcels provide the greatest opportunities for infill development, but they may need to be rezoned in order to accommodate multifamily or mixed-use development. Incentives and financing could be offered to attract private investment, and future residents would have the advantage of frequent and direct rail service to Manhattan, and access to the variety of commercial and community services. Offered at market competitive rates, these units could attract and retain younger households in the commuter workforce.
Community Opportunities

Housing

- Expanding the voluntary buyout and acquisitions housing program to provide incentives for property owners in extreme and high risk areas to rebuild in accordance with green building standards.
- Redevelopment of large surface parking lots along Sunrise Highway at Westfield Sunrise Shopping Center around the Massapequa and Massapequa Park LIRR stations to diversity housing options and take advantage of existing infill opportunities in upland areas.
- Locate continuing care residential development for aging residents near access to transit, walkable amenities, and outside of risk areas. Pair new developments with incentivized buyout and relocation services by expanding the voluntary buyout and acquisitions housing program.
- Post storm security for neighborhoods after evacuation.

Infrastructure

Rebuilding and recovery efforts will need to focus on essential infrastructure services such as water, wastewater, energy, and transportation that were damaged or destroyed by Superstorm Sandy. This includes both the need to strengthen and protect critical infrastructure assets in risk areas and to meet the community’s current and projected demand in a way that encourages resilience and economic growth.

Infrastructure Needs

Flooding in NYRCR Massapequas is not limited to major storm events. It is a regular occurrence during heavy rainfall and high tides in many areas south of Merrick Road. Regular flooding has also been reported on the east end of Front Street north of Sunrise Highway in Massapequa Park. The large area of impervious surfaces in NYRCR Massapequas, particularly in commercial areas with large surface parking lots, prevents stormwater from infiltrating the ground naturally and creates the need for storm sewers to manage flooding. During heavy rainfall events, storm sewers are often overwhelmed, leading to localized flooding throughout the community. These situations are exacerbated by a frequent need for inspection, as trash and debris blocks stormwater from entering the storm sewer system, trapping water in roadways and yards.

Strategies for increasing surface permeability are needed to help mitigate stormwater flooding issues. In low-lying areas, streets can become impassable during regular storm events. This impedes the mobility of people and goods and limits local parking capacity. In major events like Superstorm Sandy, flooded roadways prevent emergency responders from accessing residents in need and leave evacuating residents stranded or burning houses unaided. NYCR Massapequas land use is predominantly auto-oriented, and residents have to rely primarily on their cars for transportation. Effective evacuation routes and safe, adequate parking areas are needed to prevent damage and ensure the safety of community members.
Aging and decaying bulkheads are no longer adequate to prevent flooding in NYRCR Massapequas. Many bulkheads in the community have exceeded their maximum lifespan, and some older bulkheads are too low to adequately protect against storm surge, allowing water to pass over them and cause damage to adjacent properties. Many of these older bulkheads have not been raised to current code requirements, causing significant erosion, property damage and increased flood levels. Height regulations are typically enforced when bulkheads are new or being replaced, but uniform enforcement is needed to ensure that bulkhead structures are effective.

Unmanaged vegetation along streets and around power lines can damage energy and transportation infrastructure during major storms. Power lines damaged by wind or felled by trees and branches result in outages, and can create hazardous environments if still energized. Customers in affected areas must wait for damaged assets to be identified and serviced before their power is restored; a process that may take several days and typically took longer in the aftermath of Superstorm Sandy. Likewise, streets can become blocked and impassable until municipal or private repair crews can clear the way. Road and utility right-of-ways in NYRCR Massapequas are owned and managed by a number of private and public entities across multiple jurisdictions. Identifying and contacting the correct party responsible for maintenance in a specific location is challenging and sometimes leads to substantial delays in repair work.

In response to the recurring nature and increasing severity of storms, general mitigation initiatives have been proposed by the Long Island Power Authority (LIPA) and the Public Service Enterprise Group (PSEG) to protect assets from future damage: Substations at risk of flooding will be temporarily protected by emergency flood barriers, and mobile generators and switchgear will be used to carry customer load as substations are individually rebuilt and elevated. The utility company plans to increase vegetation management efforts, shorten the time between trimmings, and expand clearance areas around power lines to prevent damage from surrounding trees. Upgrades to strengthen utility poles and wires are also planned for high risk areas. Enhanced technology will be used to allow rerouting around damaged equipment and to expedite the damage assessment and restoration process by providing outage detection and location capabilities.

Since 2001, LIPA has contracted for the addition of more than 2,000 MW of supply capability to meet projected electricity demand throughout Long Island. This includes the addition of thirteen new generating stations on the island and two submarine transmission cables that connect the local grid to surrounding power markets, through which additional capacity can be purchased. LIPA/PSEG plans to have sufficient capacity to meet demand through 2020, primarily through energy efficiency measures currently being implemented.

Without energy efficiency investments, LIPA/PSEG expects peak load to increase an average of 144 MW (2.2%) annually. Energy efficiency and demand response measures would reduce growth to 1.4% on average per year. However, it is likely that the utility will eventually need to add additional generation resources on the island. The utility has historically relied on short-term purchases from the statewide capacity market to meet demand within the required reserve margin. Given the current surplus of energy and cost-effective capacity on the market, it is likely that LIPA will continue to pursue this strategy as necessary.

Plans to harden the Cedar Creek WPCP in Wantagh are also necessary in order to address the water treatment needs of NYRCR Massapequas.
The Massapequas NY Rising Community Reconstruction Plan

Assessment of Risk and Needs

Capabilities among public entities, priorities can be established and resources shared in emergency situations. Private entities such as utility companies could be incentivized to participate by offering expedited permitting. Information sharing protocols could reduce overlap and efficiency during regular operations by facilitating communication and reducing redundant work, ultimately lowering tax and ratepayer costs.

During the NYRCR Massapequas public engagement process, critical roadways were identified in southern neighborhoods where flooding has the greatest effect on mobility. Improvements to these key roadways could be coordinated with local evacuation routes and prioritized for debris removal following emergency weather events. In addition to being well publicized to residents, routes should be clearly marked and directions to higher ground, community resource centers, safe parking areas, and emergency shelters should be provided. Traffic signals and shelter lighting along these critical routes should incorporate alternative power and backup batteries to maintain function in the event of a power outage.

Recovery and reconstruction efforts concentrated on transportation could be coupled with street improvements to make NYRCR Massapequas more inviting to pedestrian activities. Many streets in the community do not have sidewalks. Even the downtown areas, including those around the Massapequa and Massapequa Park LIRR stations, do not have a completely accessible, efficient, and pedestrian friendly sidewalk network. Wide streets and signal problems create uncomfortable conditions for pedestrians with long and potentially dangerous crossings. Increasing sidewalk connections and introducing traffic-calming measures, such as medians and curb extensions, can improve pedestrian and driver safety, while making walking a more attractive and enjoyable for residents and visitors. Street improvements in the downtown commercial areas can help local businesses attract more customers by increasing visibility and access.

Community Needs

Infrastructure
- Clear and reliable contact information for those responsible for infrastructure maintenance and repair work.
- Safe and passable roadways in areas that are low-lying and suffer from routine flooding, high tides, heavy rainfall, and major storm events.
- Improved storm sewer capacity to manage runoff and increased areas of permeable surfaces in the community allow stormwater to infiltrate the ground naturally and create a redundant drainage system.
- Uniform and functional bulkheads to protect against coastal flooding and erosion issues.
- Improved mobility options for residents who do not have access to a vehicle.
- Upgrades to electricity infrastructure assets.
- Additional local generation capacity combined with energy efficiency measures to meet future demand.
- Improved street lighting (more lights on each street and backup power for lights on major evacuation routes).
- Pump station back-up power to prevent flooding along major roadways.

Infrastructure Opportunities
Long Island's aging infrastructure will make it difficult to accommodate the growing demand while adapting to the increasing threat of storm events and the potential for sea level rise. Roads, bulkheads, and power and gas lines have been particularly affected by flooding and storm damage. Hard infrastructure projects like back-flow preventers and updated pump stations in conjunction with green infrastructure like bio-swales have the potential to dramatically improve drainage within NYRCR Massapequas.

Building upon the existing hurricane evacuation routes can provide the structure for cooperation and accountability across transportation jurisdictions, allocating responsibilities between state, county, and municipal governments for maintenance and disaster recovery work. By identifying existing capabilities among public entities, priorities can be established and resources shared in emergency situations. Private entities such as utility companies could be incentivized to participate by offering expedited permitting. Information sharing protocols could reduce overlap and efficiency during regular operations by facilitating communication and reducing redundant work, ultimately lowering tax and ratepayer costs.

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Natural and Cultural Resources

Natural and cultural resource issues involve the impact of Superstorm Sandy on NYRCR Massapequas’ natural systems and the services these systems provide. They address the need for the repair and restoration of both natural assets such as dunes and tidal wetlands and cultural amenities such as public beaches and parkland. Additionally, these issues present opportunities for the use of natural systems to reduce vulnerability and foster increased community resilience. In a waterfront community with limited public open space, these parks are valuable assets for residents without private water access and present opportunities to develop and expand tourism activities; incorporate water retention and drainage; respond naturally to coastal processes; and expand existing recreational uses.

Natural and Cultural Resources Needs

Inconsistent bulkhead height and irregular maintenance have allowed water to seep in at sporadic intervals that cannot be removed without pumping and other efforts. Additionally, the high proportion of impermeable surfaces, particularly large surface parking lots, has limited the effectiveness of natural drainage systems in the community including natural basins like those of the Massapequa and Tackapausha Nature Preserves.

Natural Systems approaches increase resilience through the restoration and enhancement of natural assets typically costs less than hard infrastructure solutions, and are good for the environment. A softer shoreline with wetlands or other natural features would allow for erosion prevention protections from storm surge while consistent bulkhead heights, as well as the introduction of permeable pavement within the flood zone, would more effectively protect areas now affected by regular tidal flooding. Since they require regional coordination and time for implementation, it is important to begin thinking about these solutions early.

Community Opportunities

Infrastructure

- Coordinated roadway management plan for existing hurricane evacuation routes to coordinate maintenance and recovery work across transportation jurisdictions and utility areas.
- Critical roadway elevations on residential roadways in risk areas that feed into existing hurricane evacuation routes to maintain transportation access during flood events.
- Designated emergency parking areas in large existing surface parking areas along Sunrise Highway at Westfield Sunrise Shopping Center and the Massapequa and Massapequa Park LIRR stations so evacuating residents can safely store their vehicles.
- Targeted street improvements in conjunction with ongoing repair and recovery work to increase pedestrian access, specifically in downtown commercial areas.
- Pursue federal funding for infrastructure damage restoration and damage mitigation projects.
- Explore alternative power opportunities such as micro-grids for improved access to power and increased flexibility during and after storm events.
- Create redundancies to the existing stormwater management system through green infrastructure interventions such as permeable paving, bio-swales, infiltration ponds, and restored wetlands.
- Improve upon existing stormwater management systems by improving flood valves, outfall pipe linings, and adding additional sumps at appropriate identified locations.
Natural and Cultural Resources Opportunities

Natural systems soften the impact of storms and manage stormwater throughout a variety of techniques including the restoration and expansion of wetlands and tidal marshes. It is estimated that an acre of wetland can store approximately one million gallons of water, equal to about three-quarters of a football field covered in three feet of water. Trees and other vegetation in wetland areas help to slow the speed of flood water, resulting in lower flood heights and ultimately less flood damage. There are opportunities in NYCR Massapequas to develop a process for acquisition of severely damaged properties for flood mitigation, storm water retention, wildlife habitat, and recreation; to install permeable paving, bio-swales, infiltration ponds, and restored wetlands; and upgrade and improve access to Massapequa State Park/Preserve, John Burns Park, Bayfront Park, Brady Park, and Marjorie Post Park.

Traditionally, bulkheads, rip-rap, or other engineered structures have been used to control coastal erosion and protect property from storm damage. However, these systems can potentially increase erosion in adjacent areas. Wave energy from boat wakes, wind, and storm events create scouring in front of these structures, resulting in the loss of vegetated shallow areas leading to open water. Tidal marsh protection not only provides erosion control, it improves water quality, creates or restores habitat, and increases the aesthetic value of the property, typically at a reduced cost to the landowner. In the process of addressing damage to public parks and open spaces that are most vulnerable to storm surge such as Alhambra, Bayfront, and Colleran Parks, construction and repair of bulkheads and/or rip rap could also include building a new kayak launch, gazebo, playground, permeable parking lot, walkways, and expanded piers.
In addition to shoreline restoration, green infrastructure projects designed and implemented within the community not only mitigate the effects of storms, but can also become a valuable cultural resource to the community, providing new and improved open spaces, streetscape improvements, and protection to the already existing cultural resources. Low impact and targeted pilot projects could include: green streets, productive public open space, low impact re-developments, green roofs, permeable paving, bio-retention basins, rain gardens, preservation of native vegetation, and vegetated bio-swales. Homeowners may be incentivized to develop rain gardens or install rain barrels if the community elects to initiate a program.

### Community Opportunities

**Natural and Cultural Resources**

- Demonstration of effective and appropriate construction and repair of bulkheads and/or rip rap at existing public parks and open spaces as a resiliency education opportunity.

- Upgraded Alhambra, Bayfront, and Colleran Parks with additional resiliency features such as permeable parking lots, walkways, and playground surface materials.

- Upgraded and improve access to Massapequa State Park/Preserve, John Burns Park, Bayfront Park, Brady Park, Marjorie Post Park Install permeable paving, bio-swales, infiltration ponds, and restored wetlands.

- Develop process for acquisition of severely damaged properties for flood mitigation, storm water retention, wildlife habitat, and recreation.

- Leverage cultural institutions (schools, libraries, community centers) as emergency information and meeting centers, as well as educational and awareness building centers.
Section III: Reconstruction and Resiliency Strategies

The first two sections of the NYRCR Massapequas Plan (NYRCR Plan) provided an overview of NYRCR Massapequas (Community) and identified its risks and needs. This section presents the strategies for reconstruction and resilience, which were developed based on the information and insights collected in the planning process. These strategies address a balance of regional concerns, an analysis of problem areas, local needs, and iterative development by the NYRCR Planning Committee (Committee) and Consultant Team. Each strategy is meant to fulfill one or more of the Recovery Support Functions (RSFs) while addressing risks and needs to resolve critical community issues.
A. Reconstruction and Resiliency Strategies

The Reconstruction and Resiliency Strategies described below were developed to achieve rebuilding goals, increase resilience, and promote economic growth within NYRCR Massapequas. These strategies address a balance of regional concerns, an analysis of problem areas, community feedback on local needs, and iterative development by the Committee. Reconstruction and resiliency strategies for the Community are as follows:

- Improve Transportation and Communication Connectivity;
- Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events;
- Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater;
- Plan for Business Continuity and Growth; and
- Provide Resiliency Resources to Existing and Future Residents.

Each strategy fulfills one or more of the Recovery Support Functions (RSFs), addresses risks, meets needs, makes the best use of community assets, resolves critical issues, and, to the extent possible, addresses the Community’s vulnerable populations. A description is provided for each strategy, followed by tables presenting Proposed Projects and Featured Projects that would contribute to its implementation. A full description of each project can be found in Section IV.

**Improve Transportation and Communication Connectivity**

Improving transportation and communication connectivity, particularly during storm events, addresses the Recovery Support Functions of Community Planning and Capacity Building and Infrastructure in addition to Health and Social Services and Economic Development. Community residents and business owners, particularly those situated south of Merrick Road, had difficulty navigating their way out of the floodwaters after Superstorm Sandy when streets were flooded and unlit. Even as storm waters receded, a lack of power left street lights and cell phone towers inoperable. The Lifeline Road Network project, both within the NYCR Massapequas and extending into other south shore Nassau County communities, would select and sign key local road connections to Nassau County evacuation routes, ensure that they were clearly lit, and elevate them where necessary. Keeping these roadways accessible during storm events would also allow emergency vehicles to access neighborhoods.

**Invest in Hard Infrastructure and Generators to Prepare for Future Storms**

Investing in hard infrastructure and generators will better help to prepare NYRCR Massapequas for future storms. Projects that could help promote this strategy include improving flood diversion and control, ensuring power continuity at critical facilities, and designating emergency parking areas. This strategy addresses the recovery support functions of Infrastructure and Health and Social Services. Localized flooding occurs around NYCR Massapequas where flood valves and outfall pipe linings need to be replaced. Issues of aging and damaged flood control systems cause problems on a regular basis that are exacerbated by severe storms, damaging public and private property and limiting mobility. Purchasing generators for critical facilities is also important for keeping police stations, warming centers, and communication hubs operating at their maximum capacity during storm events and other emergencies. Securing emergency parking locations is a more abstract form of infrastructure since the

<table>
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<tr>
<th>Project Types</th>
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<tbody>
<tr>
<td><strong>Proposed Projects:</strong> Projects proposed for funding through Community Development Block Grant (CDBG-DR) funding.</td>
</tr>
<tr>
<td><strong>Featured Projects:</strong> Innovative projects where an initial study or discrete first phases of the project is proposed for CDBG-DR funding or other identified funding as well as regulatory reforms and other programs that do not involve capital expenditures.</td>
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</table>
The initial phase requires little new construction, but the potential to build structured parking north of the flood risk zone is outlined in other redevelopment projects.

**Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater**

The Massapequa Reserve and other natural areas in NYRCR Massapequas absorb and filter local stormwater and floodwater, but numerous opportunities remain to use new green infrastructure construction and waterfront parks to further manage inundation during storm and flood events. Strategies to deploy these techniques address the Recovery Support Functions of Natural and Cultural Resources and Health and Social Services. Green infrastructure pilots proposed for the NYCR Massapequas include tree pits and right of way bioswales on Broadway, infiltration ponds at Birch Lanes Elementary and McKenna Elementary, and a partial restoration of wetlands or a pond at John Burns Town Park. Additionally, the repair and redesign of three local waterfront parks—Alhambra, Bayfront, and Colleran—provide the opportunity to install bioswales, retention ponds, and permeable paths and paving. By engaging young people near schools and enhancing public access to the waterfront, the demonstration of how natural systems can help the community cope with storms and floods serves to educate the residents about their local environment and new strategies for dealing with disasters.

**Plan for Business Continuity and Growth**

Major storms like Hurricane Irene and Superstorm Sandy are a significant burden on small business owners, particularly if their homes were also damaged. Those with generators are able to provide crucial community services and support, but bear additional costs of maintenance. Damage to infrastructure requires focused repairs that often neglect the broader public realm. Planning for business continuity and growth addresses the Economic Recovery Support Function in addition to Housing, Infrastructure, and Community Planning and Capacity Building.

Efforts to assist small business owners with planning for continuity through and after a storm will make the Community more resilient. Redevelopment in eastern areas of NYCR Massapequas and a Transit-Oriented Development Infill Study capitalize on ways to expand business with new commercial opportunities linked to new housing to increase demand. Sitting mostly north of the flood risk areas, both of these areas provide safe places to do business without major storm threats. These areas may also serve as development sites for housing, providing an alternative place to live for residents who want to move outside of the flood areas and potentially creating more affordable options for low-income residents.

**Provide Resiliency Resources to Existing and Future Residents**

Providing resiliency resources to residents will better help to prepare NYRCR Massapequas for future storms and addresses the Recovery Support Functions of Housing, Health and Social Services, Economic Development, and Natural and Cultural Resources. As a result of Superstorm Sandy, nearly 3,400 property owners, primarily on the peninsulas south of Merrick Road along numerous South Oyster Bay canals, experienced the most severe damage. These areas also experience regular tidal flooding and pooling as a result of ineffective storm water drainage. Efforts can be made to revise zoning, planning, and building code regulations for resilient design to incentivize flood-resilient building construction and renovation and allow housing retrofits to support multi-generational housing, storm resilient first floors, and aging in place. The zoning code and regulatory framework should be revised such that it supports the reduction of storm-water runoff damage to public and private property through green construction and renovation incentives.

Many residents were displaced from their homes during and after Superstorm Sandy without a clear understanding of the resources available to them. A community shelter network would improve the availability of information about the existing emergency shelters; improve their quality; ensure that they are accessible and able to accommodate the needs of all community members; and establish future shelters sites in high-elevation, low-risk areas not subject to surge flooding, primarily North of Merrick Road. Developing a housing plan to accommodate the region’s aging population and providing new housing...
opportunities for first-time buyers is also critical. There are some tax incentives available for first-time homebuyers and new families through the Nassau County Assessment Department, but more could be done.

NYRCR Massapequas may implement a voluntary property acquisition program for storm damaged homes. Working with Nassau County, the State, and private developers, the Community may consider a relocation assistance program that gives these residents priority in new local developments. Additionally, tax incentives and direct incentives for residents would assist with the adaptation and relocation process for others who want to move out of the risk zone. Coordination with developers could increase density in less vulnerable areas and provide more housing options for community residents.

Providing resources to residents in the form of resiliency education before, during, and after future storms will be critical to informing residents such as senior citizens that may require additional assistance, families with young children, and pet owners on evacuation procedures and shelter options. In the aftermath of another major storm or disaster, a homeowner energy education would help prevent accidents such as fire risks and safety hazards due to flooding, provide incentives for smarter home controls, and inform the community about government grant programs. As part of a homeowner energy education program, residents would be provided with an overview of the permitting process and an outline of regulatory requirements for residential generator installation as well as recovery assistance in the form of rebates for residential installations.
### Table 05: Projects to Improve Transportation and Communication Connectivity

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Cost Estimate</th>
<th>Category</th>
<th>Regional</th>
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<tbody>
<tr>
<td>Lifeline Road Network Study</td>
<td>This study will determine the critical 25–30 mile access routes, or “lifeline roads”, within the community to ensure that evacuation and emergency service routes are maintained as safe, secure, and passable before, during, and after major storm events.</td>
<td>$35,000 for initial study</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Signage (Lifeline Road Network)</td>
<td>This project will develop and install ‘Lifeline Network’ signage along lifeline roads to direct residents to Community Resource Centers—community centers and other centralized public locations with back-up power.</td>
<td>$57,000</td>
<td>Proposed</td>
<td>N</td>
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<tr>
<td>Street Lighting (Lifeline Road Network)</td>
<td>In order to maintain functionality during power outages, this project would retrofit streetlights and signals along lifeline roads to operate on solar power with back-up battery power. Priority will be given to Merrick Road, Sunrise Highway, and intersections.</td>
<td>$7,000,000 ($630,000 for Merrick Road)</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Roadway Elevation (Lifeline Road Network)</td>
<td>This project will elevate approximately one mile of key streets susceptible to tidal flooding or storm surge, particularly those south of Merrick Road.</td>
<td>$4,500,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Regional Lifeline Transportation Network</td>
<td>This is a regional study in conjunction with NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and the Massapequas developing a “Lifeline Network” of resilient streetscape design, such as redundant power and improved drainage systems, to provide maximum accessibility in and out of residential neighborhoods for first responders and residents before, during, and after a storm.</td>
<td>$600,000 ($120,000 per NYCR Community)</td>
<td>Proposed</td>
<td>Y</td>
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## Table 06: Projects to Invest in Hard Infrastructure and Generators to Prepare for Future Storms

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<thead>
<tr>
<th>Project Name</th>
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<th>Cost Estimate</th>
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<tbody>
<tr>
<td>Flood Diversion and Control</td>
<td>This project will address flooding throughout the Community by evaluating the condition of existing sumps (drainage basins), determining where improvements can be made through removal of built-up debris, fine soil, and vegetation, and strategically locating structural and natural drainage features to divert flood waters into designated catchment areas.</td>
<td>$4,900,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Permanent Generators for Critical Community Facilities</td>
<td>This project will ensure that critical facilities, including emergency shelters, have backup power during and after major storm events by installing permanent generators on the roofs or upper floors of critical assets and evacuation sites to prevent flood damage during storm events. Note: McKenna Elementary (used by the Red Cross) and Massapequa Park Village Hall already have generators in place.</td>
<td>$2,000,000 for Natural Gas, ($36,000,000 for Solar Photovoltaic)</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Preparedness and Disaster Action Planning</td>
<td>This project will better protect the community by creating a network for checking on and contacting seniors and other vulnerable groups in the event of an emergency, purchasing and installing tidal gauges to better prepare for storms and initiate evacuation, and purchasing additional resources such as 5-ton army fire response vehicles, communication equipment, a muscle wall mitigation system, additional sand bags, chain saw, large portable water pumps, heavy duty boat trailers and an emergency boat for Bay Constables.</td>
<td>$4,600,000</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Parking</td>
<td>This project designates safe areas outside of flood zones to be used by residents in evacuation zones for off-street parking and storage during emergencies and major storm events.</td>
<td>$100,000</td>
<td>Featured</td>
<td>N</td>
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## Table 07: Projects to Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater

<table>
<thead>
<tr>
<th>Project Name</th>
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<th>Cost Estimate</th>
<th>Category</th>
<th>Regional</th>
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<tr>
<td>Green Infrastructure Pilots</td>
<td>This study will develop potential infiltration and open channel bio-swale pilot approaches for three project types: public realm (roads), private realm (parking lots) and open space (parks and preserves). Possible Pilot locations include: Broadway (tree pits and right of way swales), Birch Lane Elementary (infiltration pond), McKenna Elementary School &amp; Nassau County Police Academy (infiltration pond), and John Burns Town Park (wetlands or pond).</td>
<td>$2,200,000</td>
<td>Proposed</td>
<td>N</td>
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<tr>
<td>Project Name</td>
<td>Project Description</td>
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<td>Redesign of Parks and Open Space Plan</td>
<td>The study will create a plan that ensures that parks and open spaces in the community serve to increase resilience, enhance economic development, improve the quality of life, and add value to the surrounding homes. Unique projects will focus on improvements to Alhambra Park, Bayfront Park, and Colleran Park.</td>
<td>$200,000 for study</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Alhambra Park</td>
<td>The project will redesign the waterfront park by installing a new playground, permeable parking area, gazebo, kayak-launching area, and a new bulkhead in the recently expanded and remediated Alhambra Park. Additionally, the development of walking paths with permeable paving around bio-swales and storm water retention ponds, and the installation of energy-efficient lighting and signage would make the park more environmentally sustainable and better able to withstand future storm damage.</td>
<td>$4,000,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Bayfront Park</td>
<td>The project will repair defensive infrastructure along the water's edge (rip-rap or bulkhead to-be-determined) to address damage from Superstorm Sandy. Additionally, the Town will add walkways with permeable paving around bio-swales and stormwater retention ponds, rest area for cyclists, fitness stations, an expanded pier and energy efficient lighting.</td>
<td>$2,000,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>Colleran Park</td>
<td>The project will stabilize the shoreline with bulkhead and riprap to prevent further erosion. With a beach landing, the park will also be linked to the proposed regional Blueway, and the existing Bethpage Bikeway.</td>
<td>$2,200,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
<tr>
<td>South Shore Stormwater System Modeling and Analysis</td>
<td>The project will be a hydrologic and hydraulic (H&amp;H) model to provide a catchment-wide understanding of where stormwater run-off is coming from, how water much there is, specific areas where the current system is inadequate, and what regional improvements could be made.</td>
<td>$2,900,000 ($725,000 per NYRCR Community)</td>
<td>Proposed</td>
<td>Y</td>
</tr>
<tr>
<td>Massapequas South Shore Shoreline Conditions Analysis and Restoration</td>
<td>The project will include a survey of the existing shoreline conditions to identify opportunities to increase the efficiency of the existing drainage system and recommend innovative materials and techniques to help minimize coastal erosion and flooding. The shoreline survey will focus on critical areas prone to flooding and on inspection of all existing edge conditions along the coastline, including bulkheads, rip-rap, and natural conditions.</td>
<td>$100,000</td>
<td>Proposed</td>
<td>N</td>
</tr>
</tbody>
</table>
### Table 08: Projects to Plan for Business Continuity and Growth

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Description</th>
<th>Cost Estimate</th>
<th>Category</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Continuity Program</td>
<td>The program ensures that businesses have the capability to maintain essential functions during a range of potential emergencies and could be implemented immediately. The assistance provided by a Business Continuity Program would include planning assistance, access to alternative spaces or facilities, communications provisions, and provisions for vital records backup and management.</td>
<td>$200,000 ($40,000 or less per NYRCR Community)</td>
<td>Proposed</td>
<td>Y</td>
</tr>
<tr>
<td>Commercial Redevelopment (Eastern Massapequa)</td>
<td>The study will identify costs and benefits for a new LIRR station at an Eastern Massapequa location and its potential to attract new development. Feasibility factors include infrastructural impediments such as power transmission and sewage management. Possible programs could include a full service medical hospital with emergency care and expanded housing options for seniors, first time home buyers, and the local workforce.</td>
<td>$550,000</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Downtown Master Plan</td>
<td>This project will develop a Downtown Master Plan that includes the provision of incentives to stimulate the redevelopment of vacant, abandoned, and underused properties with strategies such as streamlined approval processes and updated land use regulations.</td>
<td>$500,000</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Transit-Oriented Development Infill Study</td>
<td>This study will consider the potential for transit oriented infill development near the Massapequa and/or Massapequa Park Long Island Rail Road (LIRR) stations, as well as the potential for a new station in Eastern Massapequa near the Westfield Sunrise Shopping Center, an area that is currently underserved by transit. The study should include housing options for seniors and first time home buyers as well as housing alternatives to residents who want to relocate from extreme and high risk zones. Building structured parking could act as emergency parking during a flood event.</td>
<td>$820,000</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Project Name</td>
<td>Project Description</td>
<td>Cost Estimate</td>
<td>Category</td>
<td>Regional</td>
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<tr>
<td>Public Communication and Education Gap Analysis</td>
<td>Create a single source for comprehensive information and emergency assistance and establish a communication network that more effectively links the local government with emergency management agencies, faith-based groups, and non-profit organizations to direct aid and recovery efforts to the community's socially vulnerable populations.</td>
<td>Proposed $100,000 ($20,000 per NYRCR Community) for Phase 1</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Voluntary Acquisition Program</td>
<td>A voluntary property acquisition pilot would assist homeowners with severely damaged properties along canals, with waterfront access, or in low-lying areas through an incentivized housing acquisition program. All damaged properties will be purchased above pre-storm values and could be used for redevelopment as resilient green housing or to be reestablished as ecological features.</td>
<td>$12,650,000 for 20 initial units</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Emergency Cell Phone Service</td>
<td>This project proposes to work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power. Cell phone networks should be improved and protected for operation under normal and emergency circumstances.</td>
<td>$250,000</td>
<td>Featured</td>
<td>N</td>
</tr>
<tr>
<td>Integrated Communication Network</td>
<td>This project will improve local disaster action planning for emergency preparation and readiness, evacuation, recovery efforts, and coordinated services across the region by promoting a single source for comprehensive information and emergency assistance and developing non-digital systems for sharing community news in the event of an emergency.</td>
<td>$120,000</td>
<td>Featured</td>
<td>N</td>
</tr>
</tbody>
</table>
Section IV: Implementation—Project Profiles

The New York Rising Community Reconstructor (NYRCR) Program has allocated to the NYRCR Massapequas Community (Community) up to $26.0 million (Massapequa I - $14.4 million; Massapequa Park - $3.0 million; Massapequa II - $8.7 million). The funding is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. While developing projects and actions for inclusion in the NYRCR Plan, the NYRCR Massapequas Planning Committee (Committee) took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. The projects and actions set forth in the NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in the NYRCR Plan does not necessarily indicate the Community’s prioritization of these projects and actions. Proposed Projects are projects proposed for funding through the Community’s allocation of CDBG-DR funding. Featured Projects are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program. Additional Resiliency Recommendations (see Section V) are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects. The total cost of Proposed Projects in the NYRCR Plan exceeds the NYRCR Community’s CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in the NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in the NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented.
In addition to providing a detailed description of each project, the profiles include information on two important elements used by the Committee to evaluate the value of each project—a Cost Benefit Analysis and a Risk Reduction Analysis. Before proceeding to the projects themselves, it is important to understand these two analytical elements of the Project Profiles.

**Cost Benefit Analysis**

A cost benefit analysis (CBA) is a tool used to calculate and compare the benefits and costs associated with a project. The CBA provides decision-makers with a framework for comparing different projects (i.e., anticipated cost of implementation against total expected benefits), and determining whether the benefits of a particular project outweigh the costs. The CBA was used to help inform the Committee as they formulated and selected projects.

Because the NYRCR Program is a community-driven process, the CBA has focused on identifying project costs and benefits that easily relate to the communities that the NYRCR Planning Committees represent. Community and Committee input—informed by a true understanding of local conditions, needs and community values—plays a crucial role in the selection of projects that are implemented. With this in mind, the CBA has used a mix of both quantitative and qualitative factors in its analysis. The costs and benefits used to evaluate projects through the CBA are explained further below.

**Project Costs**

Project Profiles include a capital cost estimate. The CBA cannot, however, project costs or benefits with complete certainty; rather, it provides the community with a practical understanding of the potential estimated costs of project implementation and the potential benefits accrued to the community with the particular project in place.

The cost of implementation a project is just one aspect of the justification for funding these Proposed Projects. Conversely, another important variable is the future costs of not implementing these Proposed Projects. Inaction has the potential to negatively impact the long-term viability of both the Community and its neighboring south shore communities. While the costs of inaction are more difficult to quantify, they are no less important to our analysis, and are therefore addressed qualitatively. These costs include:
• Extensive, repetitive damage to personal property (vehicles, residences) and public infrastructure resulting from frequent recurring flooding and future storm events;
• Economic loss to residents and to local and regional employers as a result of the inability to work; and
• Hindrance in the provision of life safety and emergency services resulting in repeated inability to access vast areas of the community.

Project Benefits
The types of benefits considered in the CBA include:

Risk Reduction and Resiliency Benefits: The extent to which a project reduces the risk of damage to a community asset from a future storm event (discussed further below under “Risk Reduction Analysis”).

Economic Benefits: The project’s potential to help minimize economic costs and reduce the time it takes for the local economy to rebound from a storm event. Economic data included, where applicable, an estimate of permanent jobs secured-added; relationship to, and/or furtherance of, Regional Economic Development Plan goals; potential for additional economic activity; and the net effect on local municipal expenditures.

Health and Social Benefits: Qualitative information was provided on the overall population benefits of improved access to health and social service facilities and public safety services; type and size of socially vulnerable population benefited; and degree to which essential health and social service facilities are able to provide services to a community during a future storm or weather event as a result of the project.

Environmental Benefits: Benefits include the protection of crucial environmental assets or high-priority habitat, threatened and endangered species, migration or habitat connectivity; any clean-up resulting from the action; creation of open space or a new recreational asset

Risk Reduction Analysis
A Risk Reduction Analysis estimates the extent to which Proposed and Featured Projects will reduce storm damage (environmental, social and economic) and flooding risk to specific community assets when the project is in place. Risk “reduction” is different from the risk “assessment” in the previous section in a very important way—risk assessment looks at storm and flood risks to community assets before the project is implemented; risk reduction looks at the reduced risk after the project is in place.
Proposed Project: Lifeline Road Network Study

Throughout Public Engagement Meetings in NYRCR Massapequas, Baldwin, Bellmore/Merrick, Freeport and Seaford/Wantagh community members expressed frustration with flooding along Merrick Road resulting from Superstorm Sandy. Superstorm Sandy tested the capacity of the infrastructure in these communities and exposed opportunities to improve upon the existing transportation network. After reviewing the existing road network, identifying emergency evacuation routes, and considering Committee and community feedback, a preliminary map was created delineating potentially critical roadways for the community. Further discussion and community workshops provided additional input regarding community use of roads and facilities as well as localized flooding issues. Mapping the assets identified by both Committee and community members with the risk analysis data lead to the identification of Merrick Road as a critical road.
As a major commercial east-west arterial corridor, Merrick Road provides access to assets considered important to these five NYRCR Communities. These assets include: pharmacies, medical offices, gas stations, supermarkets, restaurants, banks, pet care services, libraries, and government institutions. Access to these assets is essential in a post-storm scenario. Merrick Road was identified by the Community as a critical lifeline at the neighborhood and community level for many people, businesses and institutions.

The post-storm conditions included prolonged power outages and flooding in many parts of the community including along Merrick Road. Committee members and community members described the prolonged power outages and flooding as a safety hazard because it not only made it difficult to travel at night but it also made nighttime navigation feel unsafe. In addition, residents needed directions for safe/preferred routes for evacuation and reaching shelter. Downed trees blocked roadways and knocked over utility poles and wires, as shown. First responders were negatively impacted, as recovery work was limited to daylight hours.

Based on the detailed Committee discussions and an initial costing and feasibility study, the Lifeline Project was applied to additional streets that are critical for safe and secure passage during and after future storm events at the neighborhood and community level. This project proposes to identify a “Lifeline Road Network,” currently shown in draft form at left, beginning with a study to determine the critical access routes, or “lifeline roads,” used within the community totaling a distance of 25-30 mi. The network will focus on life safety and resiliency measures along these streets in order to ensure evacuation and emergency service routes are maintained before, during, and after major storm events.

The Lifeline Network study will first confirm potential target roads identified by the Community for implementing initial proposed Lifeline Projects. It will then develop a list of innovative best practices and develop streetscape design guidelines that can be implemented to create a storm resilient Lifeline Network. These best practices and guidelines will be recommended to be implemented along the targeted streets and other streets identified through the study to further support and build a more resilient street network focusing on the following concepts that have been identified through the NYRCR Massapequas Plan development process:

- “Green Street” designs (stormwater management and green infrastructure).
- Redundant and safe power distribution (stand-alone lighting and signaling, undergrounding power lines).
- Resilient street trees (trees more resilient to wind and saltwater).
- “Complete Streets” design (flexible lanes, bicycle capacity, sidewalk width, treatment and amenities, and appropriate transit provision).

The Community has identified a number of potential target areas and roads that could be incorporated into the Lifeline Network. The Lifeline Network study will confirm the specific roads and projects that could be incorporated into the Network. Projects would include:

- Signage—develop and install “Lifeline Network” signage.
- Street Lighting—install solar powered lights and battery backup utilizing existing lighting infrastructure.
- Roadway Elevation—raise key streets that are susceptible to tidal flooding or storm surge.
Based on Committee input, the proposed streets include approximately 29 miles of roadways community-wide with potential roads include the following:

East-West Roads: Sunrise Highway, Merrick Road (approximately 7.5 miles);

North-South Roads (north of Merrick Road): Hicksville Road, Broadway, Park Boulevard, Unqua Road, Carman Mill Road, Clocks Boulevard (approximately 7.7 miles);

North-South Roads (south of Merrick Road): Forest Avenue (south of Garfield Place), Division Avenue, Alhambra Road, Bayview Avenue, Bay Drive, Harbor Lane, Whitewood Drive, West Shore Drive, East Shore Drive, Clocks Boulevard (approximately 12 miles); and

East-West Roads (south of Merrick Road): Sunset Boulevard, South Bay Drive (approximately 1.8 miles).

**Estimated Project Cost**
The total estimated project cost is $35,000 for NYRCR Massapequas.

**Project Benefits**
This project addresses the Recovery Support Functions (RSFs) of Infrastructure and Community Planning and Capacity Building.

**Risk Reduction & Resiliency Benefits**
The project would identify and propose road additions and modifications that result in secure, navigable and well-lit access along vital roads and to critical assets (discussed further below under “Risk Reduction Analysis”).

**Economic Benefits**
In the aftermath of Superstorm Sandy, the U.S. Small Business Administration (SBA) reported that 124 businesses applied for business recovery assistance representing 366 affected employees. Of those who applied, only 32 were approved, leaving many businesses without the assistance necessary to cover costs during periods of reduced or frozen operation. Ensuring that Lifeline roads are safe, navigable, and well-lit at night would allow local business to continue to operate soon after major storm events by providing safe passage to business operators and patrons. This will reduce the overall time it takes for the local economy to rebound after a storm event.

**Health and Social Benefits**
These benefits include improvements of public safety at night for residents and businesses in the Community who may require access to shelter, supplies, or assistance. Access to critical assets would be secured, including key routes from coastal areas to higher ground. Recovery efforts could be accomplished at night, improving the pace at which access to roadways and properties can be restored, which has co-benefits of improving access to community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and improving local economy recovery.

**Environmental Benefits**
Developing streetscape design guidelines that incorporate resiliency features, green infrastructure, and complete streets principles would provide the NYRCR Massapequas community with the information needed to improve critical roads so they will remain functional during and after major storm events. Benefits that may be realized by implementing the design guidelines include:

- **Solar power and battery backup systems** for streetlights will improve public safety at night. Access to critical assets will be secured, including key routes from coastal areas to Community Assistance Centers. Recovery efforts can be accomplished at night, improving the pace at which access to roadways and properties can be restored, which has co-benefits of improving access to community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and improving local economy recovery. This project also reduces government expenditures by reducing the cost of power supply to public facilities.

- **Vegetation management techniques and guidelines** for trimming street trees along the Lifeline Network to enhance energy security for the NYRCR Community, which includes recommendations for inspection and removal of potential threats to the electrical distribution...
system. Introducing more tolerant and resistant street trees will reduce the occurrence of downed trees and limbs that may block roadway access, while preserving the environmental benefits of trees, including surface water retention, decreased soil erosion, shade, and air quality improvement.

- **Green street design techniques** to improve stormwater drainage and reduce the amount of standing water on roadways, allowing for safe vehicle operation during all types of inclement weather. Stormwater will be naturally filtered before being released into the Estuary, providing environmental benefits.

- **Complete streets best practices to improve walking and cycling and transit infrastructure**, offering viable alternatives to automobile travel and improving access for vulnerable populations that may need access to the Lifeline Network during storm events. Enhancement of roadway corridors in this manner would increase the attractiveness of more areas in the community. This will provide economic benefit by diversifying the locations to which waterfront landowners could relocate within the community if they seek to move to less risk-prone areas.

While the guidelines would be created for Merrick Road and other targeted areas in extreme risk of flooding and power loss, they would be easily adaptable to other commercial corridors and neighborhood streets.

**Risk Reduction Analysis**

Access to critical assets was severely impaired during and after Superstorm Sandy for many people, businesses and institutions due to prolonged power outages and flooding in many parts of the Community. This was seen by the Committee and the Community as a safety hazard and an impediment to nighttime travel. Safe and secure navigation was further complicated by downed trees, utility poles, and wires.

The project would reduce these risks by establishing secure, navigable and well-lit access to critical assets through the provision of key routes from coastal areas to emergency centers during and after storm events.

**General Timeframe for Implementation**

30 months

**Regulatory requirements related to the project**

No regulatory requirements related to this project.

**Jurisdiction**

NYS Department of Transportation (NYS DOT), Nassau County, Town of Oyster Bay Department of Public Works (DPW), and the Village of Massapequa Park.
Proposed Project: Signage (Lifeline Road Network)

Estimated Project Cost
The total estimated project cost is $57,000.

Project Benefits
This project, which addresses the Recovery Support Function (RSF) of Infrastructure, would establish secure and navigable access along vital roads and to critical assets. (Discussed above in the “Project Benefits” section of the Proposed Project: Lifeline Road Network Study.)

Cost Benefit Analysis
The cost of this project is based on the anticipated cost of design, materials, and installation. Residents, businesses and visitors—particularly those in higher flood prone areas located south of Merrick Road, identified in the map shown above (Figure 03)—will benefit from having clear “community specific” directions for egress from the parts of the Community at risk of flooding and for accessing emergency shelters and community resource centers.

Risk Reduction Analysis
This project will highlight secure and navigable access routes to critical assets by providing signage for key routes from coastal areas to emergency centers before and after storm events. When fully implemented, residents in high and extreme risk areas, primarily south of Merrick Road, will be no more than one street away from a ‘Lifeline Network’ road. This includes the more than 3,400 residences directly impacted by flooding as a result of Superstorm Sandy. (Discussed above in the “Risk Reduction Analysis” section of Proposed Project: Lifeline Road Network Study.)

General Timeframe for Implementation
18 months

Regulatory requirements related to the project
No regulatory requirements related to this project.
Jurisdiction
NYS Department of Transportation (NYS DOT), Nassau County, Town of Oyster Bay Department of Public Works (DPW), and the Village of Massapequa Park.

Sample signage from other evacuation routes and shelter networks (sources: Infrogmation on Wikimedia Commons and www.pbcgov.com)
**Proposed Project:** Street Lighting (Lifeline Road Network)

During Superstorm Sandy, residents needed clear routes for safe evacuation. Downed trees knocked over utility poles and wires, rendering street lights and signals inoperative. NYRCR Massapequas Committee Members and members of the community reported that in some neighborhoods, the power was not restored for weeks after Superstorm Sandy resulting in some areas feeling deserted and unsafe at night.

To maintain functionality during power outages, streetlights and signals along the Lifeline Road Network would be retrofitted to operate on solar power with battery backup power. This would make it safe for residents to evacuate during power outages whether by car or on foot, and improve security. Priority will be given to Merrick Road, Sunrise Highway, and intersections. Backup batteries for these units can typically store enough energy to function for three days.

The cost of this project is based on the anticipated purchase and installation of these lights in locations selected in the study. As suggested by the Committee during project discussions, the estimate includes most of the proposed network with a focus on public gathering spaces such as intersections and bus stops.
Estimated Project Cost
The total estimated project cost is $7,000,000 ($630,000 for Merrick Road).

Project Benefits
This project, which addresses the Recovery Support Function (RSF) of Infrastructure, would establish secure and navigable access along vital roads. (Discussed above in the “Project Benefits” section of the Proposed Project: Lifeline Road Network Study.)

Cost Benefit Analysis
The solar power and battery backup systems for streetlights will improve public safety at night for residents and businesses in the Community who may require access to shelter, supplies, or assistance. Access to critical assets will be secured, including key routes from coastal areas to higher ground.

Many community members said the darkness made them feel like it put their homes at property at risk so they stayed behind. Better illumination would allow police, fire and other public personnel to monitor the area and offer security protection. Knowing that this was happening might allow more people to feel comfortable leaving the area and to follow evacuation orders as they would know their personal property is not at risk from looting.

Recovery efforts can be accomplished at night, improving the pace at which access to roadways and properties can be restored, which has co-benefits of improving access to community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and improving local economy recovery.

Additional economic benefits include reduced cost of power supply to public facilities (reduced government expenditure), and secure access to critical assets (key routes from coastal areas to emergency centers).

Risk Reduction Analysis
This project would reduce public safety risk to the population by illuminating roads at night and by securing access to evacuation routes, intersections, and community facilities during and after a storm. When fully implemented, public gathering spaces such as intersections and bus stops in the Lifeline Road Network would continue to be illuminated during and after storm events, making it safe to evacuate during power outages whether by car, bus, or on foot.

General Timeframe for Implementation
30 months

Regulatory requirements related to the project
No regulatory requirements related to this project.

Jurisdiction
NYS Department of Transportation (NYS DOT), Nassau County, Town of Oyster Bay Department of Public Works (DPW), and the Village of Massapequa Park, and Public Service Electric and Gas (PSEG).
Proposed Project: Roadway Elevation (Lifeline Road Network)

During Superstorm Sandy, roadways flooded complicating evacuation for people living south of Merrick Road. As noted by NYRCR Massapequas Committee Members and representatives from the Town of Oyster Bay and the Village of Massapequa Park, sections of Merrick Road experienced severe tidal flooding during Superstorm Sandy and are also prone to flooding during high tide periods and major rainstorms. Residents suffer flood damage to private property including but not limited to their lawns and landscaping. In addition, there is damage to vehicles parked and/or driven through the salt water flooding, disruption to sanitary curbside garbage collection, interruption of mail services, and general disruption to the resident’s daily lives.

Repetitive flooding has directly affected quality of life throughout the community and property values have suffered. To provide safe egress along major roads during flood events, key streets that are susceptible to tidal flooding or storm surge would be raised. Some streets in the proposed Lifeline Road Network, such as Alhambra Road, have already been elevated. The initial study would identify those most in need of elevation and concentrate on these areas, particularly south of Merrick Road.

The cost of this project reflects the construction of a subset of the most critical roadways to elevate after conducting a study to identify them based on the potential roadways shown on the map of “Proposed Project: Lifeline Road Network.”

The areas targeted would be south of Merrick Road that have not been elevated but sustained flooding and flood damage from Superstorm Sandy and have reoccurring flooding during regular storm events totalling approximately one mile of improvements.

Estimated Project Cost

The total estimated project cost is $4,500,000.
**Project Benefits**

This project, which addresses the Recovery Support Function (RSF) of Infrastructure, would help to protect vital roads from flooding and would help to secure access to critical assets. (Discussed above in the “Project Benefits” section of the Proposed Project: Lifeline Road Network Study.)

**Cost Benefit Analysis**

The roadway reconstruction in this flood-prone neighborhood will reduce the risk of flooding to community transportation infrastructure. In addition, the drainage system improvements will extend benefits to private property in the neighborhood by improving water diversion and control and reducing the likelihood of recurring property damage or the risk of injury due to the collapse of buildings. Maintaining clear roads will improve access for residents who may require shelter, supplies, or assistance. It will also ease access for recovery crews and equipment following a storm, improving responsiveness to vulnerable populations as well as the rate at which the local economy can recover. Economic benefits include improved home and businesses values when they are no longer at risk of being cut off from community resources and emergency personnel during storms, as well as business and commercial continuity for continued operation and faster reopening of business and facilities.

**Risk Reduction Analysis**

The roadway reconstruction in this flood-prone neighborhood will reduce the risk of flooding to transportation infrastructure and ensure secure access to evacuation routes for the entire population of the Community. In addition, the drainage system improvements will extend benefits to private property in the neighborhood by improving water diversion and control reducing the likelihood of recurring property damage or the risk of injury due to the collapse of buildings. As flooding on private property is reduced, there may also be a positive effect on property values.

**General Timeframe for Implementation**

30 months

**Regulatory requirements related to the project**

Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management (CZM) coastal consistency concurrence determined by NYS Department of State.

**Jurisdiction**

NYS Department of Transportation (NYS DOT), Nassau County, Town of Oyster Bay Department of Public Works (DPW), and the Village of Massapequa Park.
Proposed Project: Flood Diversion and Control

During Superstorm Sandy, flood valves and drainage pipes failed causing additional damage which necessitates replacement and repair of this infrastructure. NYRCR Massapequas Committee Members and representatives from the Town of Oyster Bay and Village of Massapequa Park shared maps and detailed accounts of areas where backflow preventers and check valves were damaged beyond their ability to be useful during medium to heavy rains. Storm pipe outfalls were damaged due to the pounding surge from the bay and concrete storm pipes shifted damaging sections of pipe. Sumps along Front Street were, and continue to become overrun with stormwater, which was especially bad during Superstorm Sandy.

To address flooding throughout the Community, this project will evaluate the condition of existing sumps (drainage basins), determine where improvements can be made through removal of built-up debris, fine soil, and vegetation, and strategically locate structural and natural drainage features to divert flood waters into designated catchment areas. After commissioning an initial study to determine overland flow patterns in flood-prone areas, locations will be identified for drainage, detention, and check-valves on outfall pipes.

The following measures are proposed for diverting and controlling flood waters in the future:

- Strategically locate structural and natural drainage features to divert flood waters into designated catchment areas;
- Determine overland flow patterns in flood-prone areas to identify locations for drainage, detention, and check-valves on outfall pipes;
- Install 155 new tidal check valves and backflow preventers to protect roads and adjacent structures from flooding;
- Install outfall pipe lining on 10 pipes in Massapequa Park; and
- Redirect flows or install new infrastructure to address flooding along Front Street between Philadelphia Avenue and East Lake Avenue.

Inspect and evaluate existing drainage basins to ensure they are functioning properly and identify potential ways to improve permeability in these infrastructure features.

Estimated Project Cost
The total estimated project cost is $4,900,000

Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Infrastructure and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits
The project would determine overland flow patterns in flood-prone areas and propose upgrades to existing system as well as solutions employing green infrastructure solutions such as bio-swales and on-site stormwater retention areas. Locations will be identified for drainage, detention, and check-valves on outfall pipes. (Discussed further under “Risk Reduction Analysis” below.)
Economic Benefits
In the aftermath of Superstorm Sandy, the U.S. Small Business Administration (SBA) reported that 124 businesses in NYRCR Massapequas applied for business recovery assistance representing 366 effected employees. By addressing localized flooding issues and installing new tidal check valves, outfall pipe lining, and improved flood diversion controls, the risk of flood damage to local businesses will be significantly reduced during and after future storm events.

Health and Social Benefits
This project’s benefits include improved flood protection for the more than 700 households in extreme and high risk areas headed by residents over 55. The impact of Sandy on these areas and the subsequent cost of recovery and repair weakened financial resources, and these improvements will help to reduce the risk of flooding for this socially and economically vulnerable population.

Environmental Benefits
As an environmental protection and public safety measure, redundancy would be realized by structural and natural drainage features that divert flood waters into designated catchment areas.

Cost Benefit Analysis
This project would increase the efficiency of the drainage system by repairing degraded areas, and will document the system’s extent and condition in order to identify deficiencies and speed repairs. The reduction of flood risk to the roadway also improves the reliability of access to and from key assets, and reduces downtime for businesses and other critical assets, such as gas stations, marinas, supermarkets and other components of the Community economy. An environmental benefit will also be realized by reducing erosion and sedimentation that has been observed to occur with older bulkheads.

Risk Reduction Analysis
The provision of check valves would reduce flood risk to assets including roadways, utilities, and property during storms, and residential properties located near outflows. In addition, these types of infrastructure improvements could reduce flooding impacts on local streets, helping to maintain access during and after flood events. The reduced flooding risk also pertains directly to socially vulnerable populations (senior housing along Merrick Road, schools and neighborhoods with young children).

General Timeframe for Implementation
30 months

Regulatory requirements related to the project
Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

Jurisdiction
NYS Department of Transportation, Nassau County, Town of Oyster Bay Department of Public Works, and the Village of Massapequa Park.
Proposed Project: Green Infrastructure Pilots

Flooding occurs regularly with storms and tides and was particular severe and destructive during Superstorm Sandy. Green infrastructure is designed to make the NYRCR Massapequas Community more resilient by controlling flooding with a combination of hard infrastructure and natural systems. It would supplement stormwater management currently addressed by pump stations, storm drains, culverts and outflow valves.

A preliminary study would collect information to identify road elevations and drainage improvements on major roads for stormwater management, improved drainage, flood control, and pollution reduction. The pilot projects will test different project types: public realm (roads), private realm (parking lots), and open space (parks and preserves). The proposed locations of these pilots are shown above. After installation, potential infiltration and open channel bio-swale projects will be studied.

Broader green infrastructure policy will encourage the installation of permeable paving in new developments, mall parking lots, and school parking lots. A rain garden program could also be developed across the Community as Green Infrastructure Pilots. The community should also work with neighboring hamlets, villages, and Nassau County to establish a region-wide comprehensive green infrastructure plan, undertake wetland restoration, and create a shared ownership model for stormwater and wastewater infrastructure.

Possible pilot locations include: Broadway (tree pits and right of way swales), Birch Lane Elementary (infiltration pond), McKenna Elementary School & Nassau County Police Academy (infiltration pond), and John Burns Town Park (wetlands or pond).

Estimated Project Cost

The total estimated project cost is $2,200,000.
Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Infrastructure and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits
The project would provide built examples of green infrastructure to make the Community more resilient by controlling flooding with a combination of hard infrastructure and natural systems. (Discussed further under "Risk Reduction Analysis" below.)

Health and Social Benefits
This project’s benefits include public demonstration of natural and effective green infrastructure, as well as upgraded community resources like schools and parks with additional resiliency features such as permeable parking lots, walkways, playground surface materials, bio-swales, infiltration ponds, and restored wetlands. This would also help to reduce the risk of flooding for this socially and economically vulnerable populations.

Environmental Benefits
Environmental considerations include improved storm sewer capacity to manage runoff and increased areas of permeable surfaces in the community allow stormwater to infiltrate the ground naturally and create a redundant drainage system. The large area of impervious surfaces in the Community, particularly in commercial areas with large surface parking lots, would be addressed through broader green infrastructure policies to improve stormwater infiltration and reduce the need for storm sewers to manage flooding.

Cost Benefit Analysis
By diverting or delaying stormwater from entering the drainage system, green infrastructure helps protect community assets, homes and businesses from flooding. It also provides numerous co-benefits including groundwater recharging, pollutant reduction in bays and wetlands, aesthetics, air quality improvements and shade and cooling on hot days. When wetlands are healthy, they provide a natural
barrier and help to attenuate storm surge in addition to expanding environmental open space and creating recreational and educational opportunities.

**Risk Reduction Analysis**

It is estimated that an acre of wetland can store approximately one million gallons of water, equal to about three-quarters of a football field covered in three feet of water. Trees and other vegetation in wetland areas help to slow the speed of flood water, resulting in lower flood heights and ultimately less flood damage. The built-in redundancy provided by green infrastructure projects is needed to relieve pressure on the existing drainage and outflow systems and will reduce risk to environmental assets and critical infrastructure and reduces the risk of flooding to socially vulnerable populations including senior housing along Merrick Road, local schools and neighborhoods with young children.

**General Timeframe for Implementation**

30 months

**Regulatory requirements related to the project**

Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

**Jurisdiction**

Nassau County, Town of Oyster Bay and the Village of Massapequa Park.
**Proposed Project: Permanent Generators for Critical Community Facilities**

NYRCR Massapequas Community residents have voiced concerns that there were too few facilities in the community with power during Superstorm Sandy. This project is a response that provides more critical facilities that will be operable during a storm. Emergency shelters, community centers and fire stations need to have backup power during and after major storm events. At critical assets and evacuation sites, permanent generators will be installed on the roofs or upper floors to prevent flood damage during storm events.

The following locations, shown and labeled on Figure 13, would receive generators (potentially along with others):

- Town Hall South and Town Hall North (in Oyster Bay);
- Community Center in Marjorie Post Park;
- Bay Constable Building at John Burns Park;
- Massapequa Park Community Center at Brady Park; and
- All local fire stations.

The Massapequa Park Village Hall and the Red Cross Shelter at McKenna Elementary already have generators in place. The local libraries are also possible recipients of generators.

The cost estimate assumes that each of these facilities will be permanently outfitted with a 600 kW natural gas generator.

**Estimated Project Cost**

The total estimated project cost is $2,000,000 for Natural Gas. ($36,000,000 for Solar Photovoltaic)
Project Benefits
This project addresses the Recovery Support Function (RSF) of Community Planning and Capacity Building.

Risk Reduction & Resiliency Benefits
The project would provide back-up power to critical facilities during a future storm event. (Discussed further under “Risk Reduction Analysis” below.)

Health and Social Benefits
The benefits include the utilization of emergency facilities and community resource centers as resiliency education centers as well as points of coordinated emergency notifications among Nassau County, the Town of Oyster Bay, the Village of Massapequa Park, and private entities during emergency events.

Cost Benefit Analysis
Intended to create necessary redundancy as a safety measure, alternative power generators will be purchased and installed at critical facilities. This project will reduce public safety risk to the population by ensuring the supply of power to key locations within the community to provide cellular charging, food storage, and critical support during and after storm events.

Risk Reduction Analysis
The generators will reduce risk of power loss to these critical assets. Utilization of facilities such as Community Assistance Centers and/or resiliency education centers equipped with generators and stocked with emergency supplies will reduce risk to socially vulnerable populations by improving access to emergency information and resources for the community and by establishing alternative power supplies to community facilities during and after a storm. Centrally located facilities such as community resource centers at Marjorie Post and Brady Parks and libraries could be adapted for use during emergencies and provide additional access.

General Timeframe for Implementation
6 months

Regulatory requirements related to the project
No regulatory requirements related to this project.

Jurisdiction
Town of Oyster Bay or the Village of Massapequa Park.
Proposed Project: Redesign of Parks and Open Space Plan

The existing parks in the NYRCR Massapequas Community were severely damaged during Superstorm Sandy. Abutting properties at the end of the Alhambra Peninsula were damaged beyond repair and the Town of Oyster Bay has recently purchased and remediated these storm-damaged properties to expand public access. This trend may continue in the future. Coastal parks are the primary points of public physical and visual access to the water, and have great potential to be rebuilt in ways that make them more resilient.

Building on the Community’s ecological and waterfront assets will ensure that the parks and open spaces in the community serve to improve resilience, enhance economic development, and add value to the surrounding homes and quality of life. The goal of the study is to identify ways to develop and expand tourism activities and infrastructure related to the beaches and marine resources; incorporate water retention and drainage into active and passive open space; address and mitigate beach-front and park erosion in ways that respond naturally to coastal processes; and ensure that revitalization and redevelopment plans incorporate expanded open space to preserve neighborhood character, improve recreational access, and improve local environmental quality. Additionally, the study would identify opportunities to link to the proposed South Shore Blueway and the existing Bethpage Bikeway.

Unique projects will focus on improvements to the following parks, shown above:

- Proposed Project: Alhambra Park
- Proposed Project: Bayfront Park
- Proposed Project: Colleran Park

Estimated Project Cost
The total estimated project cost is $200,000.

Project Benefits
This project addresses the Recovery Support Function (RSF) of Natural and Cultural Resources.
Risk Reduction & Resiliency Benefits

The project would create a plan that ensured that the parks and open spaces in the community served to improve resilience, enhance economic development, and add value to the surrounding homes and quality of life. (Discussed further under “Risk Reduction Analysis” below.)

Economic Benefits

This project would improve home values in flood-affected areas that have diminished since Superstorm Sandy. Improving the condition of and proximity to public and cultural amenities such as parks and community centers increases the value of living in the Community. Open space that is better able to absorb storm impacts also protects the value of homes during and after a major storm event.

Health and Social Benefits

The benefits of expanded and improved public parks include improvements in fitness and other health outcomes as well as increases in community interaction. By increasing recreation options, parks promote physical activity and provide play spaces for children within walking distance of schools and residential neighborhoods. Additional social services could also be provided at publicly accessible parks and community centers that serve all members of the communities as Community Assistance Centers during emergencies and benefit young adults and the elderly on a regular basis. Park improvements could offer new opportunities to provide additional support and assistance to elderly residents, especially those who are homebound.

Environmental Benefits

Developing open space guidelines that incorporate resiliency features of green infrastructure will provide the Community with the information needed to improve community parks and to improve stormwater drainage and cleaning before being released into South Oyster Bay.

Cost Benefit Analysis

Parkland and nature reserves serve as ecological open space absorbing stormwater and flooding and resilience educational opportunities. Community benefits include expanded open space and recreational opportunities for residents who do not own waterfront property have limited access to South Oyster Bay.

Risk Reduction Analysis

These projects not only improve underutilized properties and protect property values in the area from being negatively affected by Superstorm Sandy damage, but they reduce flooding risk by creating redundancy for drainage and outflow by introducing pervious paving materials and the repair of aged bulkheads which were damaged by the storm. Investing in these community assets helps promote the well-being of the Community members by building on assets at Alahambra, Bayfront, and Colleran Parks. These parks are places to foster activities that promote social interaction including community outreach and resiliency education campaigns. Design consideration can also be made during the planning process for sites deemed appropriate for repurposing as emergency shelters and information centers during future storm events.

General Timeframe for Implementation

17 months

Regulatory requirements related to the project

Regulatory requirements may involve NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

Jurisdiction

NYS Department of Environmental Conservation, Nassau County, Town of Oyster Bay and the Village of Massapequa Park.
Proposed Project: Alhambra Park

Superstorm Sandy severely damaged the small existing Alhambra Park and the two adjacent parcels near the end of Alhambra Peninsula. After the storm, the informal kayak launch and the small park were unusable. As one of only two places within Massapequa I where residents can access South Oyster Bay, the demand to repair, expand, and improve the park is high.

At the site shown on the map of “Proposed Project: Redesign of Parks and Open Space Plan,” the Town of Oyster Bay plans to redesign the waterfront park by installing a new playground, permeable parking area, gazebo, kayak-launching area, and a new bulkhead in the expanded Alhambra Park. The adjacent property has recently been acquired and already undergone remediation. Additionally, the development of walking paths with permeable paving around bio-swales and storm water retention ponds, and the installation of energy-efficient lighting and signage would make the park more environmentally sustainable and better able to withstand future storm damage.

With its easy access for kayaks, the park would also be linked to the proposed regional Blueway, and being due south of the Massapequa Preserve, it will be linked to the existing Bethpage Bikeway.

The cost of this project is based on the anticipated construction of bulkheads, kayak launch, gazebo, playground, and permeable parking lot.

**Estimated Project Cost**

The total estimated project cost is $4,000,000.
**Project Benefits**

The project, which addresses the Recovery Support Function (RSF) of Natural and Cultural Resources, would create a plan that ensured that the parks and open spaces in the Community served to improve resilience enhance economic development, and add value to the surrounding homes and quality of life. (Discussed above in the “Project Benefits” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

**Cost Benefit Analysis**

The cost of expanding and improving Alhambra Park and reinforcing the shoreline is offset by benefits of expanding and preserving the Community’s environmental open space. The residents benefit from the creation and preservation of recreational and educational opportunities as well as the natural buffer provided by an open space equipped to better absorb and manage stormwater, storm surge and flooding. A quality park also improves community engagement and interaction while increasing the value of nearby homes and businesses. (Discussed above in the “Cost Benefit Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

**Risk Reduction Analysis**

Reinforcing the shoreline of Alhambra Park will slow the regular erosion and storm impacts of the park’s waterfront. The enhanced stormwater capacity will reduce the risk to environmental assets and better protect critical infrastructure by creating needed redundancy for drainage and outflow. (Discussed further in the “Risk Reduction Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

**General Timeframe for Implementation**

15 months

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**Regulatory requirements related to the project**

Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

**Jurisdiction**

Town of Oyster Bay
Proposed Project: Bayfront Park

Nassau Shores Bayfront Park was severely damaged during Superstorm Sandy by waves and flooding which damaged the playground, bulkhead, and walkways leaving debris behind.

Recognizing that public access to the waterfront enhances public awareness and contributes to community building, the Town of Oyster Bay plans to install a new playground and repair defensive infrastructure along the water’s edge (rip-rap or bulkhead to-be-determined) at Bayfront Park (shown at right) to address damage from Superstorm Sandy. Additionally, the Town will add walkways with permeable paving around bio-swales and stormwater retention ponds, rest area for cyclists, fitness stations, an expanded pier and energy efficient lighting.

The park will also be linked to the proposed regional Blueway and the existing Bethpage Bikeway.

The cost of this project is based on the anticipated construction and repair of bulkheads, playground, walkways and pier.

Estimated Project Cost
The total estimated project cost is $2,000,000.

Project Benefits
The project, which addresses the Recovery Support Function (RSF) of Natural and Cultural Resources, would create a plan that ensures that the parks and open spaces in the Community improve resilience, enhance economic development, and add value to the surrounding homes and quality of life. (Discussed above in the “Project Benefits” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)
Cost Benefit Analysis
The cost of improving Bayfront Park and protecting the shoreline is offset by benefits of expanding and preserving the Community’s environmental open space. The residents benefit from the creation and preservation of recreational and educational opportunities as well as the natural buffer provided by an open space equipped to better absorb and manage stormwater, storm surge and flooding. A quality park also improves community engagement and interaction while increasing the value of nearby homes. (Discussed above in the “Cost Benefit Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

Risk Reduction Analysis
Strengthening the shoreline of Bayfront Park will slow the regular erosion and storm impacts of the park’s waterfront. The enhanced stormwater capacity will reduce the risk to environmental assets and better protect critical infrastructure by creating needed redundancy for drainage and outflow. (Discussed further in the “Risk Reduction Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

General Timeframe for Implementation
15 months

Regulatory requirements related to the project
Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

Jurisdiction
Town of Oyster Bay
Proposed Project: Colleran Park

Superstorm Sandy exacerbated the erosion and damaged paths in Colleran Park, shown at right. Recognizing that public access to the waterfront enhances public awareness and contributes to community building, the shoreline of Colleran Park would be stabilized with bulkhead and riprap to prevent further erosion. The playground will also be resurfaced to repair the protective rubber damaged by Superstorm Sandy.

With a beach landing, the park will be linked to the proposed regional Blueway, and the existing Bethpage Bikeway.

The cost of this project is based on the anticipated installation of bulkhead, riprap, and rubber playground surface.

**Estimated Project Cost**
The total estimated project cost is $2,200,000.
Cost Benefit Analysis
The cost of improving Collaran Park and protecting the shoreline is offset by benefits of expanding and preserving the Community’s environmental open space. The residents would benefit from the creation and preservation of recreational and educational opportunities as well as the natural buffer provided by an open space equipped to better absorb and manage stormwater, storm surge, and flooding. A quality park also improves community engagement and interaction while increasing the value of nearby homes. (Discussed above in the “Cost Benefit Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

Risk Reduction Analysis
Reinforcing the shoreline of Collaran Park will slow the erosion and deterioration of the park and beach. This will reduce the risk to environmental assets and the risk to critical infrastructure by creating needed redundancy for drainage and outflow. (Discussed further in the “Risk Reduction Analysis” section of Proposed Project: Plan to Redesign Parks and Open Spaces.)

General Timeframe for Implementation
15 months

Regulatory requirements related to the project
Regulatory requirements may involve NYS Department of Environmental Conservation (NYS DEC), the U.S. Army Corps of Engineers (USACE), and Coastal Zone Management coastal consistency concurrence determined by NYS Department of State.

Jurisdiction
Village of Massapequa Park
Proposed Project: Public Communication and Education Gap Analysis

Currently, Nassau County Office of Emergency Management (OEM) coordinates all Federal, State, and local agencies to create and implement an Emergency Operations Plan. OEM identifies vulnerabilities, mitigates disasters, provides public education, responds to all-hazard emergencies, and protects Nassau County’s first responders. Nassau County has identified enhanced communication and education as an ongoing need to maintain its ability to respond effectively during a storm event.

Despite warnings and orders from OEM before Superstorm Sandy, many NYRCR Massapequas residents did not understand the severity of the storm and were unable to evacuate after conditions became unsafe. According to members of the Community, this resulted in a number of emergency distress calls to local police and fire departments, putting themselves and emergency responders at risk. Also, many residents did not know where to look for emergency information. Following the storm, power outages and lack of cell phone service left residents unable to communicate with friends and family members and without the means to find emergency resource information. Even those with power stated they did know of a central place to go online to share or find out about available emergency supplies in their communities.

This project will study Nassau County’s existing emergency management efforts to identify opportunities to create a single, user-friendly source for comprehensive information and emergency assistance from a variety of public agencies. It will identify gaps in the existing communication network and recommend ways to increase the effectiveness of local government, emergency management agencies, residents, businesses, and faith-based groups, as well as non-profit organizations that direct aid and recovery efforts to the Community’s residents, including socially vulnerable populations.

This project will evaluate existing emergency communication systems and determine additional needs, with an emphasis on coordination across multiple jurisdictions allowing community members to communicate with each other, and emergency readiness education. This initial study will provide recommendations for addressing gaps in communication and education and will identify potential public/private partnerships to implement the study’s recommendations.

A next phase of work, not funded by this project, will need to establish a centralized location (such as a website) with consistent “branding” to make disaster information identifiable and regular updates to keep information current. A further phase of work will need to include the creation of an educational component, using the website to promote educational seminars on disaster planning.

**Estimated Project Cost**

This project has also been proposed in the neighboring NYCR Communities of Baldwin, Freeport, Bellmore/Merrick, and Seaford/Wantagh. The approximate total project cost is $100,000, with an estimated contribution of $20,000 by the NYRCR Massapequas Community.

**Project Benefits**

This project, which addresses the Community Planning and Capacity Building Recovery Support Functions (RSFs), will allow emergency response agencies to coordinate efforts before, during, and after storm events, prioritizing resources to the areas of greatest need. Implementation of the project will improve access to emergency preparedness information for all Community residents and businesses.
Risk Reduction & Resiliency Benefits

The benefits of a well-prepared Community include reduced risk of physical damage from storm events, less social strain on the Community during and following disasters, and reduced risk of injury or death.

Health and Social Benefits

Knowledge and understanding of emergency procedures, responsibilities, and location of resources will be increased across the Community. An enhanced website that allows Community members, local organizations, and governmental agencies to communicate with each other will benefit disaster recovery, aid efforts, and enhance social connections at a time when they are needed the most. Better awareness and education about properly securing personal property, including fuel tanks, household paint, and other toxic chemicals, prior to a storm provides environmental benefits from reducing the volume of harmful toxins entering the water during a flooding event.

Economic Benefits

Post-disaster claims for financial assistance from State and Federal programs may be reduced if homes are retrofitted appropriately and if people are safe from harm because they know when, where, and how to evacuate.

Cost Benefit Analysis

The project identifies and addresses gaps in communication and education needs to better prepare the community for emergencies. It also helps the Community react quickly and appropriately to notices, warnings, and orders, lowering the number of people in risk zones and reducing the potential for injury or death in the event storms overwhelm the area with wind, rain, floodwaters, or storm surge.

Risk Reduction Analysis

Risk to population will be reduced by increasing access to educational materials and improving knowledge of emergency procedures and resources. Risk to vulnerable populations will be reduced, as emergency response agencies will be better able to prioritize resources to the areas of greatest need. Population health risks will be reduced as public access to up-to-date information on hazardous conditions is improved.

General Timeframe for Implementation

24 months

Regulatory requirements related to the project

No regulatory requirements related to this project

Jurisdiction

Nassau County Office of Emergency Management
**Proposed Project: Business Continuity Program**

NYCR Massapequas businesses were significantly impacted by Superstorm Sandy. Some were flooded and suffered substantial physical damage; others were indirectly affected by public misperception that businesses were closed when they were, in fact, open. Working hours were reduced in many cases, causing financial hardship to employees.

According to data from the U.S. Small Business Administration (SBA), 105 Community businesses, representing 314 employees applied for disaster management assistance after Superstorm Sandy. These applications verified a total of $7.5 million in real property damage, $1.2 million of machinery damage, an inventory loss of $409,722, and a leaseholder improvement loss of $554,485. Of these applications, only 37 (35.2%) were approved for an amount totaling just over $7.1 million, roughly three quarters of the $9.6 million in verified damage assistance applied for by the Community.

Business continuity planning ensures that businesses have the capability to maintain essential functions during a range of potential emergencies and could be implemented immediately. The assistance provided by a Business Continuity Program would include planning assistance, access to alternative spaces or facilities, communications provisions, and provisions for vital records backup and management. At the base of this program is the creation of a part-time business continuity facilitator responsible for educating the local business community in south shore Nassau County on crisis preparedness and management, organizational structure, and policies and procedures, as well as the following roles and responsibilities:

- Educational sessions for the business community;
- Creation of risk assessment checklist and audit assistance;
- Individualized business continuity plan assistance; and
- Maintenance and monitoring through annual exercises and continuous improvements.

The program proposes working with Adelphi University and the Business Continuity Institute to lead training sessions for local business owners. Through ongoing coordination with local Chambers of Commerce and/or related business organizations, the Business Continuity Program facilitator would help small businesses to create their own plans for continuing operations under adverse conditions, such as a major storm, as well as being responsible for identifying and assisting in the pursuit of future funding opportunities. The Program will help business owners identify their backup power needs in advance of an emergency, which will allow owners to procure emergency power generation supplies.

**Estimated Project Cost**

This project has also been proposed in the neighboring NYCR Communities of Baldwin, Freeport, Bellmore/Merrick, and Seaford/Wantagh. The approximate total project cost is $200,000, with an estimated contribution of $40,000 by the NYCR Massapequas Community.

**Project Benefits**

This project addresses the Economic Recovery Support Function (RSF). Given this is a shared project across multiple NYCR Communities, the NYCR Massapequas communities get the full benefits of the program at a lower level of cost than if the project were undertaken solely at the direction of the Community.

**Economic Benefits**

The Community’s commercial sector is largely comprised of retail businesses. When these businesses close, even for a short period of time, it is disruptive to the local economy and effects wholesalers and other businesses in the supply chain. Loss in sales across a number of businesses can lead to considerable lost sales tax revenue for Nassau County. Employees may lose wages or even their jobs. In addition, better preparedness and education can lead to a reduction in post-disaster business claims for financial assistance from state and federal programs.
For many Community business owners, damage caused by Superstorm Sandy was a serious financial burden, one that owners could not rebound from if it happened again. A business continuity plan would assist business owners in knowing what the best resiliency-related investments would be and how to plan for their future. Program staff would also help to connect business owners to grants, incentives, and other funding sources, helping to strengthen the local economy.

**Health and Social Benefits**

Businesses such as supermarkets, drug stores, and gas stations are essential to the Community for the supply of food, medicines, and fuel on a day-to-day basis. If these essential Community businesses cannot reopen quickly enough after a storm, the Community can be severely affected. The impacts are even more severe for the local senior population and those without access to a car, who may have more difficulty in traveling a farther distance to get prescriptions or food.

**Environmental Benefits**

For businesses that handle environmentally hazardous material, flooding can cause widespread environmental damage. Better education about the risks of flooding and how to plan for storm events can help to prevent this type of environmental damage from occurring by helping business owners adapt their operations to store and operate hazardous materials in a manner that removes the risk of contaminating floodwaters.

**Cost Benefit Analysis**

Given this is a shared and programmatic project, the costs are relatively low at $40,000, yet the benefits can be tremendous in getting businesses back in operation faster after a storm. Benefits are realized when businesses owners understand and mitigate against risks their business may present to local areas should flood waters intrude the property or building, such as securing fuel tanks, raising sensitive chemicals to higher floors, or dry or wet flood proofing their operation.

Further, the revenue losses to local, State, and Federal governments when businesses are closed, even temporarily, are significant. The benefit of educating businesses to better prepare for storm events, thereby reducing closure times and lost business revenue, far outweighs program costs.

**Risk Reduction Analysis**

Ensuring a stable economic base reduces the risk of loss of jobs and loss of identity along commercial corridors.

**General Timeframe for Implementation**

24 months

**Regulatory requirements related to the project**

No regulatory requirements related to this project

**Jurisdiction**

None
**Proposed Project:** South Shore Stormwater System Modeling and Analysis
During Hurricane Irene and Superstorm Sandy, the stormwater systems within the NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and the Massapequas were overwhelmed by flooding caused by rainfall and storm surge. In addition, localized flooding is observed regularly after heavy rainfall or at monthly spring tides. These four NYRCR Communities fall within the following watersheds: Milburn Creek-Middle Bay Watershed, Freeport Creek Watershed, Bellmore Creek-East Bay Watershed, Seaford Creek Watershed, Massapequa Creek Watershed, and South Oyster Bay Watershed. These watersheds encompass an area much larger than the political boundaries of the NYRCR Communities. This study would look at the portion of these watersheds that fall within the four aforementioned NYRCR Communities.

There is currently limited information available about the existing stormwater infrastructure. A hydrologic and hydraulic (H&H) model would provide a catchment-wide understanding of where runoff is coming from, how much there is, specific areas where the current system is inadequate and what improvements could be made. This model could be used to:

- Determine the causes of localized flooding issues across the catchment and identify measures to prevent the flooding;
- Understand the impacts of stormwater runoff on water quality and determine the benefits of flooding mitigation measures in order to identify projects to be implemented; and
- Identify green infrastructure solutions to provide the most effective investment to reduce surface water flooding.

This project will involve the following four phases:

- Phase 1: An initial phase of key stakeholder meetings, including Nassau County, Town of Hempstead, Town of Oyster Bay, Village of Massapequa Park, and NYS Department of Transportation (NYS DOT), U.S. Geological Survey, and other appropriate agencies and organizations to collate all the existing drainage datasets.
- Phase 2: Survey a portion of the drainage system to inform the model. The survey will include manhole surveys and connectivity surveys to determine level, size, line, and condition of the pipes.
- Phase 3: An integrated catchment model will be built, verified and then used to determine the cause of flooding and the most appropriate solutions. These solutions can range from traditional drainage improvement projects to innovative green infrastructure projects. Using the most recent high-resolution LiDAR data of the ground surface available, this phase will involve processing the data, building and calibrating the model, and installing and collecting data from four stream gauges for an eight-month period.
- Phase 4: A geographic information system (GIS) study of the physical ground conditions to determine the most appropriate location for green infrastructure in terms of maximizing infiltration and water quality benefits and choosing the most appropriate green infrastructure solutions. Potential green infrastructure solutions include permeable paving, bioswales, green roofs, stormwater ponds, and wetlands.

**Estimated Project Cost**

This proposed project has also been proposed in the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, and Seaford/Wantagh. The approximate total project cost is $2,900,000, with an estimated contribution of $725,000 by the NYRCR Massapequas Community.
Project Benefits
This project addresses the Natural Resources and Infrastructure Recovery Support Functions (RSF).

Risk Reduction & Resiliency Benefits
Modeling and analysis is necessary to help identify solutions for stormwater management, which will include capital projects, updated maintenance requirements, regulatory improvements, public awareness programs, and other property owner assistance measures. These outcomes of modeling and analysis would improve the functionality of the stormwater system and reduce flooding issues in the region, reducing damage to buildings due to flooding and increasing the chance that buildings will remain habitable. An informed model can also predict and estimate the costs and benefits of a proposed capital improvement and thus provide more certainty that a project will reduce flood risk. Subsequently, the risk of constructing a project that will not provide the anticipated benefit will also be reduced.

Economic Benefits
Stormwater drainage projects that would come out of this tool would reduce the exposure to damages from flooding, which will reduce the risk for economic loss associated with rebuilding and repair in future flood events. It also reduces the risk of economic loss associated to road closure which would affect access to businesses in the area. The model also offers a platform for improved coordination between the multiple jurisdictions of ownership. It will encourage more proactive management of infrastructure through preventative rather than reactive management, which relies on deferred, and often more costly, maintenance.

Health and Social Benefits
This project will improve access to information on critical assets and facilities during storms and other projects that result from this project will improve access for fast and safe evacuation. By reducing the amount of standing water on roadways, this project will improve vehicle operation during all types of inclement weather, as well as reduce road congestion. During major storms, improved drainage will increase the amount of time that roads are available to emergency services at the storm’s outset, and will shorten the recovery time for road access after a storm event.

Environmental Benefits
The modeling and analysis will help to identify and optimize green infrastructure projects. Green infrastructure provides many environmental benefits to the region in that green infrastructure can by helping to reduce the quantity and improve the quality of stormwater that reaches the Estuary, reducing pollution effects on wetlands, which when healthy, provide a natural barrier, and helping to attenuate storm surge.

This project has the potential lead to the reduction of pollutants carried by stormwater runoff entering tributaries and the South Shore Estuary. The findings from the study can be used for the next State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s) managed by the NY State Department of Environmental Conservation.
Cost Benefit Analysis
With the ability to identify appropriate drainage improvements with a comprehensive and effective modeling tool, the benefits of the expenditure will be realized. Strategic drainage improvements that prevent flooding along key roadways will prevent any delays and subsequent economic effects of impeding movement of goods and labor. Better-informed and strategic investments in drainage improvement projects can also lead to cost savings. Through supporting SPDES, this project has the potential to reduce local government expenditures for future stormwater improvement projects.

Risk Reduction Analysis
Undertaking the modeling and analysis will help to identify key vulnerabilities in the storm drainage system, allowing communities to identify and develop projects that will ultimately reduce the risk of flooding to the Community. In addition, the project can lead to stormwater system improvements which reduce the risk of pollution to the South Shore Estuary.

General Timeframe for Implementation
24 months

Regulatory requirements related to the project
There are no regulatory requirements related to this project.

Jurisdiction
A multi-jurisdictional committee/consortium consisting of municipalities could be considered. This form of governance and administration has proven successful on Long Island, as represented by both the Hempstead Harbor Protection Committee and Manhasset Bay Protection Committee. Potential actions of such a multi-jurisdictional committee/consortium might include being able to appoint a fiduciary to be responsible for grant management, with the committee/consortium itself being responsible for project management. The recent New York-Connecticut Sustainable Communities Consortium, a program funded by a HUD Sustainable Communities Regional Planning Grant, used this structure and was successful in carrying out the planning program over a wide geographic area across numerous municipal boundaries.
Proposed Project: Massapequas South Shore Shoreline Conditions Analysis and Restoration

South of Merrick Road, the NYRCR Massapequas Community is characterized by peninsulas along the South Oyster Bay shoreline, five creeks, and numerous canals and narrow inlets reaching as far north as Merrick Road. This results in more than 25 miles of water edge conditions, most of which is lined with homes. This part of the Community remains susceptible to damage from flooding and major storms such as Hurricane Irene and Superstorm Sandy, which caused widespread damage to Long Island’s southern coastline. Many protective coastal features were affected, compromising their ability to control erosion and flooding or to adequately protect residents and property from future storms.

As described in Section I, Part C: Critical Issues, NYRCR Massapequas has seen a steady decline in natural wetlands and dunes as decades of development have replaced the ecological systems along the Long Island Sound. Channeling and extensive private bulkhead construction have created a hardened shoreline that resists regular tidal movement but does little to soften the blow of major storms. This hardening has also prevented natural water filtration. Moreover, inconsistent bulkhead height and irregular maintenance have allowed water to seep in at sporadic intervals that cannot be removed without pumping and other efforts. A softer shoreline would allow for natural protections from storm surge while consistent bulkhead heights would more effectively protect areas now affected by regular tidal flooding.

In response to Superstorm Sandy damage, a Feasibility Report for Erosion Stabilization along the Park Shore was completed to look at ways to secure the beach through a variety of ecological engineering strategies. This report includes plans for the Colleran Park shoreline in Massapequa Park, already affected by erosion that was precipitated by Superstorm Sandy. Bayfront Park in Massapequa II and Alhambra Park in Massapequa I were littered with debris and severely damaged during Superstorm Sandy. John Burns Park flooded damaging the fields and the Bay Constable building there.

Estimated Project Cost
The estimated cost for the study is $100,000. This cost does not include pilot project implementation.

Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Infrastructure and Natural and Cultural Resources.

Risk Reduction & Resiliency Benefits
This project which includes a study and pilot project will survey existing shoreline conditions and identify opportunities to increase the efficiency of the existing drainage system and recommend innovative materials and techniques that may be implemented to help minimize coastal erosion and flooding. The shoreline survey will focus on critical areas prone to flooding and on inspection of all existing edge conditions along the coastline, including bulkheads, rip-rap, and natural conditions.

Environmental Benefits
The results will be used to identify and guide any shoreline improvements that may be implemented to address these areas such as hard, soft, or hybrid structures. These may include but are not limited to: living shorelines, wave attenuation measures such as oyster reefs, and other natural shoreline reinforcement, wave attenuation, and erosion control solutions. These improvements will have multiple benefits to the Community by helping to reduce the influence of tidal wave action, helping to mitigate shoreline erosion, and helping to protect coastal residential, commercial, and public property from flooding and degradation.

Economic Benefits
By reducing the flooding risk and flood impacts, the economic benefit to the Community will include reduced delays in accessing schools, parks, and homes during tidal flooding events or after heavy rainfalls and potential flood associated damage to these properties.

Health and Social Benefits
Local residents, including seniors, will benefit from being able to access critical services on Merrick Road, such as food stores and pharmacies. Health risks related to children playing in or falling into dirty, contaminated water would be reduced by a number of methods including the possible installation of
trash/bar screens on outflow pipe openings, having an added environmental benefit by reducing the amount of debris reaching water bodies.

**Cost Benefit Analysis**

With increased flood protection to thousands of homes south of Merrick Road, the benefits of the expenditure will be realized and serve as a model for other South Shore communities hindered by damaged or degraded shorelines.

**Risk Reduction Analysis**

Developing a program to incentivize and provide support for coordinated and continuous shoreline improvements along private waterfront properties would include measures to reduce erosion and provide protection against tidal action and storm surge. The study is the first step to reducing the risk of flooding to thousands of homes located south of Merrick Road in the Community, as well as several parks, schools, libraries, marinas, and fire department facilities by identifying degraded or damaged shoreline areas and proposing improvements that will make the community safer during future storm events. This program would include the creation of a digital inventory to assess shoreline conditions, and analyze potential strategies to restore shorelines to pre-Irene and pre-Sandy conditions. Pilot projects should be implemented and monitored at a local level and can serve as examples to appropriate shoreline repair projects and set the stage for other longer-term, larger scale improvements.

**General Timeframe for Implementation**

8 months

**Regulatory requirements related to the project**

Regulatory requirements may involve NYS Department of Environmental Conservation.

**Jurisdiction**

The Town of Oyster Bay, the Village of Massapequa Park, and Nassau County.
Proposed Project: Regional Lifeline Transportation Network

Throughout the NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequas, conditions on various roads after Superstorm Sandy compromised life safety and impeded the ability of first responders and residents to access certain destinations. Issues, such as lack of power to traffic lights, lack of street lighting, flooding, downed power lines, damaged trees, and debris all contributed to disruptions to the road network. This project is identical to the “Proposed Project: Lifeline Corridor Study and Guidelines” in the other NYRCR Communities.

By strategically focusing infrastructure investments to key streets within the five areas, a “Lifeline Network” could be developed that would provide maximum accessibility in and out of residential neighborhoods, as well as in and out of the area in general. This network of State, County, and local streets would integrate resilient streetscape design, such as redundant power and improved drainage systems, so they will be more resilient to storm events and better able to serve first responders and residents before, during, and after a storm.
The project includes a study to determine the location and specific objectives of the Lifeline Network streets, followed by the creation of guidelines for increasing the resiliency of Merrick Road and Sunrise Highway, which traverse all five NYRCR Communities, and a north-south street in each Community.

This study seeks to accomplish the following:

- Coordinate the needs and efforts of all relevant jurisdictions and agencies;
- Identify a network of “Lifeline Corridors;” and
- Develop guidelines for street improvements to be made to Lifeline Corridors.

The study will identify best practices and develop design guidelines for resilient streetscapes. The guidelines will include opportunities for:

- “Green Street” design (stormwater management and green infrastructure);
- Redundant and safe power distribution (stand-alone lighting and signaling, undergrounding power lines);
- Resilient street trees (trees more resilient to wind and saltwater); and
- “Complete Streets” design (flexible lanes, bicycle capacity, sidewalk width, treatment and amenities, and appropriate transit provision).

The guidelines will also include cross-section designs for Merrick Road, Sunrise Highway, and a north-south street in each Community that integrates the resilient streetscape methods listed above.

For the Community, a pilot project to retrofit the streetlights along Merrick Road with LED lights with photovoltaic (PV) solar panels for power and battery backup is part of “Proposed Project: Street Lighting (Lifeline Road Network)”.

**Estimated Project Cost**

This project has also been proposed in the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, and the Massapequas. The approximate total project cost is $600,000, with an estimated contribution of $120,000 by the NYRCR Massapequas Community.

**Project Benefits**

This project addresses the Infrastructure Recovery Support Function (RSF). Developing streetscape design guidelines that incorporate resiliency features, green infrastructure, and complete streets principles will provide the Communities with the information needed to refit critical roads to function better in case of major storm events.

**Risk Reduction & Resiliency Benefits**

Green street design will improve stormwater drainage and reduce the amount of standing water on roadways, allowing for safe vehicle operation during all types of inclement weather. Managing/trimming street trees will enhance energy security for the NYRCR Communities by removing threats to the electrical distribution system.

**Economic Benefits**

This project also reduces government expenditures by reducing the cost of power supply to public facilities. Enhancement of roadway corridors in this manner will increase the attractiveness of more areas in the Community. This will provide economic benefit by diversifying the locations to which waterfront landowners could relocate within the community if they seek to move to less risk-prone areas.
Health and Social Benefits

Introducing more tolerant and resistant street trees will reduce the occurrence of downed trees and limbs that may block roadway access.

By maintaining a stable energy supply along key roads, emergency response facilities will have a better chance of remaining operational, reducing risk to the population through faster emergency response. Buildings and homes throughout the community, including those housing vulnerable populations, will have a better chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter.

Solar power and battery backup systems for streetlights will improve public safety at night. Access to critical assets will be secured, including key routes from coastal areas to Community Assistance Centers. Recovery efforts can be accomplished at night, improving the pace at which access to roadways and properties can be restored, which has multiple benefits of improving access to community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and improving local economic recovery. Complete streets will improve walking, cycling, and transit infrastructure by offering viable alternatives to automobile travel and improving access for vulnerable populations.

Environmental Benefits

The volume of stormwater being released into the South Shore Estuary will be reduced and the water that does reach the Estuary will be filtered of toxins. Tree trimming guidelines will enable the Community to maintain the environmental benefits of trees, including surface water retention, decreased soil erosion, shade, and air quality improvements. Complete street guidelines can reduce the use of private automobiles, reducing greenhouse gas emissions in the process.

Cost-Benefit Analysis

The design guidelines represent a small investment with multiple returns by changing how roads and corridors are designed. These guidelines can be integrated into normal maintenance, operations, and capital programming activities. When applied to subsequent projects, the guidelines will transform single-purpose roads into community assets serving multiple functions and offering local benefits, as described above. The guidelines can also be used in an efficient manner without disrupting normal operations for the Town. Once developed, they can be applied during standard maintenance cycles and as they become manifest in the built environment, the communities that sit along them will become more resilient and robust. Once installed, the new street designs will create a higher degree of safety and reliability of the roadway system during and after any storm event, as the lighting system will be independent from local power supply, allowing for quick access after a storm.

Green infrastructure will enhance the attractiveness and livability of the community, while reducing and filtering stormwater. Enhanced Community attractiveness and livability will help bolster home values and attract new residents. These functions, in turn, protect public and private assets throughout the community by reducing flood risks and reserving stormwater capacity to move excess water that cannot be stored or absorbed locally out of the area. The public and private assets span all asset classes throughout the vulnerable areas of the community and such systems will improve overall population protection.
**Risk Reduction Analysis**

Developing design guidelines for future roadway improvements will reduce Merrick Road’s risk of flooding and debris, which would block transportation access and might interfere with the electrical distribution network. Independent streetlight power sources, proposed for the pilot project, will improve public safety along the road at night, reducing risk to Community residents. Developing mechanisms to improve transportation access and options can reduce the risk of social isolation, which is exacerbated after disasters, for socially vulnerable populations.

**General Timeframe for Implementation**

12 months

**Regulatory requirements related to the project**

There are no regulatory requirements related to this project.

**Jurisdiction**

NYS Department of Transportation, Nassau County, the Town of Oyster Bay, and the Village of Massapequa Park.
Featured Project: Commercial Redevelopment Study (Eastern Massapequa)

During NYRCR Public Engagement Events, many residents and NYRCR Massapequas Committee Members expressed concern that there were no designated areas for families with vehicles to safely park their cars to avoid water damage during Superstorm Sandy. They reported extensive damages to multiple vehicles, a hardship which may have been avoided with better preparation and emergency parking areas. North of Sunrise Highway and outside of the extreme hazard areas, the Westfield Sunrise Shopping Center is surrounded by acres of parking and sits among vacant and deteriorating commercial sites along Sunrise Highway Eastern Massapequa. Members of the Committee suggested that parking could be designated here as a short-term emergency parking solution.

According to American Community Survey, Eastern Massapequa is an area with the largest concentration of families whose incomes fall below the NYRCR Massapequas median income of $93,000. Despite being a socially vulnerable population this area was underserved by public transit during Superstorm Sandy. As a long-term strategy, a new Long Island Rail Road (LIRR) station should be considered between Massapequa Park and Amityville to improve transit access for a socially vulnerable population as well as to increase public access to the commercial businesses from surrounding communities. A new LIRR station would contribute to an ideal location for a redevelopment with transit access, pervious paving, stormwater retention ponds and bio-swales, as well as mixed-use development that could include new retail options, health services, and housing.

The first phase of this project will be to make contact with the land owners of the Westfield Sunrise Shopping Center and establish an agreement with the Town of Oyster Bay to designate short-term emergency parking. In addition, the study will identify costs and benefits for a new LIRR station at this location and its potential to attract new development. This includes infrastructural impediments such as power transmission and sewage management. A tax stabilization program and other incentives will be explored, and top priority uses will be determined such as a full service medical hospital with emergency care close to the community and expanded housing options for seniors, first time home buyers, and the local workforce.

Estimated Project Cost
The total estimated project cost is $550,000

Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Housing and Economic Development.
Economic Benefits

Nassau County is dominated by single family housing, with a majority of units over 50 years old. Escalating home prices and property tax levels limit the stock of housing available for the County’s young and aging population, low-income residents, and those displaced by previous storms. A mixed-use commercial redevelopment with a range of housing options would increase the number of smaller, affordable housing and rental developments often targeted as “next generation” (first time) home buyers and options for senior living.

Health and Social Benefits

Expanded medical offerings should be considered in a redevelopment study to address the Health and Social Services Needs of the Community (Discussed in Section II: Assessment of Risk and Needs, B. Assessment of Needs and Opportunities):

- Improved access to health care and social interaction for senior community members with limited mobility.
- Improved access to basic services for low-income and minority groups who face social and geographic isolation.
- Resources to help caregivers manage client demands with their own recovery needs.
- Additional resources to help outreach programs better connect with underserved populations and improve awareness of the breadth of available health and social service resources.

Environmental Benefits

The commercial areas in Eastern Massapequa along Sunrise Highway Eastern Massapequa are surrounded by acres of parking and sit among vacant and deteriorating commercial sites. New developments should incorporate green infrastructure solutions to stormwater management including pervious pavement, on-site stormwater retention, bio-swales, and other approaches to increase water infiltration.

Cost Benefit Analysis

Providing emergency parking in the short term will help many Community members avoid unnecessary losses caused by water damage to their vehicles during future storm events. There may be a cost associated with any agreement to use private land for emergency parking.

A potential new LIRR station can contribute to improved retail and a stronger tax base as well as providing transportation options for a socially vulnerable population. In the long run, improved transit could incentivize development in areas of Eastern Massapequa and will generate additional tax revenue to reduce the overall tax burden for the entire Community. Any new developments should incorporate green infrastructure solutions to stormwater management, a range of housing options and price-points, and expanded medical offerings.

Risk Reduction Analysis

This project will reduce economic risks for the community with new retail to generate additional tax revenue for the community as well as providing new housing options for residents interested in relocating within the community to a home outside of a flood risk area. If the study determines a strong demand for diverse housing options, there may be opportunities to increase the age and income mix in the area, expanding the overall tax base and reducing the tax burden on existing residents. Medium density residential development may be constructed here to provide an alternative to living in extreme and high risk zones.

General Timeframe for Implementation

12-18 months

Regulatory requirements related to the project

No regulatory requirements related to this project.

Jurisdiction

Town of Oyster Bay, Westfield U.S. Shopping Centers, and the Metropolitan Transportation Authority (MTA).
Economic resilience continues to be important to the NYRCR Massapequas Community as it recovers from damage caused by Superstorm Sandy and the recent recession. In addition to the proposed regional project Business Continuity Program, this project focuses on supporting the existing Community business centers with infill and improved design standards. It addresses the quality of the public realm by developing urban design standards to reduce flood risks caused by stormwater runoff through green-infrastructure interventions such as pervious pavement, rain gardens, and on-site storm water retention; and to improve automotive and non-automotive mobility options including improved sidewalks and bicycle lanes and exploring opportunities for structured parking for short-term emergency use during storms and as a long-term development incentive.

The Town of Oyster Bay and the Village of Massapequa Park would engage in a comprehensive master-planning process for the downtown and commercial districts to encourage economic development that embraces and supports small, independent businesses in commercial corridors. Both government agencies should encourage the development of business associations to discuss corridor improvements, advocate for local businesses, and encourage community engagement.

Alternatively, local officials should work with business owners to establish a business improvement district (BID) in each Community business center in order to raise the money necessary to maintain clean and safe districts as well as to invest in future public realm improvements.

**Estimated Project Cost**

The total estimated project cost is $500,000.

**Project Benefits**

This project addresses the Recovery Support Function (RSF) of Economic Development.
Risk Reduction & Resiliency Benefits
In order to improve appearances, the study should also address design standards for commercial corridors, particularly along Merrick Road. It should also identify for street improvements which may include improved lighting, storm water management, road elevations, or green infrastructure initiatives.

Economic Benefits
The proposed Downtown Master Plan will include provisions to stimulate the redevelopment of vacant, abandoned, and under-used properties with strategies such as streamlined approval processes and updated land use regulations.

Environmental Benefits
Green infrastructure helps protect community assets, homes, and businesses from flooding. This has numerous co-benefits including groundwater recharging, pollutant reduction in bays and wetlands, aesthetics, air quality improvements, and shade and cooling on hot days. Strategies for diverting or delaying stormwater from entering the drainage system should be explored.

Cost Benefit Analysis
The plan will help the Community develop a more robust economy and attract new businesses, increasing the tax revenue for future community-building and infrastructure projects. Improving housing and business options will provide incentive and opportunities for more young families and empty nesters to locate within Massapequa and Massapequa Park Centers along Sunrise Highway near Long Island Rail Road (LIRR) stations. It also provides options for long-time residents to relocate outside of hazard areas, reducing the risk to people currently living in areas of high flood risk. Road congestion can also be minimized by reducing the need for personal automobile use through more walkable commercial centers and with better transit access to the LIRR.

This plan should also provide options for a diverse mix of alternative energy sources including solar, wind, fuel cell, and other microgrid technologies in order to safeguard local businesses against extended disruptions caused by future storms. Energy security and increasing energy capacity also support economic development by increasing the appeal for future businesses to locate in the area.

The creation of a business improvement district (BID) requires that all businesses in a commercial center contribute to a common fund used for local improvements. With an already high tax burden, business owners will need to weigh the benefits above against the additional cost incurred by their businesses.

Risk Reduction Analysis
By participating in a BID, business owners can effectively develop strategies for preparing for future storms. Most businesses along Hicksville Road, Broadway, and Park Boulevard experienced much less damage during Superstorm Sandy than businesses along Merrick Road and were able to recover quickly after power was restored; however, without being able to predict the severity of future storms, as an additional safeguard, developing a central location with a cluster of essential services can increase protections against power loss during and after future storm events. This and other alternative energy approaches mentioned above have the added benefit of reducing energy loads on the existing utility grid, increasing the use of clean energy, and adding redundancy, and increasing capacity and access to energy sources. Additionally, green infrastructure projects and strategies for diverting or delaying stormwater from entering the drainage system improve protection to community assets.

General Timeframe for Implementation
12-18 months

Regulatory requirements related to the project
May require zoning modifications as well as policy modifications relating to the BID.

Jurisdiction
Village of Massapequa Park and/or the Town of Oyster Bay.
Featured Project: Emergency Preparedness and Disaster Action Planning

In the aftermath of Superstorm Sandy, it was immediately apparent that the Town of Oyster Bay and Village of Massapequa Park emergency responders were not equipped to effectively respond to the hardest hit areas during Superstorm Sandy. NYRCR Massapequas Community assets along Merrick Road, and particularly in John Burns Park, were destroyed due to localized flooding which could have been prevented with the proper protection equipment. At least six homes south of Merrick Road were left to burn because the Fire Department could not gain access due to flooded roadways. These issues were further complicated by the Fire Department’s inability to assist with intensified communication needs. The Bay Constables had difficulty rapidly removing boats still in the water and were unable to secure their building against floodwaters.

Emergency preparedness and disaster action planning for the Community will include the following actions:

- Create a network for checking on and contacting seniors and other vulnerable groups in the event of an emergency.
- Purchase and install tidal gauges to better prepare for storms and initiate evacuation.
- Purchase additional fire response vehicles (proposed four emergency response ready communication vehicles and two supporting utility trailers) and necessary communication equipment.
- Purchase 5-ton army truck with pump and tank to access burning structures in flooded areas
- Purchase Muscle Wall Mitigation system to protect residents and buildings in lieu of sandbags.
- Potentially purchase additional sand bags, chain saw, large portable water pumps, heavy duty boat trailers and an emergency boat for Bay Constables.

Estimated Project Cost
The total estimated project cost is $4,600,000.

Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Infrastructure, Community Planning and Capacity Building, and Health and Social Services.

Risk Reduction & Resiliency Benefits
Upgrading emergency response vehicles and equipment along with a coordinated response will result in a better connected and informed Community, facilitating the sharing of information that may result in reduced risk of physical damage from storm events, less social strain on the Community and their families during and following disasters, and reduced risk of injury or death.

Economic Benefits
Better planned and organized deployment of emergency protection measures such as real time water diversion away from key community assets would protect critical emergency resources as well as valuable business investments. These assets include emergency shelters, information centers, grocery stores, gas stations, and other services necessary to protect and support the Community during and after future flood events.

Cost Benefit Analysis
Emergency preparedness ensures that the Community is equipped with the tools necessary before, during, and after a storm event. This project would ensure additional security and protect key community assets by providing the fire department and other first responders with faster and more effective indicators (tidal gauges), effective flood prevention and real time water diversion control (Muscle Walls), reliable and durable equipment (including 5-ton army truck with pump and tank, chain saw and portable water pumps).

These measures can only work with coordinated effort and require adequate lead time before a storm hits for deployment. In addition to the initial cost of purchasing equipment, there will be additional costs for upkeep and repair.
Risk Reduction Analysis

Supplying the Community with communications vehicles, a new truck, tanks, sand bags, Muscle Walls, water pumps and boat trailers, the Fire Department, Bay Constables and other emergency personnel can better secure community assets and respond to emergencies during a major storm. According to community members, there were insufficient resources to protect these assets during Superstorm Sandy.

Tidal gauges provide the Community with localized information about storm forecasts and impacts and provide local emergency responders with better information about the storm. Seniors and other vulnerable populations who need additional assistance before, during and after storms would benefit from a system that checked on them or provided them with targeted information and additional options for evacuation and shelter.

General Timeframe for Implementation

6 months

Regulatory requirements related to the project

No regulatory requirements related to this project.

Jurisdiction

Town of Oyster Bay and the Village of Massapequa Park.
Featured Project: Transit-Oriented Development Infill Study

Mobility was impaired in the wake of Superstorm Sandy and the importance of diversified transit options was made apparent. Tunnels to Manhattan were damaged by the storm and there were no designated safe areas for short-term parking to avoid water damage to vehicles. Single family homes south of Merrick Road in the NYCR Massapequas experienced the most severe damage due to flooding during Superstorm Sandy and many were forced out of their homes for prolonged periods of time. Because of limited rental housing options in the area, there were insufficient short-term rental alternatives for residents whose homes were severely damaged. During NYCR Public Engagement Events, Community members expressed their frustration with having to rely on the goodwill of friends for places to stay.

This study will consider the potential for transit-oriented infill development near the Massapequa and/or Massapequa Park Long Island Rail Road (LIRR) stations, as well as the potential for a new station in Eastern Massapequa near the Westfield Sunrise Shopping Center, an area that is currently underserved by transit. The primarily elevated tracks of the Babylon Line are situated north of the hazard area and were not affected by Superstorm Sandy. There are surface parking lots adjacent to the stations which provide opportunities for emergency parking as well as for future mixed-use, transit-supportive redevelopment.

Focusing primarily on areas within a quarter mile radius of the two existing LIRR stations in the NYCR Massapequas, this study will ensure pedestrian accessibility by identifying barriers that limit pedestrian access to the stations. During the first phase of the study, opportunity sites will be identified, infrastructure upgrades will be determined, and zoning changes will be recommended as necessary to allow for new
development. This study will help local municipalities guide and incentivize future development in areas around transit stations.

Transit-oriented redevelopment near the LIRR Stations shown at left may include housing options for seniors, first time home buyers, as well as housing alternatives to residents who want to relocate from extreme and high risk zones. Structured parking will provide a permanent solution to an emergency parking during future flood events.

**Estimated Project Cost**
The total estimated project cost is $820,000.

**Project Benefits**
This project addresses the Recovery Support Functions (RSFs) of Housing and Economic Development.

**Economic Benefits**
Both the Massapequa and Massapequa Park LIRR stations are surrounded by concentrations of commercial development with the character of a traditional village downtown. Although mostly single story, these areas are generally compact and walkable, and served by acres of parking near the station areas and Sunrise Highway. Strategic infill near the LIRR stations could stimulate economic growth and diversify the commercial tax base without disrupting existing residential areas. Development near transit can improves access to retail leading to a stronger tax base by generating additional tax revenue and reducing the overall tax burden for the entire Community. Additionally, mixed-use development near transit offers a greater range of housing options and would increase the number of smaller, affordable housing and rental developments often targeted as “next generation” (first time) home buyers and options for senior living.

**Health and Social Benefits**
There is potential to add compact transit oriented development (TOD) including a mix of uses senior housing and alternative living options for empty nesters near to walkable commercial cores. Proximity to public transit has the added benefit of providing additional mobility options for connecting aging and socially vulnerable populations to nearby medical service.

**Environmental Benefits**
Development near transit including mixed-use commercial and housing as well as structured parking increases mobility options and can help to reduce road congestion and the associated CO2 emissions into the air.

**Cost Benefit Analysis**
Infill in commercial centers and near transit will help the community achieve a more robust and diversified economy. This mixed-use area will provide additional tax revenue by attracting young professionals, increasing the population with disposable incomes, and offering local seniors alternative housing options.

**Risk Reduction Analysis**
Additional housing provides options for area residents whose homes were damaged by Superstorm Sandy and may want to relocate within the community but move outside of the hazard areas south of Merrick Road. The future housing developed as part of a transit-oriented development will provide more housing choice for residents who are currently susceptible to risks from storm surge and flooding. Cars that remained parked in the area affected by storm surge during Superstorm Sandy were also badly damaged. Structured parking near the station could serve as emergency parking during a storm event, as well as bringing more residents to within walking distance from the LIRR.

**General Timeframe for Implementation**
12-18 months

**Regulatory requirements related to the project**
This project may require zoning modifications.

**Jurisdiction**
Village of Massapequa Park, the Town of Oyster Bay, the Metropolitan Transportation Authority (MTA), and Nassau County.
Superstorm Sandy severely damaged 3,500 houses in the NYRCR Massapequas Community. Houses with canal or waterfront access or in low-lying areas on the peninsulas are particularly vulnerable to storm damage. Although a combination of grants and loans from the federal and state government as well as insurance payments from flood insurance companies helped some residents to rebuild after Superstorm Sandy, the threat of future storms may deter some homeowners who cannot financially manage repeated repairs and reconstruction.

A voluntary property acquisition pilot would assist homeowners with severely damaged properties along canals, with waterfront access, or in low-lying areas through an incentivized housing acquisition program. Residential parcels acquired through this program may be cleared and reestablished as ecological features such as dunes or wetlands and preserved as open space. In high risk zones, acquired property could be used for redevelopment as resilient green housing. All damaged properties acquired will be

Featured Project: Voluntary Acquisition Program
purchased above pre-storm values with additional incentives available in order to cluster contiguous properties. Over time, this area will serve as a coastal buffer zone.

A similar strategy was utilized after the 2008 flooding in Cedar Rapids, Iowa. City officials initiated a voluntary property acquisition program, purchased the property with U.S. Housing and Urban Development (HUD) Community Development Block Grant - Disaster Recovery (CDBG-DR) and FEMA Hazard Mitigation Grant Program funding. In flooded areas along the waterfront a new park has been built incorporating best practices in stormwater management as shown in the images at left.

**Estimated Project Cost**
The total estimated project cost is $12,650,000 for 20 initial units.

**Project Benefits**
This project addresses the Recovery Support Functions (RSFs) of Housing, Economic Development, and Natural and Cultural Resources.

**Economic Benefits**
Housing stock in Nassau County is predominantly post-war construction with the majority built in the single largest decade of settlement between 1950 and 1960. Since most modern building codes went into effect in the 1980s, the vast majority of housing is not built to modern code, although conforming alterations and renovations have occurred. According to a HUD Office of Policy and Research report, Superstorm Sandy resulted in heavy damage to 3,500 housing units in the Community. After Superstorm Sandy, more housing is being elevated in preparation for future storm events, but renovations including elevating homes are expensive. This program would provide additional alternatives to families who are not able to rebuild in the same location. (Discussed in Section II: Assessment of Risk and Needs, A. Description of Community Assets and Assessment of Risk)

**Environmental Benefits**
A process for acquisition of severely damaged properties would improve flood mitigation, storm water retention, wildlife habitat, and recreation through permeable paving, bio-swales, infiltration ponds, and restored wetlands. When wetlands are healthy, they provide a natural barrier and help to attenuate storm surge in addition to expanding environmental open space and creating recreational and educational opportunities.

**Cost Benefit Analysis**
Acquiring and removing the most at-risk properties and replacing them with natural systems that can soften the impact of the storm surge for the surrounding area while providing additional ecological open space to the community. Should home values remain low, the acquisition program will provide owners of damaged properties to sell their homes at pre-storm values and move elsewhere.

The initial pilot program would purchase 20 single family homes on a voluntary basis at a cost of $12.6 million dollars, and the financial cost may be prohibitive to large scale buyouts without substantial support from the federal government.

**Risk Reduction Analysis**
Properties which are continuously at risk for severe damage from future storms will be potentially eligible for this program. Property owners face an increasing financial burden if property values decline after storms or if future storms require further repairs and rebuilding. By acquiring severely damaged property and returning the land to a natural state or by rebuilding homes to be more resilient in the face of future storms, the overall risk to Community will be reduced.

**General Timeframe for Implementation**
12-18 months

**Regulatory requirements related to the project**
No regulatory requirements related to this project.

**Jurisdiction**
New York State, the Town of Oyster Bay, and the Village of Massapequa Park.
Featured Project: Emergency Cell Phone Service

The NYRCR Massapequas Community has regular issues with quality cell phone service that were exacerbated by Superstorm Sandy when power loss resulted in extremely limited service. Community members have voiced concerns that it is essential that cellular phone networks are improved to ensure that they function during storm events.

This project proposes to work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power. Cell phone networks should be improved and protected for operation under normal and emergency circumstances.

Estimated Project Cost
The total estimated project cost is $250,000.

Project Benefits
This project addresses the Recovery Support Functions (RSFs) of Economic Development, Infrastructure, and Community Planning and Capacity Building.

Risk Reduction & Resiliency Benefits
Improving cellular service during emergencies would result in a better connected and informed Community, facilitating the sharing of information that may result in reduced risk of physical damage from storm events, less social strain on the Community and their families during and following disasters, and reduced risk of injury or death.

Health and Social Benefits
Socially vulnerable populations including children, senior citizens, and people with disabilities will benefit from improved communication with family members and friends who they may rely upon for information and mobility assistance.

Cost Benefit Analysis
Private cellular carriers will need to purchase generators in order to maintain service during power loss. By providing cell phone signals during a storm event, community members will have better information about current storm conditions, available resources, evacuation routes, emergency shelters, and community resource centers as well as the ability to connect with loved ones and reduce anxiety during major storms and other emergency events.
Risk Reduction Analysis

With an operational cellular network and access to a generator, residents can use their phones to get the latest information on storms, evacuation, and other resources while being able to communicate with family members in the event of an emergency. In the past, information dissemination has been a challenge, particularly in an era when fewer people have radios in their homes and expect to be able to communicate through their phones. Ensuring that the network remains operational during a future storm reduces risk for the Community when residents and businesses are better able to communicate with people who can provide directions and evacuation assistance as well as being able to reach out to their families and social networks.

General Timeframe for Implementation

6-12 months

Regulatory requirements related to the project

No regulatory requirements related to this project.

Jurisdiction

Town of Oyster Bay, Village of Massapequa Park, and local cellular companies.
Featured Project: Integrated Communication Network

Based on concerns voiced by residents at NYRCR Public Engagement Events, it is critical to establish a communication network that more effectively links the local government with emergency management agencies, faith-based groups, and non-profit organizations to direct aid and recovery. Residents found information distributed at the time of Superstorm Sandy to be inconsistent and not always timely. Local expertise was underutilized by disaster personnel deployed from other areas.

An integrated communication network will improve local disaster action planning for emergency preparation and readiness, evacuation, recovery efforts, and coordinated services across the region. On a local level, this project will promote a single source for comprehensive information and emergency assistance and develop non-digital systems for sharing community news in the event of an emergency. This builds on the Proposed Project: Public Communication and Education Gap Analysis.

Estimated Project Cost
The total estimated project cost is $120,000.

Project Benefits
This project addresses the Recovery Support Function (RSF) of Community Planning and Capacity Building.

Risk Reduction & Resiliency Benefits
Improving the communication of emergency information and instructions will result in a better connected and informed Community, facilitating the sharing of information that may result in reduced risk of physical damage from storm events, less social strain on the Community and their families during and following disasters, and reduced risk of injury or death.

Health and Social Benefits
Socially vulnerable populations including children, senior citizens, and people with disabilities will benefit from improved communication with family members and friends who they may rely upon for information and mobility assistance.

Cost Benefit Analysis
The relatively low cost of establishing a local hub for information and participating in broader communication improvement initiatives benefits residents with peace of mind, higher quality service, and the informational resources to assist vulnerable populations. Developing plans that draw on local knowledge and having a population well educated about the integrated communication network available to them in the event of an emergency protects residents and makes the rebuilding process smoother after a disaster.

Risk Reduction Analysis
Without one clear and available source of information about actions to take during an emergency, residents may feel immobilized by conflicting information or a lack of it. Seniors, families with small children and non-English speakers may be at a particular disadvantage. Systems that ensure that these vulnerable populations have ready access to consistent and valuable information dramatically improve their safety and their ability to respond to storm events and other emergencies appropriately.

General Timeframe for Implementation
3 months, with periodic updates

Regulatory requirements related to the project
No regulatory requirements related to this project.

Jurisdiction
Town of Oyster Bay, the Village of Massapequa Park, Nassau County, the Town of Hempstead, Village of Amityville, and the Town of Babylon.
**Featured Project: Emergency Parking**

During Superstorm Sandy, cars were damaged or destroyed because of a lack of parking available to residents who wanted to move their vehicles to a safe location during the storm. Leaving cars in the flood zone added to the debris removal challenges and added gas and oil seepage to the stormwater.

Residents who live within the risk area have requested that areas unlikely to be flooded be designated for their use. These should be secure off-street locations where evacuating residents can park and store their vehicles during emergencies and major storm events and without being ticketed or towed.

North of Sunrise Highway and outside of the extreme hazard areas, the Westfield Sunrise Shopping Center is surrounded by acres of parking and sits among vacant and deteriorating commercial sites along Sunrise Highway Eastern Massapequa. Members of the Committee suggested that parking could be designated here as a short-term emergency parking solution and potentially operate with a special lease during flood events. A more permanent solution should be identified for emergency parking and may include a structured parking deck near rail stations.

**Cost Benefit Analysis**

Residents living in flooded areas already bear the cost of repair and rebuilding of their homes and can rarely withstand the added financial burden of repairing or replacing vehicles. Immobile vehicles can also impact or impair debris removal after storms. Both costs can be lightened by providing central locations for secure parking outside of the hazard areas.

**Risk Reduction Analysis**

Providing residents who live in hazard areas with safe and secure options for places to leave their vehicles will encourage better preparation during future flooding events and greatly reduce the cost of damage in the Community.

**General Timeframe for Implementation**

3 months

**Regulatory requirements related to the project**

No regulatory requirements related to this project.

**Jurisdiction**

Nassau County OEM, the Town of Oyster Bay, and the Village of Massapequa Park.

**Estimated Project Cost**

The total estimated project cost is $100,000.

**Project Benefits**

This project addresses the Recovery Support Function (RSF) of Community Planning and Capacity Building.

**Risk Reduction & Resiliency Benefits**

The commercial areas in Eastern Massapequa along Sunrise Highway Eastern Massapequa are surrounded by acres of parking. Through a contact agreement with the land owners of the Westfield Sunrise Shopping Center and the Massapequa and Massapequa Park LIRR stations, the Town of Oyster Bay and Village of Massapequa Park could designate short-term emergency parking for residents during future storm events.
Section V: Additional Materials

Section V, Additional Materials, provides supporting information for the NYRCR Plan:

A. Additional Resilience Recommendations. This section describes resiliency projects and actions the Committee would like to highlight that are not categorized as Proposed or Featured Projects.

B. Master Table of Projects. This table provides a comprehensive list of Proposed and Featured Projects, as well as Additional Resiliency Recommendations.

C. Public Engagement Process. This section provides a detailed description of the public engagement process, including a description of the Community’s eight Committee Meetings and three Public Engagement Events. Results from questionnaires and online surveys are also included.

D. Community Asset Inventory. This table provides results of the risk assessment for the Community’s 41 key assets.

E. End Notes. This section includes numerical listing of all NYRCR Plan references.

F. Glossary. This glossary comprises a comprehensive list of acronyms used in the NYRCR Plan.
## A. Additional Resiliency Recommendations

### Table 10: Additional Resiliency Recommendations

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Project Name</th>
<th>Short Description</th>
<th>Cost Estimate</th>
<th>Regional</th>
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</thead>
<tbody>
<tr>
<td>Improve Transportation and Communication Connectivity;</td>
<td>Utility Line Undergrounding (Lifeline Network)</td>
<td>Bury utility lines along streets identified as part of the Lifeline Road Network (primarily North of Merrick Road) to improve emergency readiness in conjunction with roadway improvements and tie projects into Green Infrastructure Plan.</td>
<td>$24,000,000 for 8 miles of roadway</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity;</td>
<td>Tree Trimming (Lifeline Network)</td>
<td>Enforce regular tree trimming along streets identified as part of the Lifeline Road Network (primarily South of Merrick Road) to improve emergency readiness.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Bay Constable Building Reconstruction at John Burns Park</td>
<td>Reconstruct the Bay Constable building to allow for regular flooding. Install power generator and back-up batteries on the facility roof.</td>
<td>$4,500,000</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Community-Scale Back-up Power Generation and Distribution</td>
<td>Conduct a study to identify opportunities for community-scale back-up power distribution centers.</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity;</td>
<td>Bike Trails</td>
<td>With regional collaboration, connect the Bethpage Bikeway to waterfront parks in Massapequa and support the northern connection with Cold Spring Harbor in order to improve and expand access to bicycle paths and waterways. Develop a bike path and bike lane network that provides safe ways to travel particularly during emergencies when gasoline supplies are low.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Utility Distribution and Wastewater Protection</td>
<td>Work with PSEG and local emergency service providers to identify and underground electricity distribution lines in vulnerable or inaccessible areas. Flood-proof new underground distribution substations and equipment and existing substations located in risk areas. Elevate sewage-pumping stations and install back-up natural gas generators on site to maintain operations during a power outage.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Arts and Culture</td>
<td>Encourage and support community theater, arts, and other cultural programs as a community-wide initiative.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
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<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Natural Gas Infrastructure Modernization</td>
<td>Work with National Grid to modernize natural gas distribution infrastructure. Identify and invest in implementable technologies to better regulate and isolate natural gas lines in the event of damage or leakage. Connect residents and businesses to gas lines where service is available, and expand service into areas of need.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Fuel Tank Security</td>
<td>Amend building and planning regulations to phase out the use of oil fuel tanks south of Merrick Road, and incorporate temporary-intermediary regulations to require proper anchoring requirements based on anticipated inundation levels.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Community Shelter Network</td>
<td>Coordinate with Nassau County to improve the quality and information about the existing emergency shelters, ensure that they are accessible and able to accommodate the needs of community members, and establish future shelters sites in high-elevation, low-risk areas not subject to surge flooding (primarily North of Merrick Road).</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Resiliency Education</td>
<td>Develop educational materials about flood prone areas, storm warning systems, and available services in the event of a storm event and inform vulnerable residents such as senior citizens, families with young children, and pet owners on evacuation procedures and shelter options. Establish a homeowner energy education program to prevent accidents in the aftermath of a storm or disaster such as fire risks and safety hazards due to flooding, provide incentives for smarter home controls, and inform the community about government grant programs.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Emergency Animal Shelters</td>
<td>Work with local businesses and organizations to establish a refuge center for animals or families with animals to go to during a storm emergency or flood event.</td>
<td>$15,000</td>
<td>N</td>
</tr>
<tr>
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<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Residential Generator Rebate Program</td>
<td>As part of a homeowner energy education program, provide residents with an overview of the permitting process and outline regulatory requirements for installation. Provide recovery assistance in the form of rebates for residential installations of generators.</td>
<td>$2,750,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Transportation Improvements</td>
<td>Develop and expand mobility and transit options to allow alternative transportation and reduce congestion; thereby providing mobility options during or after future storm events.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Youth and Teen Engagement</td>
<td>Provide community engagement opportunities and activities for youth and teenagers, including employment, job training, and recreation, incorporate resiliency education and awareness in schools, and provide more venues and activities for teens including indoor recreation centers.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Revise Zoning and Building Codes for Resilience</td>
<td>Undertake a planning study and make recommendations to revise zoning, planning and building code regulations for resilient design to incentivize flood-resilient building construction and renovation in the Massapequas.</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Improved Governance and Funding</td>
<td>Improve interface with the local governments by the development of a computerized records system that allows remote access to permit and possibly through the creation of a Town Hall Annex. Create shared services for local governments and school districts to ensure adequate and equitable education funding.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Inclusive Housing Plan</td>
<td>Develop a housing plan to accommodate the region’s aging population and provide new housing opportunities for first-time buyers.</td>
<td>$50,000</td>
<td>N</td>
</tr>
</tbody>
</table>
## B. Master Table of Projects

### Table 11: Master Table of Projects

<table>
<thead>
<tr>
<th>Strategy</th>
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</thead>
<tbody>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Lifeline Road Network Study</td>
<td>This study will determine the critical 25–30 mile access routes, or “lifeline roads”, within the community to ensure that evacuation and emergency service routes are maintained as safe, secure, and passable before, during, and after major storm events.</td>
<td>Proposed</td>
<td>$35,000 for initial study</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Signage (Lifeline Road Network)</td>
<td>This project will develop and install ‘Lifeline Network’ signage along lifeline roads to direct residents to Community Resource Centers—community centers and other centralized public locations with back-up power.</td>
<td>Proposed</td>
<td>$57,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Street Lighting (Lifeline Road Network)</td>
<td>In order to maintain functionality during power outages, this project will retrofit streetlights and signals along lifeline roads to operate on solar power and with back-up battery power. Priority will be given to Merrick Road, Sunrise Highway, and intersections.</td>
<td>Proposed</td>
<td>$7,000,000 ($630,000 for Merrick Road)</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Roadway Elevation (Lifeline Road Network)</td>
<td>This project will elevate approximately one mile of key streets susceptible to tidal flooding or storm surge, particularly those south of Merrick Road.</td>
<td>Proposed</td>
<td>$4,500,000 per mile</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storms</td>
<td>Flood Diversion and Control</td>
<td>This project will address flooding throughout the Community by evaluating the condition of existing sumps (drainage basins), determining where improvements can be made through removal of built-up debris, fine soil, and vegetation, and strategically locating structural and natural drainage features to divert flood waters into designated catchment areas.</td>
<td>Proposed</td>
<td>$4,900,000</td>
<td>N</td>
</tr>
<tr>
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<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>Green Infrastructure Pilots</td>
<td>This study will develop potential infiltration and open channel bio-swale pilot approaches for three project types: public realm (roads), private realm (parking lots) and open space (parks and preserves). Possible Pilot locations include: Broadway (tree pits and right of way swales), Birch Lane Elementary (infiltration pond), McKenna Elementary School &amp; Nassau County Police Academy (infiltration pond), and John Burns Town Park (wetlands or pond).</td>
<td>Proposed</td>
<td>$2,200,000</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storms</td>
<td>Permanent Generators for Critical Community Facilities</td>
<td>This project will ensure that critical facilities, including emergency shelters, have backup power during and after major storm events by installing permanent generators on the roofs or upper floors of critical assets and evacuation sites to prevent flood damage during storm events. Note: McKenna Elementary (used by the Red Cross) and Massapequa Park Village Hall already have generators in place.</td>
<td>Proposed</td>
<td>$2,000,000 for Natural Gas ($36,000,000 for Solar Photovoltaic)</td>
<td>N</td>
</tr>
<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>Redesign of Parks and Open Space Plan</td>
<td>The study will create a plan that ensures that parks and open spaces in the community serve to increase resilience, enhance economic development, improve the quality of life, and add value to the surrounding homes. Unique projects will focus on improvements to Alhambra Park, Bayfront Park, and Colleran Park.</td>
<td>Proposed</td>
<td>$200,000 for study</td>
<td>N</td>
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</tbody>
</table>
The Massapequas NY Rising Community Reconstruction Plan

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<thead>
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<tbody>
<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>Alhambra Park</td>
<td>The project will redesign the waterfront park by installing a new playground, permeable parking area, gazebo, kayak-launching area, and a new bulkhead in the recently expanded and remediated Alhambra Park. Additionally, the development of walking paths with permeable paving around bio-swales and storm water retention ponds, and the installation of energy-efficient lighting and signage would make the park more environmentally sustainable and better able to withstand future storm damage.</td>
<td>Proposed</td>
<td>$4,000,000</td>
<td>N</td>
</tr>
<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>Bayfront Park</td>
<td>The project will repair defensive infrastructure along the water's edge (rip-rap or bulkhead to-be-determined) to address damage from Superstorm Sandy. Additionally, the Town will add walkways with permeable paving around bio-swales and stormwater retention ponds, rest area for cyclists, fitness stations, an expanded pier and energy efficient lighting.</td>
<td>Proposed</td>
<td>$2,000,000</td>
<td>N</td>
</tr>
<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>Colleran Park</td>
<td>The project will stabilize the shoreline with bulkhead and riprap to prevent further erosion. With a beach landing, the park will also be linked to the proposed regional Blueway, and the existing Bethpage Bikeway.</td>
<td>Proposed</td>
<td>$2,200,000</td>
<td>N</td>
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</table>
### Table 11: Master Table of Projects (Cont’d)

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<tr>
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<tbody>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Public Communication and Education Gap Analysis</td>
<td>Create a single source for comprehensive information and emergency assistance and establish a communication network that more effectively links the local government with emergency management agencies, faith-based groups, and non-profit organizations to direct aid and recovery efforts to the community’s socially vulnerable populations.</td>
<td>Proposed</td>
<td>Phase 1: $20,000 (per NYRCR Community)</td>
<td>Y</td>
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<td></td>
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<td></td>
<td>Phases 2 &amp; 3: Potential for private / Red Cross partnership</td>
<td></td>
</tr>
<tr>
<td>Plan for Business Continuity and Growth</td>
<td>Business Continuity Program</td>
<td>The program ensures that businesses have the capability to maintain essential functions during a range of potential emergencies and could be implemented immediately. The assistance provided by a Business Continuity Program would include planning assistance, access to alternative spaces or facilities, communications provisions, and provisions for vital records backup and management.</td>
<td>Proposed</td>
<td>$200,000 ($40,000 or less per NYRCR Community)</td>
<td>Y</td>
</tr>
<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td>South Shore Stormwater System Modeling and Analysis</td>
<td>The project will be a hydrologic and hydraulic (H&amp;H) model to provide a catchment-wide understanding of where stormwater run-off is coming from, how much water much there is, specific areas where the current system is inadequate, and what regional improvements could be made.</td>
<td>Proposed</td>
<td>$2,900,000 ($725,000 per NYRCR Community)</td>
<td>Y</td>
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### Table 11: Master Table of Projects (Cont’d)

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<tr>
<td>Use Green Infrastructure and Waterfront Parks to Absorb Floodwater and Stormwater</td>
<td><strong>Massapequas South Shore Shoreline Conditions Analysis and Restoration</strong></td>
<td>The project will include a survey of the existing shoreline conditions to identify opportunities to increase the efficiency of the existing drainage system and recommend innovative materials and techniques to help minimize coastal erosion and flooding. The shoreline survey will focus on critical areas prone to flooding and on inspection of all existing edge conditions along the coastline, including bulkheads, rip-rap, and natural conditions.</td>
<td>Proposed</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td><strong>Regional Lifeline Transportation Network</strong></td>
<td>This is a regional study in conjunction with NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and the Massapequas developing a “Lifeline Network” of resilient streetscape design, such as redundant power and improved drainage systems, to provide maximum accessibility in and out of residential neighborhoods for first responders and residents before, during, and after a storm.</td>
<td>Proposed</td>
<td>$600,000 ($120,000 per NYRCR Community)</td>
<td>Y</td>
</tr>
<tr>
<td>Plan for Business Continuity and Growth</td>
<td><strong>Commercial Redevelopment (Eastern Massapequa)</strong></td>
<td>The study will identify costs and benefits for a new LIRR station at an Eastern Massapequa location and its potential to attract new development. Feasibility factors include infrastructural impediments such as power transmission and sewage management. Possible programs could include a full service medical hospital with emergency care and expanded housing options for seniors, first time home buyers, and the local workforce.</td>
<td>Featured</td>
<td>$550,000</td>
<td>N</td>
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### Table 11: Master Table of Projects (Cont’d)

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</thead>
<tbody>
<tr>
<td>Plan for Business Continuity and Growth</td>
<td>Downtown Master Plan</td>
<td>This project will develop a Downtown Master Plan that includes the provision of incentives to stimulate the redevelopment of vacant, abandoned, and underused properties with strategies such as streamlined approval processes and updated land use regulations.</td>
<td>Featured</td>
<td>$500,000</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storms</td>
<td>Emergency Preparedness and Disaster Action Planning</td>
<td>This project will better protect the community by creating a network for checking on and contacting seniors and other vulnerable groups in the event of an emergency, purchasing and installing tidal gauges to better prepare for storms and initiate evacuation, and purchasing additional resources such as 5-ton army fire response vehicles, communication equipment, a muscle wall mitigation system, additional sand bags, chain saw, large portable water pumps, heavy duty boat trailers and an emergency boat for Bay Constables.</td>
<td>Featured</td>
<td>$4,600,000</td>
<td>N</td>
</tr>
<tr>
<td>Plan for Business Continuity and Growth</td>
<td>Transit-Oriented Development Infill Study</td>
<td>This study will consider the potential for transit oriented infill development near the Massapequa and/or Massapequa Park Long Island Rail Road (LIRR) stations, as well as the potential for a new station in Eastern Massapequa near the Westfield Sunrise Shopping Center, an area that is currently underserved by transit. The study should include housing options for seniors and first time home buyers as well as housing alternatives to residents who want to relocate from extreme and high risk zones. Building structured parking could act as emergency parking during a flood event.</td>
<td>Featured</td>
<td>$820,000</td>
<td>N</td>
</tr>
</tbody>
</table>
## Table 11: Master Table of Projects (Cont’d)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Project Name</th>
<th>Short Description</th>
<th>Category</th>
<th>Cost Estimate</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Voluntary Acquisition Program</td>
<td>This project would initiate a voluntary acquisition of damaged property for redevelopment or open space.</td>
<td>Featured</td>
<td>$12,650,000 for 20 initial units</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Emergency Cell Phone Service</td>
<td>This project proposes to work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power. Cell phone networks should be improved and protected for operation under normal and emergency circumstances.</td>
<td>Featured</td>
<td>$250,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Integrated Communication Network</td>
<td>This project will evaluate existing emergency communication systems and determine additional needs, with an emphasis on coordination across multiple jurisdictions allowing community members to communicate with each other, and emergency readiness education. This initial study will provide recommendations for addressing gaps in communication and education and will identify potential public/private partnerships to implement the study’s recommendations.</td>
<td>Featured</td>
<td>$120,000</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storms</td>
<td>Emergency Parking</td>
<td>This project designates safe areas outside of flood zones to be used by residents in evacuation zones for off-street parking and storage during emergencies and major storm events.</td>
<td>Featured</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity; Utility Line Undergrounding (Lifeline Network)</td>
<td>Bury utility lines along streets identified as part of the Lifeline Road Network (primarily North of Merrick Road) to improve emergency readiness in conjunction with roadway improvements and tie projects into Green Infrastructure Plan.</td>
<td>Additional Resiliency Rec.</td>
<td>$24,000,000 for 8 miles of roadway</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Strategy</td>
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</tr>
<tr>
<td>Improve Transportation and Communication Connectivity;</td>
<td>Tree Trimming (Lifeline Network)</td>
<td>Enforce regular tree trimming along streets identified as part of the Lifeline Road Network (primarily South of Merrick Road) to improve emergency readiness.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Bay Constable Building Reconstruction at John Burns Park</td>
<td>Reconstruct the Bay Constable building to allow for regular flooding. Install power generator and back-up batteries on the facility roof.</td>
<td>Additional Resiliency Rec.</td>
<td>$4,500,000</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Community-Scale Back-up Power Generation and Distribution</td>
<td>Conduct a study to identify opportunities for community-scale back-up power distribution centers.</td>
<td>Additional Resiliency Rec.</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity;</td>
<td>Bike Trails</td>
<td>With regional collaboration, connect the Bethpage Bikeway to waterfront parks in Massapequa and support the northern connection with Cold Spring Harbor in order to improve and expand access to bicycle paths and waterways. Develop a bike path and bike lane network that provides safe ways to travel particularly during emergencies when gasoline supplies are low.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Utility Distribution and Wastewater Protection</td>
<td>Work with PSEG and local emergency service providers to identify and underground electricity distribution lines in vulnerable or inaccessible areas. Flood-proof new underground distribution substations and equipment and existing substations located in risk areas. Elevate sewage-pumping stations and install back-up natural gas generators on site to maintain operations during a power outage.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Strategy</td>
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</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Natural Gas Infrastructure Modernization</td>
<td>Work with National Grid to modernize natural gas distribution infrastructure. Identify and invest in implementable technologies to better regulate and isolate natural gas lines in the event of damage or leakage. Connect residents and businesses to gas lines where service is available, and expand service into areas of need.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Invest in Hard Infrastructure and Generators to Prepare for Future Storm Events</td>
<td>Fuel Tank Security</td>
<td>Amend building and planning regulations to phase out the use of oil fuel tanks south of Merrick Road, and incorporate temporary-intermediary regulations to require proper anchoring requirements based on anticipated inundation levels.</td>
<td>Additional Resiliency Rec.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Community Shelter Network</td>
<td>Coordinate with Nassau County to improve the quality and information about the existing emergency shelters, ensure that they are accessible and able to accommodate the needs of community members, and establish future shelters sites in high-elevation, low-risk areas not subject to surge flooding (primarily North of Merrick Road).</td>
<td>Additional Resiliency Rec.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Strategy</td>
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</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Resiliency Education</td>
<td>Develop educational materials about flood prone areas, storm warning systems, and available services in the event of a storm event and inform vulnerable residents such as senior citizens, families with young children, and pet owners on evacuation procedures and shelter options. Establish a homeowner energy education program to prevent accidents in the aftermath of a storm or disaster such as fire risks and safety hazards due to flooding, provide incentives for smarter home controls, and inform the community about government grant programs.</td>
<td>Additional Resiliency Rec.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Emergency Animal Shelters</td>
<td>Work with local businesses and organizations to establish a refuge center for animals or families with animals to go to during a storm emergency or flood event.</td>
<td>Additional Resiliency Rec.</td>
<td>$15,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Residential Generator Rebate Program</td>
<td>As part of a homeowner energy education program, provide residents with an overview of the permitting process and outline regulatory requirements for installation. Provide recovery assistance in the form of rebates for residential installations of generators.</td>
<td>Additional Resiliency Rec.</td>
<td>$2,750,000</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Revise Zoning and Building Codes for Resilience</td>
<td>Undertake a planning study and make recommendations to revise zoning, planning and building code regulations for resilient design to incentivize flood-resilient building construction and renovation in the Massapequas.</td>
<td>Additional Resiliency Rec.</td>
<td>$100,000</td>
<td>N</td>
</tr>
<tr>
<td>Strategy</td>
<td>Project Name</td>
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</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Improved Governance and Funding</td>
<td>Improve interface with the local governments by the development of a computerized records system that allows remote access to permit and possibly through the creation of a Town Hall Annex. Create shared services for local governments and school districts to ensure adequate and equitable education funding.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Inclusive Housing Plan</td>
<td>Develop a housing plan to accommodate the region’s aging population and provide new housing opportunities for first-time buyers.</td>
<td>Additional Resiliency Rec.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Transportation Improvements</td>
<td>Develop and expand mobility and transit options to allow alternative transportation and reduce congestion; thereby providing mobility options during or after future storm events.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Youth and Teen Engagement</td>
<td>Provide community engagement opportunities and activities for youth and teenagers, including employment, job training, and recreation, incorporate resiliency education and awareness in schools, and provide more venues and activities for teens including indoor recreation centers.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Arts and Culture</td>
<td>Encourage and support community theater, arts, and other cultural programs as a community-wide initiative.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
</tbody>
</table>
### Table 11: Master Table of Projects (Cont’d)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Project Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Inclusive Housing Plan</td>
<td>Develop a housing plan to accommodate the region’s aging population and provide new housing opportunities for first-time buyers. Maintain and support existing housing programs that provide funds to purchase and rehabilitate vacant or abandoned properties. Work with Nassau County, the State and private developers to establish a relocation assistance program that gives residents relocated due to strategic adaptation priority in new developments. Provide tax incentives and direct incentives for residents to assist with the adaptation and relocation process, and work with developers to increase density in less vulnerable areas and provide more housing options for community residents.</td>
<td>Additional Resiliency Rec.</td>
<td>$50,000</td>
<td>N</td>
</tr>
<tr>
<td>Improve Transportation and Communication Connectivity</td>
<td>Transportation Improvements</td>
<td>Develop and expand mobility and transit options to allow alternative transportation and reduce congestion; thereby providing mobility options during or after future storm events.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
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<tr>
<td>Provide Resiliency Resources to Existing and Future Residents</td>
<td>Youth and Teen Engagement</td>
<td>Provide community engagement opportunities and activities for youth and teenagers, including employment, job training, and recreation, incorporate resiliency education and awareness in schools, and provide more venues and activities for teens including indoor recreation centers.</td>
<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
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<td>Additional Resiliency Rec.</td>
<td>N/A</td>
<td>N</td>
</tr>
</tbody>
</table>
C. Public Engagement Process

The strategies and projects outlined in the NYRCR Massapequas Plan (NYCR Plan) will ultimately impact the quality of life for those who live, work, and play in NYRCR Massapequas Community (Community). As such, input from residents, business owners, and community leaders has been an important component of the planning process. The NYRCR Massapequas Planning Committee (Committee) and Consultant Team have worked to provide a number of opportunities for public participation and community engagement, including a series of Public Engagement Events, surveys, focus groups, and an online outreach campaign.

NYRCR Planning Committee

The Committee—comprised of 14 community representatives—dedicated their time and expertise to work closely with the State Consultant Team. The Committee guided the development of material for the NYRCR Plan and the community engagement process. Committee members have had a major role in defining the geographic scope and vision for the Community. They were also critical to the development of strategies and projects for future implementation. The Committee held seven meetings over the course of the project. In addition, the Committee participated in two Joint Committee Meetings with the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Freeport, and Seaford/Wantagh to learn about innovative resilience measures, explore shared issues and opportunities for collaboration, cooperation, coordinated resiliency project planning.

Early on, the Committee shared many concerns and the conversations focused on issues relating to flooding and the damage caused by Superstorm Sandy. Recurring topics of discussion included monthly tidal flooding issues affecting residents and resulting from fluctuations in high- and low-tides as well as the recurring and localized flooding issues resulting from ineffective stormwater diversion and control throughout the community. It was noted that even during non-emergency storm events, regular water pooling occurs on many neighborhood and arterial streets including sections of Merrick Road. Although many of the flooding issues occur south of Merrick Road, poor drainage from the Southern State Parkway has created similar problems in areas north of Sunrise Highway.

The Committee also identified shared values across the Community: “living near the water in a more sustainable way, family values and community support, access to parks as gathering places for community, and strengthening the Community.” Building upon these overarching values, the Committee worked to fashion a draft Vision Statement which was vetted and expanded upon by the Community at subsequent Public Engagement Events. These values served as reference points throughout the planning process, fostering meaningful conversations and healthy debate among Committee members and Community members working together identify projects with balanced response to disaster recovery needs, flood prevention opportunities, and long-term community resilience.
Public Engagement Events

Community residents and other stakeholders participated in three public engagement events to review the evolving work of the Committee and Consultant Team and to contribute their voices to the NYRCR Massapequas planning process. A fourth public event will be held in Spring 2014 in order to share the final plan with the Community.

Public Engagement Event 1: Vision, Community Assets, Needs and Opportunities, and Project Ideas

The first public engagement event was held in October 2013. The meeting, which included an open house, presentation, and small group discussions, introduced the NY Rising Community Reconstruction (NYRCR) Program to the community; introduced NYRCR Massapequas’ Community, Committee, Consultant, and State representative’s roles in NYRCR Program planning process; and provided an opportunity to review the community vision developed by the Committee. Participants worked to refine the community vision, identified community needs and opportunities, and suggested potential recovery and resiliency projects in order to inform the preparation of the NYRCR Conceptual Plan.

Public Engagement Event 2: NYRCR Conceptual Plan, Values, Strategies and Projects

The second public engagement event was held in November 2013. The event had three main components. The meeting was designed to present the emerging Conceptual Plan, solicit community feedback on issues related to the six elements of the plan, and generate strategy and implementation ideas.
Public Engagement Event 3: Vision, Community Assets, Needs and Opportunities and Project Ideas

This event, held in February 2014, marked the third public engagement event of the NYRCR Program. The meeting’s objectives were to provide the Community with a progress update, gather community feedback on the projects being considered for inclusion in the NYRCR Massapequas Plan (NYRCR Plan), and begin to generate public support for implementation. The Community Development Block Grant Disaster Recovery (CDBG-DR) program, funded by the U.S. Department of Housing and Urban Development (HUD) and administered by New York State, has allocated funds to the Community to support eligible reconstruction and resiliency projects.

Public Engagement Event 4: The Massapequas NY Rising Community Reconstruction Plan

The fourth and final public engagement event will present the completed NYRCR Plan to community members and stakeholders in order to lay the foundation for implementation.

Online Presence and Platforms

The website www.stormrecovery.ny.gov/nyrcr provides information about the NYRCR Program, and regularly posted material relating to the NYRCR Plan. This includes the details for upcoming public engagement events, news and announcements, Committee contacts, and plan-related documents. The website also included a tool for visitors to submit comments on the NYRCR Conceptual Plan.

Business Surveys

A survey was deployed specifically to businesses in the Community to gather additional information on storm impacts—which have been difficult to quantify from other sources—and to generate ideas that could encourage economic development and support resiliency. Business surveys were open from January 15 to February 25, 2014. The respondents were distributed among many industry types including retail, healthcare, fitness, business/legal/financial, construction, manufacturing, restaurants and warehousing/logistics and had varying degrees of damage from Superstorm Sandy. There were, however, many similar issues and recommendations.

Housing Survey

The Community is primarily a residential community. Specialized economic research was conducted to explore the impact of Superstorm Sandy on housing. Data was gathered from a variety of sources, including broker interviews. The research looked at the community’s housing characteristics, property values, household characteristics, the impacts of Sandy (both physically and economically) and from this, considered the future demand and risks on Community housing assets.

Health and Social Services

Key Informant Interviews

The Committee and Consultant Team recognized the importance of information related to health and social services issues as well as incorporating the perspectives of socially vulnerable populations in the planning process. The Committee – along with those of the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Seaford/Wantagh, and the Village of Freeport – commissioned an assessment of health and social service recovery needs and opportunities to plan for social resilience. In addition to research, organizations and individuals in the health and social services fields were identified to participate in key informant interviews. Since the identities of those interviewed were confidential, there are not individual results specifically for the Community presented in the assessment.
D. Community Asset Inventory

The asset inventory and risk assessment performed for the NYRCR Plan includes individual information for each Community asset, landscape attributes that may influence risk, and the risk assessment which establishes a risk score based on landscape attributes, a hazard score, an exposure score, and a vulnerability score for each asset. The asset inventory and risk assessment inputs can be seen in Table 12.

Asset Information

The asset information columns in Table 12 include the following information:

- **Asset Name**: The name of the facility or a descriptive name that serves as a unique identifier.
- **Socially Vulnerable**: Identifies whether the asset serves socially vulnerable populations in the Community.
- **Risk Area**: Identifies the risk area for each asset based on New York State Department of State hazard maps. Risk areas include extreme, high, and moderate zones.
- **Asset Class**: Each asset is categorized by asset class: Economic (A), Health and Social Services (B), Housing (C), Infrastructure Systems (D), or Natural and Cultural Resources (E).
- **Critical Facility**: Assets are marked as critical facilities based on critical asset criteria established by the Federal Emergency Management Agency (FEMA) guidelines or Community Significance (CSF).
- **Community Value**: Assets are given a community value of high, medium, or low based on NYRCR Planning Committee Member input and feedback from Public Engagement Events. Community value can be applied individually or collectively based on certain assets and asset classes.

Landscape Attributes

The landscape attribute columns in Table 12 include the following information:

- **Erosion Rate**: Marked “yes” if the long-term average erosion rate is 1 ft. or more per year, or unknown.
- **Beach Width**: Marked “yes” if the water line is frequently in contact with a shore defense structure or upland vegetation.
- **Shore Defenses**: Marked “yes” if shore defenses are absent, not constructed to anticipated storm or sea level rise conditions, or are deteriorating.
- **Vegetation**: Marked “yes” if protective vegetation, wetlands, or intervening structures between asset and flood source are absent.
- **Dunes or Bluffs**: Marked “yes” if dunes are absent, below the base flood elevation (BFE), eroding, discontinuous, or have little vegetation. Marked “yes” if bluff slopes are unstable or partially vegetated.
- **Soils**: Marked “yes” if the asset is located on a coastal barrier island or filled wetland.

Risk Assessment

The risk assessment columns in Table 12 include the following information:

- **Hazard Score**: The hazard score is based on the likelihood an event will occur and the magnitude (destructive capacity) of the event. Likelihood is derived from the storm recurrence interval within the selected planning time frame.
- **Exposure Score**: The coastal risk assessment area maps are used to provide a “base exposure score” for each asset. Generally, assets in the extreme risk area are closer to the shoreline and are more exposed to potential damage. Therefore, assets in extreme risk areas receive a base exposure score of 2; assets in high risk areas receive a base exposure score of 1, and assets in moderate risk areas receive a base exposure score of 0.5. Landscape attributes are used to further exposure scores, contributing an additional 0.5 for each “yes” in the landscape attribute columns.
- **Vulnerability Score**: Each asset receives a vulnerability score based on the impact of its damage relative to its asset class.
- **Risk Score**: Risk scores are based on the formula Hazard x Exposure x Vulnerability.
<table>
<thead>
<tr>
<th>Asset Information</th>
<th>Landscape Attributes</th>
<th>Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset Name</strong></td>
<td><strong>Socially Vulnerable</strong></td>
<td><strong>Risk Area</strong></td>
</tr>
<tr>
<td>Alfred G Berner Junior High School</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Alhambra Marine Services</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Alhambra Park / Kayak Launch</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Bayfront Park</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Billmore Beach Club</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Birch Lane School</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Brooklyn Ave Chemical</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Budget Inn Motel</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cell Tower - 40 Cammans Rd</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cell Tower - Sunrise Hwy &amp; RI 107</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cell Tower - Village Hall 151 Front St</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cell Tower - Water Utility Massapequa Ave &amp; May Pl</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Collarim Park</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Fairfield Elementary School</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Florence Avenue Beach</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Harbor Green Waterfront</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>John Burns Town Park</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa LIRR</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Park LIRR</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Marpole Post Park</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Downtown Cultural</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Downtown Essential</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Asset Name</td>
<td>Socially Vulnerable</td>
<td>Risk Area</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Massapequa Fire Department East End</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Fire Department Headquarters</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa High School</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Library Bar Harbour</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Park Community Center at Brady Park</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Preserve State Park</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Reform School</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Massapequa Senior Citizens Hq</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Massapequa X Ray Center</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Merrick/Forest Essential</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Merrick/Judlowe Essential</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Merrick/Park Cultural</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Merrick/Unqua Services</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Nassau Shores Beach Club</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Oakley Ave Apartments Meeting Hall</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Oyster Bay Town Hall South</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Peninsular Golf Club</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Pump Station - Alhambra &amp; Park Ln</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Pump Station - Biltmore &amp; Beverly Rd</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Pump Station - Cedar &amp; Highland Rd</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Asset Information</td>
<td>Landscape Attributes</td>
<td>Risk Assessment</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
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</tr>
<tr>
<td>Asset Name</td>
<td>Erosion Rate</td>
<td>Beach Width</td>
</tr>
<tr>
<td>Pump Station - Kings Walk &amp; Whitewood</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Pump Station - Roosevelt &amp; Spray St</td>
<td>Yes</td>
<td>Extreme</td>
</tr>
<tr>
<td>Pump Station - Von Huenfeld &amp; Roosevelt Ave</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Riviera Beach Club</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Southgate Shopping Center</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>St Peter &amp; St Paul’s Syrian Orthodox Church</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Sunrise/Forest Health/Social</td>
<td>Yes</td>
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</tr>
<tr>
<td>Sunrise/Park Mobility</td>
<td>Yes</td>
<td>High</td>
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<tr>
<td>Temple Sinai Of Massapequa</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>The Bristol Assisted Living</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Town of Oyster Bay Yard</td>
<td>Yes</td>
<td>Moderate</td>
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<tr>
<td>U S Post Office Massapequa Park</td>
<td>Yes</td>
<td>Moderate</td>
</tr>
<tr>
<td>Unqua Elementary School</td>
<td>Yes</td>
<td>Moderate</td>
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<tr>
<td>Village Hall</td>
<td>Yes</td>
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<tr>
<td>Village Hall</td>
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<td>Westfield Sunrise Mall</td>
<td>Yes</td>
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<td>Water Treatment Plant - Sunrise HWY</td>
<td>Yes</td>
<td>Moderate</td>
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<tr>
<td>Whitewood Landing</td>
<td>Yes</td>
<td>Moderate</td>
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<tr>
<td>YES Community Counseling Center Outpatient Chemical Dependency</td>
<td>Yes</td>
<td>Moderate</td>
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</table>
E. End Notes

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

2. The following localities’ allocations comprise the NYRCR Community’s total allocation: Massapequa I - $14.4 million; Massapequa Park - $3.0 million; Massapequa II - $8.7 million.


5. Ibid.

6. Ibid.


8. U.S. Census Bureau American Community Survey 2007-2012


12. [Link to index page]


17. [Link to new.mta.info]


21. Nassau County Assessor’s Data 2013 and State Risk Assessment Maps

22. US Bureau of the Census, 2010 Decennial Census


25. Richardson, Todd and Winter, Ben, “Analysis of Communities Impacted by Hurricane Sandy” (Draft, January 29, 2013) HUD, Office of Policy and Research.


28. [Link to davidednenberg.com]


30. Nassau County Assessor’s Data 2013 and State Risk Assessment Maps

31. [Link to US Census Bureau]

32. [Link to US Bureau of the Census]

33. ESRI Major Shopping Center Database, Nassau County 2012. Web.
34. ESRI Retail Marketplace Profile 2012: Massapequa Park village, Massapequa (Town of Hempstead), Massapequa (Town of Oyster Bay). Web.

35. U.S. Census Bureau


37. Low income occupants have annual incomes below $75,000 or meet HUD's low income limit at 80% of the AMI (area median income)


39. Esri forecasts, Demographic and Income Profile, Massapequa (CDP 3646668); January 03, 2014.


45. GBF 2012


47. Ibid.

F. Glossary

BID: Business Improvement District
CDBG-DR: Community Development Block Grant - Disaster Recovery
CHHA: Coastal High Hazard Area
CSF: Community Significance
CZM: Coastal Zone Management
ESRF: New York State Empire State Relief Fund
FEMA: Federal Emergency Management Agency
GIS: Geographic Information System
HRRF: New York State Homeownership Repair and Rebuilding Fund
HUD: U.S. Department of Housing and Urban Development
IHP: Individual and Households Program
kW: Kilowatt
LIPA: Long Island Power Authority
LIRPC: Long Island Regional Planning Council
LIRR: Long Island Rail Road
MTA: Metropolitan Transportation Authority
MW: Megawatt
NOAA: National Oceanic and Atmospheric Administration
NOAA-CSC: National Oceanic and Atmospheric Administration Coastal Services Center
NYRCR: New York Rising Community Reconstruction
NWS: National Weather Service
NYS: New York State
NYS CMP: New York State Coastal Management Plan
NYS DEC: New York State Department of Environmental Conservation
NYS DOS: New York State Department of State
NYS DOT: New York State Department of Transportation
OEM: Office of Emergency Management
PD: Police Department
PSEG: Public Service Electric and Gas Company
RPA: Regional Plan Association
RSF: Recovery Support Function
SBA: U.S. Small Business Administration
SFHA: Special Flood Hazard Area
SLOSH: Sea, Lake and Overland Surges from Hurricanes
TOD: Transit-Oriented Development
TSD: Transit-Supportive Development
USACE: U.S. Army Corps of Engineers