

# Seaford/Wantagh NY Rising Community Reconstruction Plan



March 2014  
NY Rising Community  
Reconstruction Program



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This document was developed by the NYRCR Seaford/Wantagh 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:

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# Foreword

## Introduction

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

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

## Program Overview

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

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

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

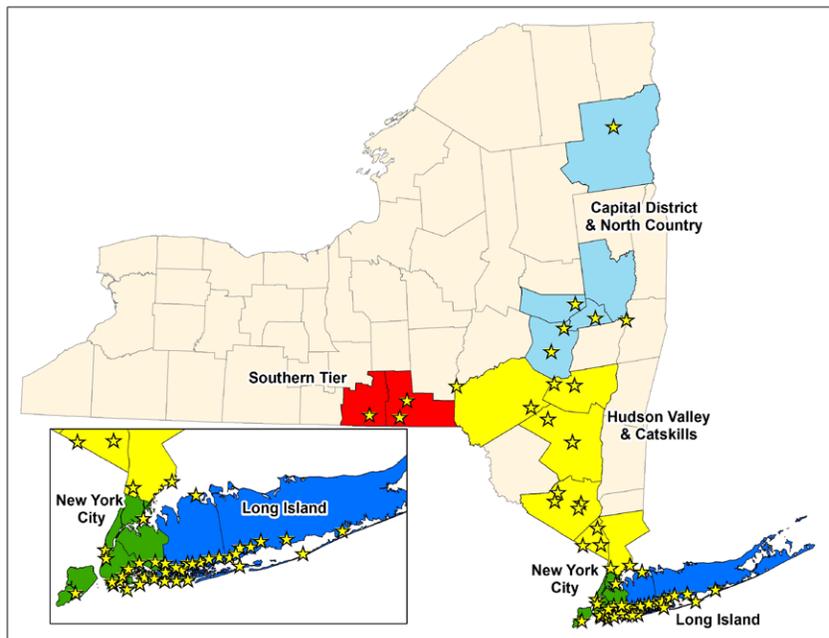
1. Five of the 102 localities in the program – Niagara, Herkimer, Oneida, Madison, and Montgomery Counties – are not funding through the CDBG-DR program.

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 NYRCR Program is also working with both private and public institutions to identify existing funding sources and create new funding opportunities where none existed before.

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



Communities participating in the NYRCR Program (Note: map includes those NYRCR Communities funded through the CDBG-DR program, including the NYRCR Communities announced in January 2014.)

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

## The NYRCR Plan

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

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

NYRCR Seaford/Wantagh is eligible for up to \$11.2 million in CDBG-DR implementation funds.<sup>2</sup>

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

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

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

2. The following localities' allocations comprise the NYRCR Community's total allocation: Seaford - \$7.9 million; Wantagh - \$3.3 million.

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# Executive Summary

## Overview

The NY Rising Community Reconstruction (NYRCR) Program was established by the State of New York to provide rebuilding and revitalization assistance to communities severely damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. This program empowers communities to identify resilient and innovative reconstruction projects that consider current damage, future threats, and economic opportunities. For the purposes of this planning effort, Seaford and Wantagh were combined to create the NYRCR Seaford/Wantagh Community (Community).

With the completion of this Seaford/Wantagh NY Rising Community Reconstruction Plan (NYRCR Plan), the Community is eligible to receive funds to support the implementation of projects and activities identified in its NYRCR Plan. New York State (NYS) Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funding to the Community. The total of up to \$11.2 million includes \$7.9 million for Seaford and \$3.3 million for Wantagh.

The geographic scope of this NYRCR Plan consists of the unincorporated hamlets of Seaford and Wantagh, located in the Town of Hempstead on the south shore of Nassau County, Long Island, New York. The Community is bordered by Bellmore to the west, Jerusalem Avenue and North Wantagh to the north, Tackapausha Nature Preserve and Massapequa to the east, and East Bay and South Oyster Bay to the south. The geographic scope of NYRCR Seaford/Wantagh is shown in Figure ES-01.

Seaford and Wantagh, with a combined population of more than 34,000, are bedroom communities composed mainly of single-family homes with primary business and commercial districts along the major thoroughfares of Merrick Road and Sunrise Highway. These two hamlets are located within the Town of Hempstead and have a wealth of community amenities, including several parks (Cedar Creek Park, Wantagh Park, Seamans Neck Park, Twin Lakes Preserve, and Mill Pond Park); easy access to East Bay, South Oyster Bay, and Jones Beach; two Long

Island Rail Road (LIRR) stations; high quality schools; libraries; fire departments; police precincts; and the Cedar Creek Water Pollution Control Plant.

## Storm Impacts

Coastal communities like Seaford and Wantagh are subject to a higher degree of exposure to the damage caused from weather events like hurricanes due to their proximity to the water. The magnitude of damage from Superstorm Sandy was greater than Hurricane Irene, but both storm events brought significant damage to homes, businesses, infrastructure, and the natural environment.

In August 2011, Hurricane Irene's heavy rain and wind caused flooding and downed trees, resulting in impassable roads and power outages. Flooding was concentrated in the residential neighborhoods south of Merrick Road, while heavy winds and power outages affected the entire Community.

In October 2012, Superstorm Sandy caused peak storm surge at high tide of 8- to 10-feet, which inundated waterfront neighborhoods that generally lie between 5- and 10-feet above sea level. Large swaths of land were flooded and the Community faced severe problems with power outages, heavy debris, and immobility due to damaged and flooded roads and compromised power lines. More than 2,000 housing units were reported to be damaged, and although the degree of damage varied, the majority of homes damaged by floods were inundated with one- to four-feet of water. Downed trees and power lines, floodwaters and debris blocked major roads and evaluation routes. Power outages for most residents lasted up to 16 days and also caused disruption to cellular communications. Some business establishments were directly impacted by flooding and storm damage, while others suffered due to power outages and reduced commercial activity as a result of the storm. Gas stations could not pump fuel without backup power. In addition to pollution due to debris, the surge waters lifted home heating oil tanks from their foundations, causing oil to spill out and enter the waters and the air, as well as remain in the ground and ruin existing vegetation.

## Critical Issues

Recent storm events uncovered a variety of critical issues with the natural and built environment in the Community, along the south shore of Long Island, throughout vast utility service areas, and in the broader region. These issues directly and indirectly impact: homes; businesses; sanitary sewer, storm-water, and energy infrastructure; public facilities; and natural resources. The following critical issues were identified during the NYRCR planning process, which directly informed the formulation of the strategies and projects of the NYRCR Seaford/Wantagh Plan:

- Flooding and Drainage;
- Energy Infrastructure;
- Shoreline Protection;
- Information and Communication;
- Housing Risk and Destabilization;
- Economic Challenges;
- Regional Connections; and
- Resilient Planning and Design.

While local issues are paramount, it is important to recognize the Community's relationship to its neighbors and to the region beyond. 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 shoreline. Weaving local and regional efforts together allows for building back in ways that are stronger, better and smarter than before. The plan is tailored to the specific needs of the Community but contains projects of regional interest and also identifies actions or projects that benefit the Community and adjacent neighbors.

## Community-Driven Process

The NYRCR Program provided the Seaford/Wantagh Community with an unprecedented opportunity to participate in a community-driven planning effort. The NYRCR Planning Committee (Committee), composed of eight community representatives, dedicated their time, passion, and expertise to guide the development of the NYRCR Plan. The Committee played an integral role in the planning process by: 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 NYRCR Seaford/Wantagh. The Committee held nine official meetings over the course of seven months, from September 2013 to March 2014. In addition, the Committee participated in two Joint Committee Meetings with the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Massapequas, and Freeport to explore shared issues and opportunities for collaboration and cooperation.

Through a combination of input received from the community during Public Engagement Events and the work of the Planning Committee, a vision statement and list of goals were developed to reflect the Community's aspiration for the future. These

### Vision for a Resilient Future

The vision for the Seaford/Wantagh NY Rising Community Reconstruction Plan is to support a resilient, stable waterfront community that values its quality of life and relationship to the water, and that is equipped to handle future natural events through sound investment in infrastructure, economic development, natural resources, and communication.

### Goals for the Future

The NYRCR Seaford/Wantagh Plan strives to:

- Foster innovative and natural solutions to coastal storm surges and erosion management.
- Protect fresh water resources and improve stormwater management
- Provide emergency infrastructure to all first response facilities and improve communication networks before, during, and after emergency events.
- Ensure public safety during and after major natural events.
- Improve resilience of key community facilities and infrastructure.
- Redevelop commercial areas that are more resilient in their design and location.

# Figure ES-01: Geographic Scope



### Legend

- NYRCR Boundary
- Water
- Long Island Rail Road
- Main Roads
- LIRR Station
- Local Roads

### Data Sources

ESRI, NOAA,  
 US Census,  
 Nassau County,  
 NYS DOS  
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statements provide the foundation of the NYRCR Seaford/Wantagh 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.

The strategies and projects outlined in the NYRCR Plan will ultimately impact the quality of life for those who live, work, and play in the Community. As such, input from residents, business owners, and community leaders has been an important component of the planning process. Community residents and other stakeholders participated in three Public Engagement Events to review the evolving work of the Committee, and to contribute their ideas, thoughts, and suggestions to the planning process. In addition, a Community website was set up on the NYRCR website ([www.stormrecovery.ny.gov/nyrcr](http://www.stormrecovery.ny.gov/nyrcr)) to post planning materials, including items from Public Engagement Events and online surveys, to give all residents an opportunity to provide feedback.

## Final Plan as Blueprint for Implementation

### Assessment of Risks and Needs

Hurricane Irene and Superstorm Sandy exposed certain vulnerabilities related to the Community's ability to mitigate and respond to major storm events, climate change, and sea level rise. As part of developing the NYRCR Plan, an inventory of community assets was compiled and evaluated to determine each asset's potential of being damaged or destroyed by a future storm surge or flooding event. By analyzing potential hazards, as well as levels of exposure and vulnerability to possible storm impacts, a measure of risk was calculated for each asset. In addition, the community asset locations were combined with NYS Department of State (DOS) hazard maps that illustrate a full range of coastal risks and consider both the frequency and impact of flooding. This quantitative and spatial analysis, in addition to local knowledge from stakeholders gathered throughout the process, helped to highlight assets and geographic areas requiring attention, and served as a basis for the generation of project ideas.

In Seaford and Wantagh, several assets in the community are located in high and extreme risk zones; including one sewer pump station, three parks, three marinas, five marine businesses, one community center, one fire station, and sections of the Merrick Road commercial corridors. Of particular concern is the section of Merrick Road adjacent to the Seaford-Oyster Bay Expressway, a key County evacuation route. In addition to these individual assets, more than 2,600 residential parcels are located in high and extreme risk areas. Detailed information of these analyses can be found in Section II: Assessment of Risk and Needs.

The risk assessment was paired with an exploration of reconstruction- and resiliency-related needs and opportunities, many of which were identified by Committee Members and the public at Committee Meetings and Public Engagement Events. Risk, needs, and opportunities were organized by six categories that relate to all aspects of life in the Community: community planning and capacity building, economic development, health and social services, housing, infrastructure, and natural and cultural resources. The Community identified the following key needs and opportunities:

- Improved communication, education and access to resources in the Community to prepare and respond to storm events;
- Improved guidance on how to incorporate resilient measures into building designs and business operations;
- Address low-lying streets suffering from routine flooding during high tides and/or heavy rainfall that can become impassable during major storm events;
- Create a region-wide stormwater management program to bring together multiple levels of jurisdiction to address flooding issues;
- Strengthen and better utilize parks to address flooding risks and issues; and
- Increase energy system resilience to prevent massive power outages and better secure the safety of roadways for transportation.

## Reconstruction and Resiliency Strategies

Strategies included here are designed 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 Seaford/Wantagh to rebound quickly when confronted with challenges of all kinds in the future. These strategies address and balance regional concerns, an analysis of problem areas, community feedback, and iterative development by the Committee. Reconstruction and Resiliency Strategies for the Community are listed below and described in detail in Section III of the NYRCR Plan:

- Invest in Resilience Enhancements for Critical Assets;
- Improve Stormwater Management and Drainage Systems;
- Improve Transportation Access and Connectivity; and
- Establish Policies for Resilient Planning and Design.

## Proposed and Featured Projects

The projects that resulted from this extensive planning process support the Reconstruction and Resiliency Strategies as well as the vision and goals for the Community. The projects included in the NYRCR Plan are organized into three categories, which are:

- **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.

Table 01 lists these 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 01:** Proposed projects, featured projects, and additional resiliency measures

Strategy	Project Name	Short Description	Category	Regional
Improve Stormwater Management and Drainage Systems	South of Merrick Road Outfall, Bulkhead and Drainage Survey, Inspection, and Check Valve Installation	Survey and inspect the location, condition, and elevation of the Community's drainage system south of Merrick Road, including outfalls, bulkheads, underground pipes, manholes and catch basins. Install check valves in key locations.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Bulkhead Replacement/ Upgrade	Inspect and identify bulkheads on public property at street ends and canal ends that require replacement and raising. Replace bulkheads at an appropriate height and with materials that are more resilient to erosion and wind.	Proposed	N
Improve Stormwater Management and Drainage Systems	Sunrise Highway, Merrick Road, Park Ave Drainage Improvement Study and Design	Study and design improvements for stormwater management and drainage systems located along Sunrise Highway, Merrick Road, and Park Avenue. This study should consider the potential for green infrastructure solutions to meet the assessed needs. Once the likely improvements have been identified, the project will proceed into the design of the drainage improvements.	Proposed	N
Improve Transportation and Communication Connectivity	Merrick Road Streetlight Retrofits Project	Install LED streetlights with solar PV and battery backup on existing utility poles. Merrick Road will serve as the pilot for the streetlight retrofit project.	Proposed	N
Establish Programs and Policies for Resilient Planning and Design	Community Assistance Centers and Protecting Critical Community Infrastructure	Create network of Community Assistance Centers and complimentary public education program. Community Assistance Centers are places for residents to find emergency preparedness information. During and after a storm, these centers would become a place to collect and distribute resources, charge cell phones, and access the internet.	Proposed	N

**Table 01 (cont'd):** Proposed projects, featured projects, and additional resiliency measures

Strategy	Project Name	Short Description	Category	Regional
Invest in Resilience Enhancements for Critical Assets	Wantagh High School County Shelter Resilience Enhancement	Wantagh High School is a designated emergency shelter for Nassau County. Ensure that Wantagh High School is accessible and able to accommodate the needs of community members by assessing the facility's utilization during Sandy and implementing resiliency upgrades, including backup generation capacity.	Proposed	N
Invest in Resilience Enhancements for Critical Assets	Cedar Creek Microgrid Design	The New York State Energy Research and Development Authority (NYSERDA) is currently conducting a feasibility study for a microgrid at the Cedar Creek WPCP and surrounding facilities. Based on the results of this study, this project would fund the design of the microgrid system.	Proposed	N
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. Establish a communication network that more effectively links government services with non-profit and other emergency recovery organizations. Create a physical	Proposed	Y
Establish Programs and Policies for Resilient Planning and Design	Business continuity program	Create a business continuity program that provides small businesses with a roadmap for continuing operations under adverse conditions.	Proposed	Y
Improve Stormwater Management and Drainage Systems	Seaford Creek Stormwater System Modeling, Analysis, and Pilot	Conduct Hydrologic and Hydraulic study of Seaford Creek watershed to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	Proposed	N
Improve Stormwater Management and Drainage Systems	South Shore Stormwater System Modeling and Analysis	Conduct Hydrologic and Hydraulic study of six South Shore watersheds to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	Proposed	Y

**Table 01 (cont'd):** Proposed projects, featured projects, and additional resiliency measures

Strategy	Project Name	Short Description	Category	Regional
Improve Transportation and Communication Connectivity	Lifeline Corridor Study and Guidelines	Study and design for infrastructure improvements along critical roads to maintain access during storm events.	Proposed	Y
Improve Stormwater Management and Drainage Systems	Sunrise Highway, Merrick Road, Park Ave Drainage Improvements	Improve stormwater management and drainage systems located along Sunrise Highway at Wantagh State Parkway, Merrick Road by Mill Pond Park, Wantagh State Parkway, Seaford Oyster Bay Expressway, and Park Avenue. Green infrastructure solutions should be incorporated where possible.	Featured	N
Improve Transportation and Communication Connectivity	Seaford Road Raising	Rebuild local streets in Seaford at higher elevation to alleviate monthly spring tide flooding.	Featured	N
Improve Transportation and Communication Connectivity	Wantagh Road Raising	Rebuild local streets in Wantagh at higher elevation to alleviate monthly spring tide flooding.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Wantagh High School and Seaford High School Solar Power and Battery Storage	Seek funding through New York State "K-Solar" Initiative to expand current array of solar panels at both schools and add battery backup for storage.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Wantagh Library and Seaford Library Solar Power and Battery Storage	Seek funding through New York State "Community Solar NY" Initiative to install solar PV panels and battery backup for storage.	Featured	N
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	Create new residential design guidelines for improving architectural quality and functionality in newly raised homes. Recommend changes to TOH building, planning, and zoning to encourage resilient design.	Featured	N
Establish Programs and Policies for Resilient Planning and Design	Marina and Dock Resilience Guidelines	Develop and adopt new guidelines on the siting and design of new marinas, as well as the reconstruction of existing marinas. Develop emergency preparedness and evacuation procedures for marinas, including uniform procedures for securing vessels.	Featured	N

**Table 01 (cont'd):** Proposed projects, featured projects, and additional resiliency measures

Strategy	Project Name	Short Description	Category	Regional
Establish Programs and Policies for Resilient Planning and Design	Home Heating Upgrades	Amend building and planning regulations to phase out the use of oil fuel tanks south of Merrick Road. This incorporates requirements and enforcement for correct tank anchoring procedures, and incentives for residents to convert to natural gas or other alternative fuel sources.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Cedar Creek Hazard Mitigation Strategy	Develop a hazard mitigation strategy to mitigate damage to the Cedar Creek WPCP from future storm events. Strategic planning and redesign of the facility for flood protection help ensure that the plant will be able to continue operating under adverse conditions.	Featured	N
Invest in Resilience Enhancements for Critical Assets	Wastewater Facilities Hardening Study	Wastewater facilities must be kept in continuous operation. Identify ways to harden wastewater treatment facilities to prevent further damage from inundation.	Featured	Y
Invest in Resilience Enhancements for Critical Assets	Wastewater Facilities Odor Control Improvements	Implement improvements to the odor control systems at the Cedar Creek Water Pollution Control Plant to mitigate community nuisance.	Featured	Y
Invest in Resilience Enhancements for Critical Assets	Comprehensive Gas Station Backup Power	State mandate to install generators or other provision backup power for gas stations in critical areas to facilitate evacuations and disaster recovery.	Featured	Y
Invest in Resilience Enhancements for Critical Assets	Harden the Electrical Grid	Specific resilience measures including undergrounding overhead primary wire, elevating substations, and creating outage response system.	Featured	Y

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## Section I: Community Overview

The communities of Seaford and Wantagh sit along the southern portion of Nassau County on Long Island, with Wantagh bordered by Bellmore on the west and Seaford bordered by Massapequa on the east. The hamlets are collectively referred to in this document as the New York Rising Community Reconstruction (NYRCR) Seaford/Wantagh Community. In 2013, NYRCR Seaford/Wantagh (Community) was estimated to have a population of 34,624 residents. The population's median age is 42.6 years. Residents of Seaford and Wantagh formed 11,470 households and are estimated to have a median household income of \$106,766.<sup>3</sup> The Community is predominately White (91.2% of the total population) with small numbers of African American (0.2%), or Hispanic or Latino descent (5.1%).

The Community consists largely of residential neighborhoods characterized by detached single-family homes, tree lined streets, and networks of greenways and waterways interspersed throughout. NY Rising Community Reconstruction Program Seaford/Wantagh Planning Committee (Committee) and Community members report that they value their suburban quality of life and their ready access to Jones Beach. Committee and Community members cite close-knit nature of the Community as a very important aspect contributing to their overall quality of life.

The Community's relationship to the water is paramount. The Community embraces its coastlines on the East or Oyster Bays, finger canals, and other waterfront areas spread throughout the hamlets in the areas south of Merrick Road. Wantagh is referred to as "The Gateway to Jones Beach," with the Wantagh State Parkway providing the main access point to Nassau County's southern barrier beaches.

Sunrise Highway, which runs east-west, is a major thoroughfare through the Community. It provides access to both the Wantagh State Parkway and the Seaford-Oyster Bay Expressway which offer north-south connections. Wantagh Avenue, Merrick Road, and Jerusalem Avenue are also heavily traveled local routes in the Community.

The key highway arteries of Merrick Road and Sunrise Highway also serve as the primary business and commercial districts within Seaford and Wantagh. These corridors have retail, office, industrial, and mixed-use facilities spread throughout in a low density development pattern with parking in front or behind and oriented towards major streets. Many restaurants are also located along the transportation corridors and in shoreline areas in the Seaford Harbor neighborhood.

Seaford and Wantagh each have their own station on the Long Island Rail Road's (LIRR) Babylon Branch, which runs from Penn Station in Manhattan to Babylon Village in Suffolk County. Despite an express train journey time of 50 minutes to Manhattan, rail ridership in the Community is slightly lower than the adjacent communities, with average weekday ridership of 2,990 for Seaford and 4,953 for Wantagh.<sup>4</sup> Given the lower density development patterns, street characteristics, and distance between land uses, car use is essential for daily living. Local residents rely primarily on cars for transportation, with 80% of the combined population using a personal vehicle for their daily commute.<sup>5</sup>

Several canals in the southern portion of the Community provide residents with access to East Bay, South Oyster Bay and the Atlantic Ocean. Tackapausha Preserve, an 89-acre nature sanctuary, runs along Seaford's eastern edge. The 259-acre Cedar Creek Park is located on the coast of Wantagh and offers a number of sports facilities, trails, and bike paths. Additional public amenities include Wantagh Park, Seamans Neck Park, Twin Lakes Preserve, and Mill Pond Park. The Cedar Creek Water Pollution Control Plant (WPCP) occupies a portion of the Cedar Creek Park and currently serves approximately 600,000 residents of Nassau County, treating an average daily flow of 56.9 million gallons of wastewater.<sup>6</sup>

With the introduction of the NY Rising Community Reconstruction (NYRCR) Program, the Committee worked to actively identify critical post-storm issues and to develop strategies to enhance the long term resiliency of their community. Eight community representatives dedicated their time, passion, and expertise as Committee Co-Chairs and Members to guide the development of the NYRCR Seaford/Wantagh Plan (NYRCR Plan) from its inception. Local residents and business people participated in three Public Engagement Events and shared their opinions and ideas through online platforms, business surveys, and key interviews. More than 175 residents and stakeholders from Seaford and Wantagh actively participated in the NYRCR Program to address storm-related impacts that affect their community as a whole. The result of their efforts is this NYRCR Plan. The NYRCR Plan presents a series of strategies and projects that respond to critical issues and community aspirations and contribute to building a more resilient, sustainable, and safer future for these two hamlets.

This section of the NYRCR Plan, the Community Overview, includes the following sub-sections:

- **Geographic Scope:** Defines the physical boundaries of the NYRCR Plan and includes a description of NYRCR Seaford/Wantagh to provide context for the planning effort.
- **Description of Storm Damage:** Summarizes the impacts of Hurricane Irene and Superstorm Sandy on the lives of residents, their homes, local businesses, community services, and public and government facilities.
- **Critical Issues:** Describes the key concerns facing the community as it relates to major storm events. These issues are further detailed in Section II: Assessment of Risks and Needs.
- **Community Vision:** Includes NYRCR Seaford/Wantagh's aspirations for a more resilient future.
- **Relationship to Regional Plans:** Describes the regional perspectives and prior planning work considered in the preparation of the NYRCR Plan to address shared challenges and issues.

## A. Geographic Scope of NYRCR Plan

As shown in Figure 01, the geographic scope of NYRCR Seaford/Wantagh (Community) extends north from the waterfront at South Oyster Bay to Jerusalem Avenue and the southern border of North Wantagh. The area is bounded on the east by the Tackapausha Nature Preserve and follows Seaford Creek south into Crescent Cove. The western boundary delineates Wantagh from neighboring Bellmore, forming the edge of Mill Pond Park and intersecting the Sunrise Highway and the Long Island Rail Road's Babylon Branch as it moves north.

The Community consists of the unincorporated hamlets of Seaford and Wantagh. Both are bedroom communities comprised mainly of single-family homes, and are characterized by low-lying residential tracts extending out into the bay over infilled marshland. The two hamlets are located within the Town of Hempstead, NY, which makes up a large portion of Long Island's South Shore in Nassau County.

Within the greater New York City metropolitan area, they are approximately 26 miles east of Manhattan, and 12 miles east of the Nassau-Queens border. To the west is the hamlet of Bellmore, and to the east is the hamlet of Massapequa, each of which is also a NYRCR Community. To the north of the Community is the hamlet of North Wantagh.

Although both hamlets have their own volunteer fire departments, the Wantagh Fire Department provides dispatch services for neighboring portions of Seaford. The Wantagh Fire Department also provides fire service and ambulance backup for Jones Beach and Tobay Beach. Both hamlets are patrolled by the Nassau County Police Department, with Seaford served by the Seventh Precinct and Wantagh served by the First, Seventh, and Eighth Precincts. Wantagh and Seaford each operate independent school districts.

## B. Description of Storm Damage

Due to their proximity to the water and the low elevations of waterfront areas, coastal communities like Seaford and Wantagh are subject to a higher degree of exposure and damage from weather events like hurricanes. Both Hurricane Irene and Superstorm Sandy produced damage as a result of flooding and winds. The immediate impacts experienced by the Community during those two events included coastal flooding of homes and businesses; wind damage to trees, utility poles and other structures; power outages; localized flash flooding in streets; boat damage to properties; debris buildup in homes, businesses, streets, parks and open spaces; backups and overflows of sanitary and stormwater drainage systems; and oil spill contamination from oil tanks lifted by surge. Figure 02 on the following page shows the extent of flooding for Superstorm Sandy and Hurricane Irene.

### Hurricane Irene

Hurricane Irene made landfall in New York on August 28, 2011, as a Category 1 Hurricane and was immediately downgraded to a Tropical Storm upon landing. Heavy rain and storm surge caused extensive flooding in Seaford and Wantagh, particularly south of Merrick Road. It was observed that the storm surge height in nearby Freeport was 4.73 ft. above the normal astronomical tide level.<sup>7</sup> Severe flooding was noted in the areas near Wantagh Park and Cedar Creek Park.<sup>8</sup> The southbound Seaford-Oyster Bay Expressway at Sunrise Highway was closed the morning after the storm due to flood conditions on the roadway.<sup>9</sup>

Heavy winds exceeding 60 miles per hour for a sustained period, in combination with floodwaters, caused many downed trees and wide-scale power outages in Wantagh and Seaford.<sup>10</sup> There was extensive tree damage in Seaford at the corner of Merrick Road and Washington Avenue as well as in North Wantagh on Seamans Neck Road.

The total cost for preparation, clean up and damage repair for Nassau County was approximately \$12 million. The county submitted FEMA Public Assistance claims for \$11.9 million, of which \$10.5 million was approved as of September 2013.<sup>11</sup>

### Superstorm Sandy

On October 29, 2012, the New York Tri-State Area was devastated by Superstorm Sandy, the most destructive storm of the 2012 Atlantic Ocean hurricane season and one of the largest storms recorded in human history. It was observed that the storm surge height in nearby Freeport was 7.85 ft. above the normal astronomical tide level.<sup>12</sup>

The day after Superstorm Sandy a number of roads, including Merrick Road at Seaford-Oyster Bay Expressway and Merrick Road throughout Nassau County, were closed due to tidal flooding, debris, downed power lines, utility poles, and trees. Local

#### What causes coastal flooding?

Coastal flooding, or coastal inundation, is the flooding of normally dry, low-lying coastal land, primarily caused by severe weather events along the coast, estuaries, and adjoining rivers. In coastal communities like Seaford and Wantagh, several factors can contribute to coastal flooding.

**Storm Surge:** Storm surge is an abnormal rise in water level, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure.

**Tidal Flooding:** High tide levels are caused by normal variations in the astronomical tide cycle and occur twice a day in Seaford and Wantagh. Approximately twice a month these daily high tides are at their highest and have been known to cause flooding in low lying areas in Seaford and Wantagh.

**Inundation Flooding:** Intense periods of rainfall over inland areas may overflow into creeks and combine with storm surge and high tides to increase the flood severity along the coast. Intense periods of rainfall can also cause flooding in inland areas where there is not sufficient capacity for the water to infiltrate into the ground or sufficient capacity for the water to be taken away with drainage infrastructure.

**Sea Level Rise:** Global sea level has been rising since the end of the last ice age. This gradual and permanent change in sea level increases the odds of damaging floods from storm surges.

# Figure 01: Geographic Scope



### Legend

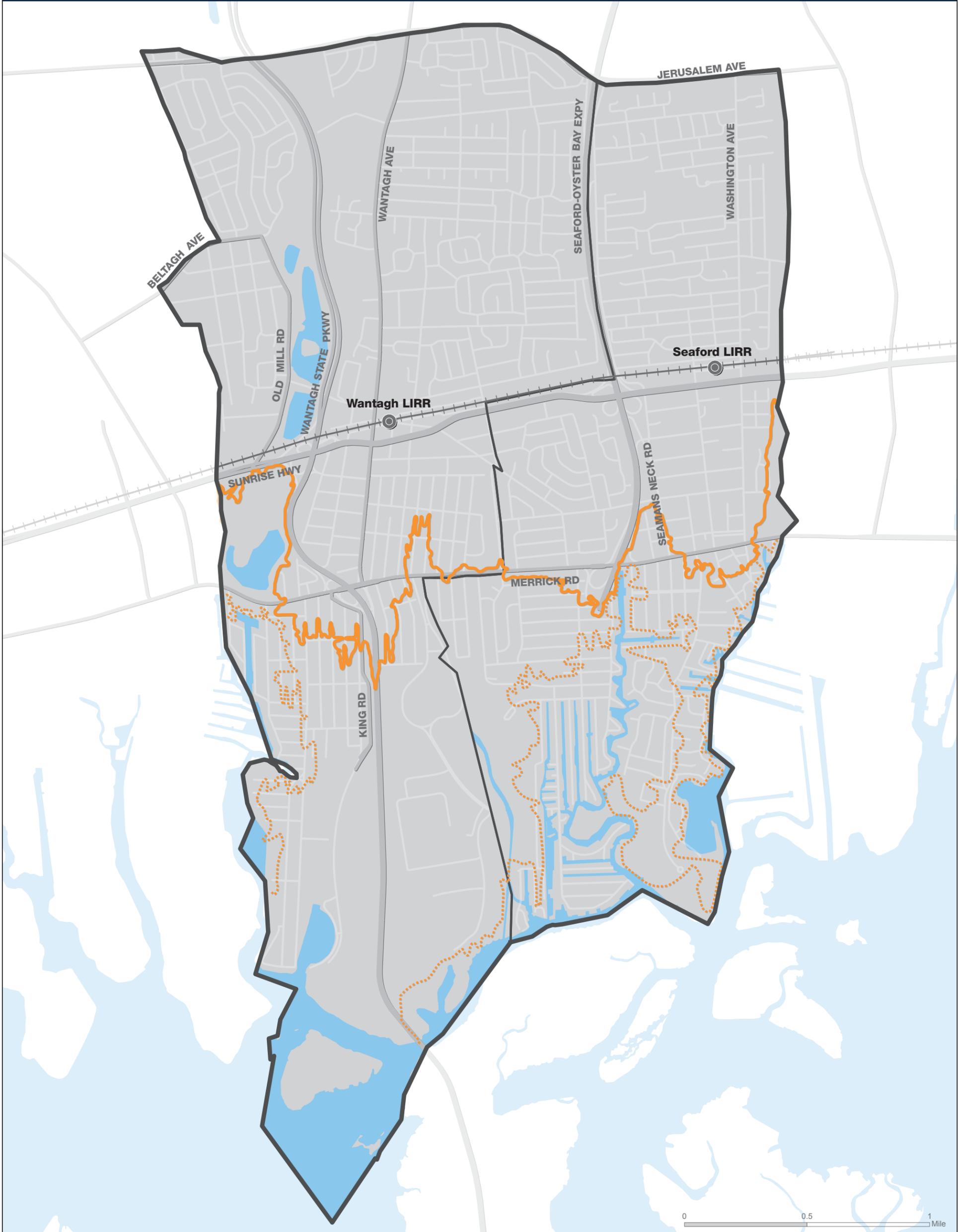
- NYRCR Boundary
- Long Island Rail Road
- LIRR Station
- Water
- Main Roads
- Local Roads

### Data Sources

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



# Figure 02: Extent of Flooding



### Legend

- NYRCR Boundary
- Long Island Rail Road
- 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



roads in the southern portion of the Community such as Neptune Road, Seamans Neck Road, Newbridge Road and many of the roads in the canal areas of both communities were also closed.

As of December 2013 the FEMA Public Assistance program has approved nearly \$333 million in Superstorm Sandy assistance to fund emergency efforts and help repair and rebuild public infrastructure in Nassau County.<sup>13</sup> FEMA has also agreed to grant \$810 million in Public Assistance to fix Superstorm Sandy damage to the Bay Park Sewage Treatment Plant.<sup>14</sup>

The observed surge heights and amount of FEMA funding granted to the county demonstrate the extent to which the degree of damage caused by Superstorm Sandy eclipsed that of Hurricane Irene. This is corroborated by the accounts of Seaford and Wantagh residents. One resident in Wantagh, occupying a house on Sycamore Ave (south of Merrick Rd), said that the water from Irene stopped at the house stoop while the water from Superstorm Sandy left entered as high as 2.5 feet inside the home. Another resident of the Community bought a house on Neptune Avenue in Seaford a week before Hurricane Irene in 2011. During Irene, two inches of water invaded the first floor, whereas during Superstorm Sandy the first floor was filled to the ceiling with water.<sup>15</sup>

### Emergency Response

Before Hurricane Irene, Nassau County issued a mandatory evacuation from areas south of Merrick Road, from Rockville Centre to the Suffolk border.<sup>16</sup> Every American Red Cross shelter was opened at some point. In total, 1,400 people used the shelter system.<sup>17</sup>

On October 28, 2012, a day before Superstorm Sandy was expected to make landfall, Nassau County issued a mandatory evacuation. The order issued at 2:00 p.m. required 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, to evacuate.<sup>18</sup> The order instructed residents to utilize coastal evacuation routes, which include: Peninsula Boulevard, Long Beach Road, Meadowbrook State Parkway, and the Seaford-Oyster Bay Expressway. It also instructed those

requiring public transportation to evacuate by 7:00 p.m. when NICE Bus and the MTA would begin shutting down public transportation. Like many communities in Nassau County (as reported at Committee meetings and Public Engagement Events) most residents chose to disregard the order and weather the storm at home.

Following the evacuation order, American Red Cross shelters began opening on the afternoon of October 28, 2012. Based on the experience from

### Why are floodwaters so destructive?

Floodwaters present general hazard to life and safety when waters rush into and retreat from a populated area. The water itself along, with debris and toxins carried by it, poses an immediate risk. Beyond immediate risks, however, floodwaters are destructive for how they move and what they contain. As water moves into and out of an area, water movement can damage and destroy structures as well as lift and move objects creating further damage and immediate or long term risks.

In areas of human settlement, floodwaters also pick up petrochemicals from cars, home heating systems, and industrial areas, toxins from work sites and buildings, sewage from sewage systems and a variety of other material. The waters pick up carry and deposit material and fluids throughout the flooding area leaving a toxic and messy trail in their path when waters retreat from their area.

Once covered in floodwaters, buildings left with this sludge must be carefully remediated. Much of the materials become waterlogged and mold quickly becomes another set of hazardous conditions for people who are returning. For these reasons, floodwaters can severely damage a community by the physical damage they inflict and the pollution and toxicity they leave behind.

In the case of storm surge flooding that occurred during both Hurricane Irene and Superstorm Sandy, flood damage was further exacerbated by the salinity of the flood waters which corroded and ruined electrical circuits, pumps, vehicles and other mechanical equipment.



The Seaford Fire Department provided beds for residents displaced by Superstorm Sandy (source: Arup)

Hurricane Irene, the County used a tiered approach and opened a select number of American Red Cross shelters that were adequately supplied with backup generators, such as the Nassau Community College shelter. As experienced during Hurricane Irene, despite the availability of shelters most people chose to stay with friends and family, stay in a hotel, or not evacuate. In total, 1,250 people used the shelter system.<sup>19</sup> Additionally the County opened a Pet Shelter at Nassau County Mitchel Athletic Complex in Uniondale, a Special Needs Shelter at the Nassau Community College in Garden City East and an Orthodox Shelter at West Hempstead High School in West Hempstead.<sup>20</sup>

Food and drink distribution centers and showers were opened on November 2, 2012, for residents affected by Superstorm Sandy and continued to operate through the following weeks.<sup>21</sup> Cedar Creek Park in Wantagh became a major distribution center, with showers and washers and dryers. FEMA also set up a Disaster Recovery Center (DRC) at the park. As temperatures dropped in advance of an oncoming nor'easter, warming centers were opened throughout the County.<sup>22</sup> Wantagh High School, which is an American Red Cross shelter, was not officially opened by the County as a shelter because of the absence of a backup generator at the school. In the aftermath of the nor'easter, however, the school did not lose power and became a warming center for the local community.

The communities of Seaford and Wantagh rallied and came together before, during and after Superstorm Sandy. Neighbors helped neighbors. The local police and fire departments, joined by federal, state, and county officials, as well as a corps of volunteers, came together and responded to the need at hand. The Seaford Fire Department provided beds for displaced residents at its Southard Avenue Headquarters and both the Wantagh-Seaford Homeowners Association and the Seaford Harbor Civic Association looked to provide neighborhood support as best they could. Gold's Gym opened their doors to residents for people to shower, eat in the café, and charge computers and cell phones.

As reported by emergency responders and Committee Members, the lack of transportation access made it difficult for emergency response services to effectively identify areas of need and provide aid to community members affected by the storm.

### Home Impacts

As the majority of the land on or near the waterfront is residential, Superstorm Sandy had a profound impact on housing. The Superstorm Sandy and Hurricane Irene inundation map in Figure 2 clearly illustrates that the neighborhoods south of Merrick Road were most affected by storm surge flooding, particularly the neighborhoods of Mandalay, Seaford Harbor, and Seamans Neck. Residences north of the Cedar Creek Sewage Treatment Plant also experienced sewage backflows during Superstorm Sandy.<sup>23</sup> Residents on Bayport Court in Wantagh observed water levels of up to five feet above ground during Superstorm Sandy.<sup>24</sup>

Superstorm Sandy resulted in heavy or strong damage to 2,300 housing units in the Community, causing damage in excess of 20% or more of their value. Another 115 more had damages less than 20% of their value. Damage was caused mostly by flooding which exceeded four feet in nearly 300 units, ranging between one and four feet in more than 1,000 units, and was less than one foot in more than 500 units.<sup>25</sup> Altogether, flooding caused 96% of the housing damage in the Community, while still more damage was caused by boats set adrift from their docks.

From claims registered by some 2,900 homeowners as of July 2013, the FEMA Individuals and Households Program (IHP) assessed total damages to owner-occupied housing in the Community at \$41.3 million and approved assistance to 1,700 property owners.<sup>26</sup> More than 500 renters also filed claims and FEMA assessed an undisclosed amount of rental housing damage and provided assistance to little more than half of those registered.

As of July 2013, the total amount of approved funds dispersed to the Community by FEMA IHP was \$16.1 million to homeowners and \$1.5 million to renters.<sup>27</sup> As of September 2013 an additional \$35.4 million was distributed to homeowners in the Community by the federal Small Business Association (SBA) disaster loan program.<sup>28</sup> As of March 2014, the State has made a total of \$201.7 million in payments available to 4,654 homeowners in Nassau for reimbursement of work completed plus an advance of funds for additional repair.<sup>29</sup> It is unknown, however, what funds have been disbursed specifically to the Community from the NYS Homeownership Repair and Rebuilding Fund (HRRF), the Empire State Relief Fund, or the NY Rising Acquisition program to supplement FEMA aid.

### Business Impacts

NYRCR Seaford/Wantagh is primarily a residential community with commercial properties concentrated along major roads. Small businesses line Sunrise Highway and Merrick Avenue and most businesses in the Community serve the local population. These corridors are largely auto-oriented in nature with strip malls and small businesses including restaurants, neighborhood-serving retail such as pharmacies, gas stations, and car dealerships. Prior to Superstorm Sandy, the economic health of the Community's local businesses was beginning to face challenges – according to the U.S. Census Bureau, the Community experienced a roughly 13% decline in jobs over the 9-year period from 2002 to 2011.<sup>30</sup>

According to data from the SBA<sup>31</sup>, 95 Community businesses, representing 288 employees, applied for disaster management assistance after Superstorm Sandy. This represents about 20% of the businesses and about 5% of the jobs in the Community. These applications verified a total of \$3.4 million in real property damage, \$1.5 million of machinery damage,



Home damage from Superstorm Sandy (source: Urbanomics)

### Homeowner Assistance

Although damage to privately-owned homes was extensive in some areas of the Community and was a concern raised at Public Engagement Events, direct assistance is not part of the NYRCR Seaford/Wantagh Plan's articulated strategies and projects. The NYRCR Plan focuses on community-wide resiliency initiatives that seek to mitigate the effects of storm events on residents, neighborhoods and community assets. Other Federal, State, local, and not-for-profit programs, including the NY Rising Housing Recovery Program are assisting homeowners with reconstruction directly.

an inventory loss of \$1.2 million, and a leaseholder improvement loss of \$952,077. Of these applications, only 25 (26%) were approved for an amount totaling slightly less than \$1.5 million, roughly one fifth of the \$7.1 million in verified damage assistance for which applications were submitted.

Several Seaford businesses, such as Stillwaters Restaurant, the Seaford Harbor Deli, G&B Laundromat, and Catfish Max's Restaurant have remained shuttered since the storm.<sup>32</sup> Many of these businesses are in the process of completely rebuilding their facilities.

Community marinas were also significantly damaged by the storm. Surge waters were strong enough to twist piers and release boats stored on the

properties into the surrounding residential neighborhoods. Recovery resources were identified for marina cleanup efforts but many of the facilities have not yet been fully repaired.

### Environmental Impacts

Superstorm Sandy's storm surge washed out parks and wetlands throughout the community and carried trash and debris into local wetlands and waterways. The Freeport-based organization Operation SPLASH (Stop Polluting Littering and Save Harbors) estimates that the storm deposited more than a million pounds of garbage into the wetlands, including everything from car tires to boats and building components.

Several parks, including Wantagh Park, Mill Pond, and Cedar Creek Park, suffered damage from the inundation of salt water. The damage at Wantagh Park included mechanical and electrical equipment damage from salt water; structural damage to the Community Center from about three feet of flood water; railing damage from a fallen tree; and dock damage from storm surge. The damage at Cedar Creek Park included fence damage throughout the park from surge waters and wind and irrigation system damage from salt water. The damage at Mill Pond Park included damage to the discharge basin from a fallen tree and scour along the discharge outlet retaining wall.

Surge waters lifted home heating oil tanks from their foundations causing oil to spill out into flood waters.<sup>33</sup> Once the water receded, oil remained on the ground damaging existing vegetation and emitting strong fumes in the days after the storm.

### Community Facility Impacts

Community facilities and resources emerged largely unscathed from the storm. All of the schools in both the Seaford and Wantagh school districts were in good physical condition and maintained power after Superstorm Sandy, with the exception of the Seaford Harbor School, which did not have power.<sup>34</sup>

The Seaford and Wantagh Post Offices were left without power.<sup>35</sup> Wantagh's post office borrowed a generator, but postal carriers in Seaford could not sort in the dark so there was a reduced mail delivery. For many homes and businesses, the mail service



Flood and waters overwhelmed storm sewers, resulting in localized flooding further inland (source: Wantagh Seaford Patch)

is a lifeline; postal delivery is a door-to-door service already in place that can provide additional eyes and ears on the ground for those, such as the elderly, who may be in need of help.

### Infrastructure Impacts

The Community areas south of Sunrise Highway encompass a former estuarial and wetland area that is predisposed to flood risks and subsequently a greater risk of damage during an event like Superstorm Sandy or Hurricane Irene. Thus, infrastructure located in this area that is not designed to a higher level is at greater risk of damage or destruction during a storm event. On the Flood Risk maps for Seaford and Wantagh, the majority of the community falls under moderate to extreme flood risk.

Superstorm Sandy's surge waters travelled as far north as Sunrise Highway and left roadways flooded throughout the southern portion of the Community. Streets in low-lying areas, particularly in the Mandalay, Seaford Harbor, and Seamans Neck areas, were completely inundated and receding floodwaters left roadways littered with heavy debris. Heavy winds knocked down trees, traffic signals and utility lines along Sunrise Highway, Merrick Road, Seaford-Oyster Bay Expressway, and the Wantagh State Parkway. While the New York State Police were able to reopen Long Island's major highways north

of Merrick Road within a day of the storm, several roads to the south remained closed until they could be cleared of obstructions.

Superstorm Sandy's surge waters not only traveled over bulkheads to flood areas inland, but traveled through drainage outfalls that are mostly unprotected from backflow. Within the Community, more than 140 storm water drainage outfalls along the coast discharge directly into Oyster Bay. The current condition of many of these outfalls is unknown. Several of these outfalls regularly submerge and inundate the drains upstream during monthly peak high tide events. Some roadways where backflow through outfalls may contribute to flooding include Narragansett Avenue, Miami Street, Anchor Place, Plover Place, Widgeon Place, and Anglers Place in Seaford, and Mermaid Avenue, Canal Place, Wantagh Avenue, and Mariners Avenue in Wantagh.

A number of other critical infrastructure systems were affected by power outages and storm surge waters. Wantagh Park Sewage pump station was flooded and experienced significant damage. There were reports from community members of sewage backing up from the district system into private homes. 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 twice their normal values. According to the damage assessment report by Nassau County, 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.<sup>36</sup>

Long Island Rail Road (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 were powered off after being shut down to avoid damage. 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.<sup>37</sup>

Superstorm Sandy caused almost 10,000 power outages in the Community alone. Nearly 3,000 customers were still without power eleven days after the storm made landfall.<sup>38</sup> At the peak of Superstorm Sandy's impact, more than 90% of LIPA's (now PSEG) 1.1 million electricity customers lost power. Outages were expected to last no longer than ten days, however, on the 7th of November 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 due to the uncertainty surrounding the safety of the electrical systems and the potential of damage to natural gas systems.<sup>39</sup>

Cellular communication networks were down for days after the storm because many cell phone towers had insufficient backup power to maintain service. Flooding also affected numerous cell towers and 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. As a result of these outages, emergency notification systems were rendered ineffective for many Community residents.

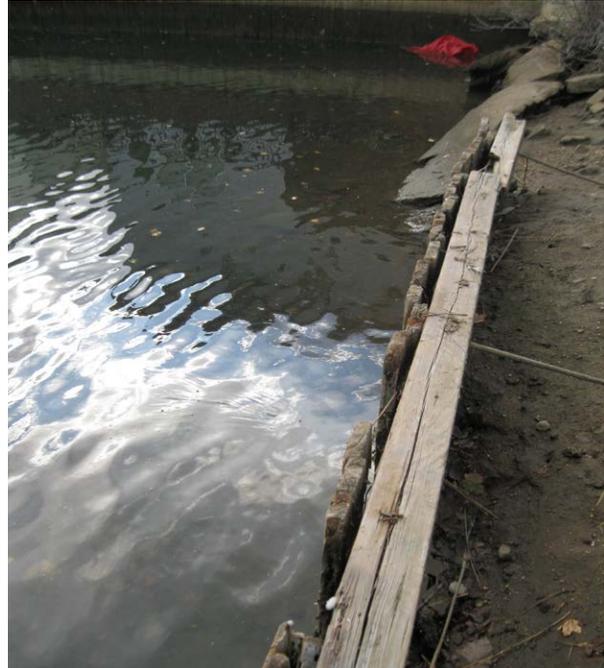
Many gas stations throughout Long Island were left without power for their pumps and the storm prompted the shutdown of two east coast refineries. Although some gas stations did not lose power and remained operational, many wholesale gasoline suppliers did not and were unable to pump fuel into tanker trucks for distribution. Wholesalers that did have power had difficulty keeping up with demand, as service stations that were open had to be replenished more frequently.

## C. Critical Issues

The damage caused by Superstorm Sandy directly and indirectly impacted homes; businesses; sewer, stormwater, and energy infrastructure; public facilities; and natural resources in the Community. These impacts revealed several critical issues facing the community that are crucial to address in a way that allows the Community to be more resilient when faced with future natural disasters. The following are critical issues facing NYRCR Seaford/Wantagh:

- **Flooding and Drainage:** Even before the occurrence of Superstorm Sandy, areas within the community regularly experienced flooding during high tide or moderate rainfall events. Drainage issues relate to both tidal surge and storm water runoff. During the storm and its aftermath, flooding made it very difficult for many residents and first responders to travel on highways, arterials and local roads. Much of the storm water infrastructure is antiquated and detailed records are spread amongst different agencies. Stewardship, responsibility, and accountability are shared, which increases the likelihood of different maintenance and upkeep protocols, resulting in different states of repair for the different systems. Asset ownership is complex and responsibility for maintenance and renewal are unclear.
- **Energy Infrastructure:** Damage to energy infrastructure assets caused power outages during Superstorm Sandy, including transmission and distribution lines and substations. The majority of power lines are above ground and therefore vulnerable to wind damage and damage from falling trees or branches. Many critical public and private facilities in the Community lacked emergency backup power and street signal outages were widespread.
- **Shoreline Protection:** Throughout the 1900s, rapid suburban development in Seaford and Wantagh led to a significant change in the waterfront areas, from wetlands to residential development. Wetlands loss reduced the buffer area of protection from regular tidal flooding and the natural functions that contributed to the ecological health of the Bays. Bulkheads were introduced mainly to reduce soil erosion and hardened shorelines also helped provide water access adjacent to developments. While people have come to rely on bulkheads to prevent inundation, this was not the intended function of the infrastructure. The variation in height, composition, maintenance, and age of bulkheads throughout the Community creates gaps and inconsistencies in the coastline, which allows water to enter and cause damage to the Community.
- **Information and Communication:** During and after the storm, power loss, downed communication lines, and inoperable cellular towers prevented residents from accessing information such as the locations of distribution and help centers.
- **Housing Risk and Destabilization:** According to maps created by the New York State Department of State (NYS DOS) identifying areas subject to moderate, high, and extreme risk from inundation and erosion from future storm events and sea level rise, more than 6,300 homes, or 54 % of the total housing stock in the Community, are located within these risk areas. Damage from Superstorm Sandy adversely affected the housing market and many home values have decreased. According to research conducted by the Consultant Team, home values in the Community are down 20% to 30% in areas south of Sunrise Highway. This is partly due to perceived risk from flooding but is also related to the risks of additional repair and maintenance, and higher flood insurance premiums.
- **Economic Challenges:** The Community is home to a variety of small businesses, most in the retail sector. Many of these local retailers closed for extended periods due to damage from the Superstorm and some never reopened. While most business owners were able to survive and rebuild, the loss of revenues combined with the financial investment required to reopen created a significant financial loss, leaving them with depleted financial resources for rebuilding in the event another storm of significant size moves through the area.

- **Regional Connections:** South Shore coastal communities on Long Island experience similar impacts during storm events and typically rely on finding shelter and services in inland communities. Many communities' infrastructure networks and service districts are closely interconnected and/or overlap. Most hamlet communities do not have the autonomy to address local issues and, in many cases, a shared or regional approach could be more effective.
- **Resilient Planning and Design:** 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 dealing with changing climate and weather patterns. Nor do they reflect current best practice with regards to green building. Homes and businesses in the area were largely repaired to their pre-existing conditions and flood resilience was not addressed in the rebuilding effort. The same is true for local marinas. Field observations in the local area show that while some building owners are now elevating and flood-proofing their structures, this is happening on a limited basis. Finally, many support centers designated to provide shelter and assistance to storm victims needed additional reserve power or other necessary services to support displaced residents after the storm.



Inconsistency in bulkhead heights and maintenance can cause damage to shorelines (source: Arup)



A significant number of homes within the Community face severe flood risk (source: Arup)

## D. Community Vision

Through a combination of input received from the community during Public Engagement Events and the work of the Planning Committee, a vision statement and list of goals were developed to reflect the community's aspirations for the future. These statements provide the foundation for the NYRCR Seaford/Wantagh 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.

### Community Vision

#### Vision for a Resilient Future

The vision for the Seaford/Wantagh NY Rising Community Reconstruction Plan is to support a resilient, stable waterfront community that values its quality of life and relationship to the water, and that is equipped to handle future natural events through sound investment in infrastructure, economic development, natural resources, and communication.

#### Goals for the Future

The NYRCR Seaford/Wantagh Plan strives to:

- Foster innovative and natural solutions to coastal storm surges and erosion management.
- Protect fresh water resources and improve stormwater management.
- Provide emergency infrastructure to all first response facilities and improve communication networks before, during and after emergency events.
- Ensure public safety during and after major natural events.
- Improve resilience of key community facilities and infrastructure.
- Redevelop commercial areas that are more resilient in their design and location.

## E. Relationship to Regional Plans

Regional plans and studies previously conducted raise many of the issues and challenges expressed by Committee Members and the public in the NYRCR Seaford/Wantagh area. The *LI 2035 Visioning Initiative* (2009)<sup>40</sup> discusses the risks faced in coastal areas from hurricanes and major storms while also documenting infrastructure needs in the community. The *South Shore Estuary Reserve Comprehensive Management Plan* (2001)<sup>41</sup> deeply examines the needs of wetlands and bay ecosystems. These plans and others formed a foundation of needs and opportunities that were then used to frame strategies, projects and programs to respond to those needs.

What was learned from reviewing these plans is that the communities along the south shore in proximity to NYRCR Seaford/Wantagh share common issues and concerns related to reconstruction, recovery, and resiliency. This makes perfect sense as these communities all inhabit one natural ecosystem along the Great South Bay and also share similar physical attributes. Furthermore, these communities share similar patterns of development, interconnected infrastructure systems, common 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 into account and leverage regional considerations and regional strategies are grounded in a local context.

The NYRCR 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 2. 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 document review, there were two Joint Committee Meetings held with the neighboring communities of NYRCR Baldwin, NYRCR Bellmore/Merrick, NYRCR Massapequas, and NYRCR Freeport to promote understanding of regional issues and develop shared projects. In March 2014, meetings were also held with the Town of Hempstead.

The NYRCR Planning Committee and Consultant Team have identified a set of key themes that outline common issues and opportunities within the region. Some of these issues apply to the Community in the context of this planning effort, while others do not apply.

- **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, power and gas lines have been particularly affected by flooding and storm damage.

For example, the *Places to Grow* (2010)<sup>42</sup> report notes that the transportation network no longer best serves Long Island's present-day commuting patterns. The report recommends a reevaluation of the transportation network 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:** Flood management, water conservation, and environmental protection have been recurring themes in many of the documents studied including the *South Shore Estuary Reserve Comprehensive Management Plan* (2010),<sup>43</sup> the *NYS Coastal Management Plan* (2006),<sup>44</sup> and the *2010 Draft Nassau County Master Plan* (2010).<sup>45</sup>

- **Energy Rates:** 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, including the *2010 Draft Nassau County Master Plan* (2010)<sup>46</sup> and the *Cleaner Greener Long Island Regional Sustainability Plan* (2013),<sup>47</sup> favored investment in energy efficiency and conservation, renewable energy sources, and distributed energy generation strategies to increase energy independence and reduce ratepayer costs.

- **Housing:** Single family housing, with a majority of units that are more than 50 years old, dominates Nassau County. 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. Several plans, including the *2010 Draft Nassau County Master Plan* (2010),<sup>48</sup> the *Nassau County Consolidated Plan* (2010),<sup>49</sup> the *Sustainable Strategies for LI 2035* (2010),<sup>50</sup> the *New Vision for the Long Island Economy* (2011),<sup>51</sup> the *Long Island 2035 Visioning Initiative* (2009),<sup>52</sup> the *Cleaner Greener Long Island Regional Sustainability Plan* (2013),<sup>53</sup> the *Strong Island* (2013) report,<sup>54</sup> and the *Nassau County Infill Redevelopment Study* (2013)<sup>55</sup> have recommended an increase in smaller, affordable housing and rental developments.
- **Governance:** Long Island's mesh of municipal and administrative jurisdictions can reduce public sector efficiency and limit coordination, while creating an inconsistent regulatory landscape for its residents and businesses. Many of the plans reviewed, including the *2010 Draft Nassau County Master Plan* (2010),<sup>56</sup> incorporate recommendations for consolidating overlapping or duplicated services, streamlining permitting processes, and establishing more comprehensive land use regulations.
- **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 Office of Emergency Management (OEM) is responsible for the *County Multi-Jurisdictional Hazard Mitigation Plan* (2007).<sup>57</sup> The Nassau County OEM has also developed a *Disaster Debris Management Plan* (2009)<sup>58</sup> to facilitate and coordinate the management of debris following an emergency or disaster, specifically a hurricane or nor'easter event, establishing County-wide mitigation goals and providing strategies for implementation of 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 future emergency.

- **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 demographically concentrated, with the populations of many communities more than 90% White. According to the *LI 2035 Visioning Initiative* (2009), 54% of the population will be non-white by 2035.<sup>59</sup> 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, which includes meeting the health needs of an aging, diverse population.

**Table 02:** Existing regional plans, local plans, and other reports

Document Name	Date Published	Author
A New Vision for Long Island's Economy – The Strategic Economic Development Plan for Nassau and Suffolk Counties	November 2011	Long Island Regional Economic Development Council
Blue Water Trail Master Plan	October 2013	Nassau County
Cedar Creek WPCP Facilities Masterplan	2009	Nassau County Department of Public Works
Cleaner Greener LI Regional Sustainability Plan	April 2013	Regional Plan Association
Coastal Risk Assessment Areas	2013	New York State Department of State, National Oceanic and Atmospheric Administration Coastal Services Center, Federal Emergency Management Agency
Community Profiles	2012	United States Census Bureau
Draft Nassau County Master Plan	October 2010	Nassau County
LI Comprehensive Economic Development Strategy	August 2012	Long Island Regional Planning Council, Long Island Comprehensive Economic Development Strategy Committee
LI 2035 Visioning Initiative	December 2009	Long Island 2035 Study Team
Nassau County Consolidated Plan	2010	Nassau County
Nassau County Infill Redevelopment Feasibility Report	September 2013	Regional Plan Association
Nassau County Stormwater Management Program Plan	2009	Nassau County Department of Public Works
Nassau County Multi-jurisdictional Hazard Mitigation Plan	February 2007	Nassau County Office of Emergency Management
Nassau County Debris Management Plan	January 2009	Nassau County
North Atlantic Coast Comprehensive Study (NAACS) Draft	Document in Process	United States Army Corps of Engineers
NYS Coastal Management Program	1982	New York State Department of State
Places to Grow – An Analysis of the Potential for Transit-Accessible Housing and Jobs in Long Island's Downtowns and Station Areas	January 2010	Regional Plan Association
Progress and Promise – Building a Foundation for Long Island's Future (Update)	September 2012	Long Island Regional Economic Development Council

**Table 02 (cont'd):** Existing regional plans, local plans, and other reports

Document Name	Date Published	Author
Long Island's Rental Housing Crisis	September 2013	Regional Plan Association
Significant Coastal Fish and Wildlife Habitat Assessments Narrative		New York State Department of State
South Shore Estuary Reserve Comprehensive Management Plan	2001	South Shore Estuary Reserve Council with assistance provided by New York State Department of State
South Shore Estuary Reserve Workplan Implementation- Estuary Public Use and Tourism Study	September 2010	Cashin Associates for Town of Oyster Bay, New York State Department of State
Strong Island – Recovery & Resurgence – Strategic Economic Development Plan for Nassau and Suffolk Counties (Update)	September 2013	Long Island Regional Economic Development Council
Sustainable Strategies for Long Island 2035	December 2010	Long Island Regional Planning Council

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## Section II: Assessment of Risk and Needs

As part of developing the NYRCR Seaford/Wantagh Plan, a three-part inventory and risk assessment was carried out to evaluate the vulnerability of community assets to future storm damage, specifically flooding. The aim of this process was to provide a quantitative analysis of risk to community assets to supplement the qualitative information collected at Committee Meetings and Public Engagement Events.

An additional needs and opportunities assessment was performed to provide a basis for the strategies and projects proposed for NYRCR Seaford/Wantagh (Community).

## A. Description of Community Assets and Assessment of Risk

The process of identifying assets and risks is described below. The first step in the process is identifying assets within the community. Community assets are the places where economic, environmental, and social functions of communities take place, and the resources that support those functions. NYRCR Seaford/Wantagh has a variety of community assets including commercial districts, schools, infrastructure, parks, and ecological areas that were greatly impacted by Superstorm Sandy and face future exposure. Community assets were initially identified through data collected from New York State and Nassau County Geographic Information System (GIS) databases. Information contained within different datasets was used to separate individual assets into asset class categories: Economic, Health and Social Services, Housing, Infrastructure Systems and Natural and Cultural Resources, which could ultimately be distilled into key assets to be mapped and included in the asset inventory.

### Asset Class Categories

**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.

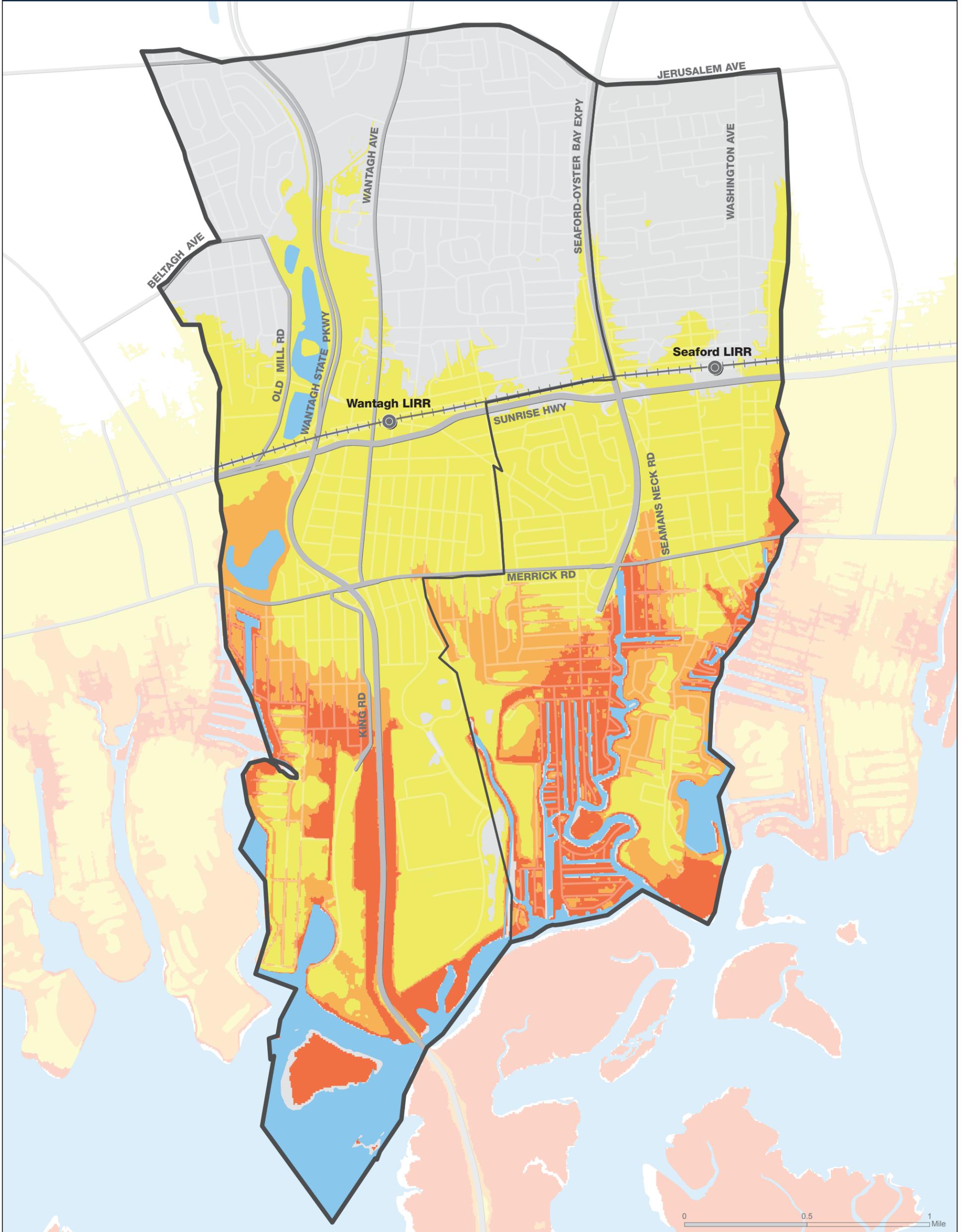
**Infrastructure Systems:** Includes pedestrian, bicycle, and vehicular ways, transit, bridges, airports, rail, ferries, gas stations, water distribution and supply, stormwater and wastewater systems, and solid waste and recycling services.

**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.

When assets were identified, the asset maps were combined with New York State Department of State (NYS DOS) hazard maps, overlaying the risk zones with community assets to identify individual assets within each risk zone. The hazard maps illustrate 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 described as subject to extreme, high, and moderate risk from inundation and erosion from future storm event and sea level rise. 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 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 Zone 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 NOAA's Sea, Lake and Overland Surges from Hurricanes (SLOSH) category 3 hurricane inundation zones.

**Figure 03:** New York State Department of State Risk Areas



**Legend**

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

**New York Department of State Risk Areas**

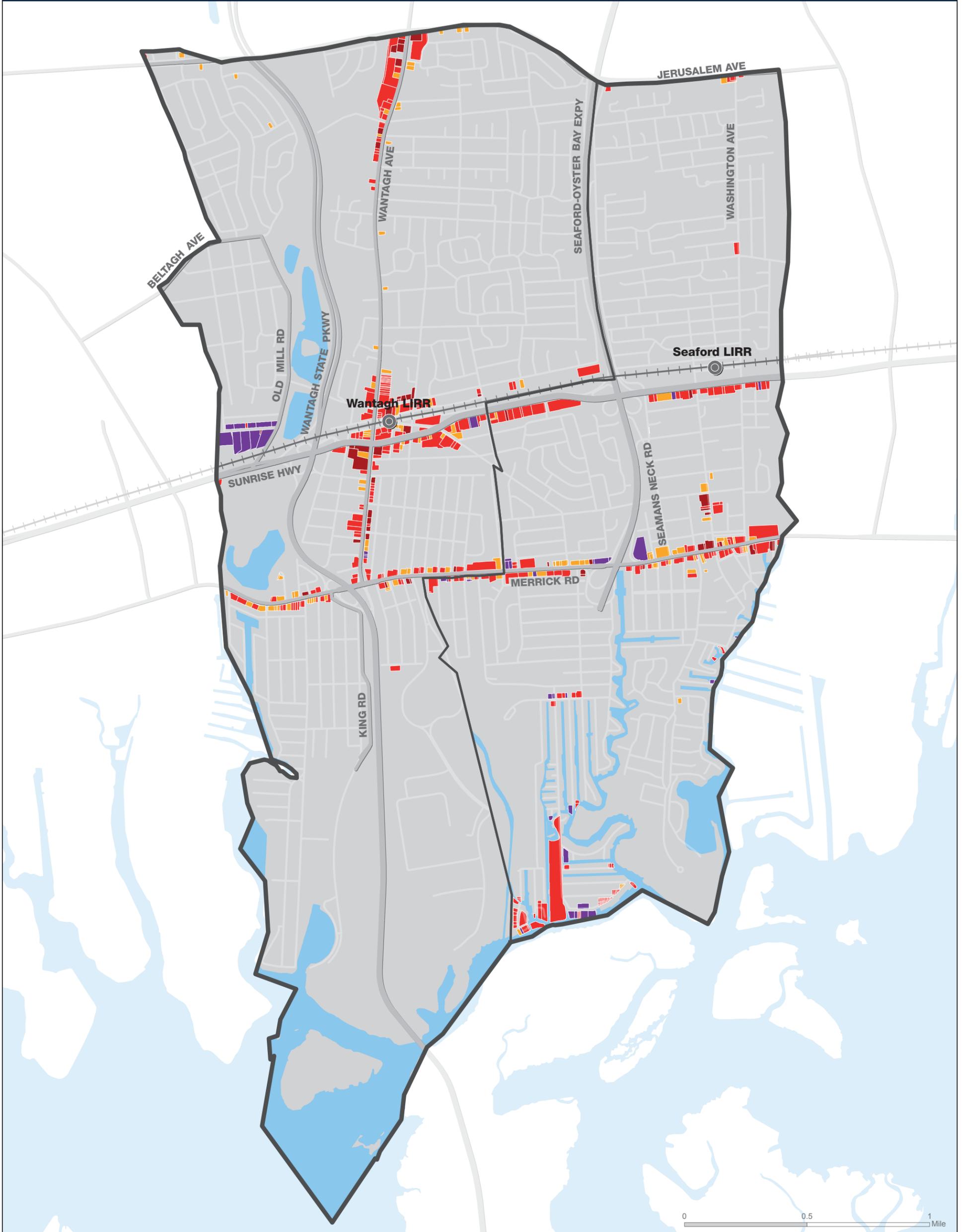
- Extreme
- High
- Moderate

**Data Sources**

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



# Figure 04: Economic Land uses



### Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

### Land Uses

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

### Data Sources

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



As asset and risk mapping was underway, the study team went on numerous site visits to gain a better understanding of the physical attributes of the local area, the extent of damage, and to verify in the field what was shown in the data sets and maps. Site visits were complemented by meetings with Town of Hempstead, Nassau County, and other officials to learn from their experiences.

## i. Description of Community Assets

The following presents a summary of Community assets, organized by asset class, that have been affected by previous storms, or are at risk to future impacts. Assets were identified first through research and data analysis, followed by meetings with local officials and community figures, and thus reflect community member feedback. Asset information was periodically reviewed at Planning Committee Meetings throughout the process, and residents were asked to annotate or amend asset maps presented during the first two Public Engagement Events. Table 03 and Table 04 at the end of this section identify the total number of assets in each asset class located in extreme, high, and moderate risk zones.

### Economic

Nearly all of the Community's commercial property value (72.6%) is located in moderate risk zones, with 5.7% located in extreme risk zones and 7.2% in high risk zones.<sup>60</sup>

As shown in Figure 04, the Community's primary commercial areas include the commercial corridors along Merrick Road and Sunrise Highway. The Wantagh Avenue corridor extends from Merrick Road to Sunrise Highway, culminating with a concentration of development around the Wantagh LIRR station. As it continues north, the corridor gives way to strip development and then residential blocks, before picking up again at Carrollton Avenue and continuing into North Wantagh. The Ocean Avenue commercial area in south Seaford consists of marinas, boat and boat repair shops, and restaurants catering to the boating population. While the Ocean Avenue area is low lying and was completely inundated during Sandy, these facilities were not damaged.

### Health and Social Services

Health and social service assets within the Community encompass both emergency and life safety assets such as police and fire stations, together with administrative assets such as schools, government facilities, libraries, and community centers. The majority of other Health and Social Services Assets are located farther north, and are heavily relied upon in emergency events to provide community support.

Wantagh Fire Station 3 is located in an extreme risk zone and is acknowledged by the local Fire Department to experience regular flooding. This is taken into account by their emergency planning and the station is expected to be unusable during flood events.

Seaford and Wantagh school buildings did not suffer any discernible damage during Superstorm Sandy. Although the Mandalay Elementary School and Seaford Harbor School are south of Merrick Road in extreme and high risk areas, respectively, they are at slightly higher elevations and thus have reduced risk of flooding. However, access to these assets is often restricted by inundation of the surrounding roads. The Seaford Harbor School lost power during Superstorm Sandy as well, and the Wantagh and Merrick Post Offices were without power, which impeded mail sorting and delivery.

### Housing

Housing assets include single-family and multifamily dwellings, group or senior housing, and public housing. Similar building types in close proximity may be identified as a single asset, for example a particular residential neighborhood may be a single asset. A majority (49%) of houses in the Community were built in the 1950s and 1960s. Development slowed considerably in the following two decades, with only one in every eight of today's existing housing units built after 1970. Only 5% of the present housing stock was built after 1990.<sup>61</sup> Developable land was created by infilling the fingers of marshland that reached in the South Oyster Bay. Considering much of this developed land was not built up to heights that considered future rising tides and storm surges, many of the Community's southern homes have been historically susceptible to storm surge and tidal inundation.



The Community's Fire Station 3 experiences regular flooding (source: Arup)



Housing in the Community is mainly detached single-family units (source: Arup)

Over the five-year period from 2007 to 2011, the Community's housing stock consisted of 11,646 units, of which 11,206 were occupied by households and 440 were vacant. The housing stock is dominated by detached single family homes, with fully 93% of all housing in detached and attached single family homes. There are 286 multifamily units in the Community and 880 units of rental housing, which comprise 7.9% of the Community's housing stock.<sup>62</sup> Figure 05 shows the location of rental housing in the Community. In the Community's extreme and high risk zones, where inundation was greatest, rental housing comprises 200 units, or 25% of all housing stock.<sup>63</sup>

### Infrastructure Systems

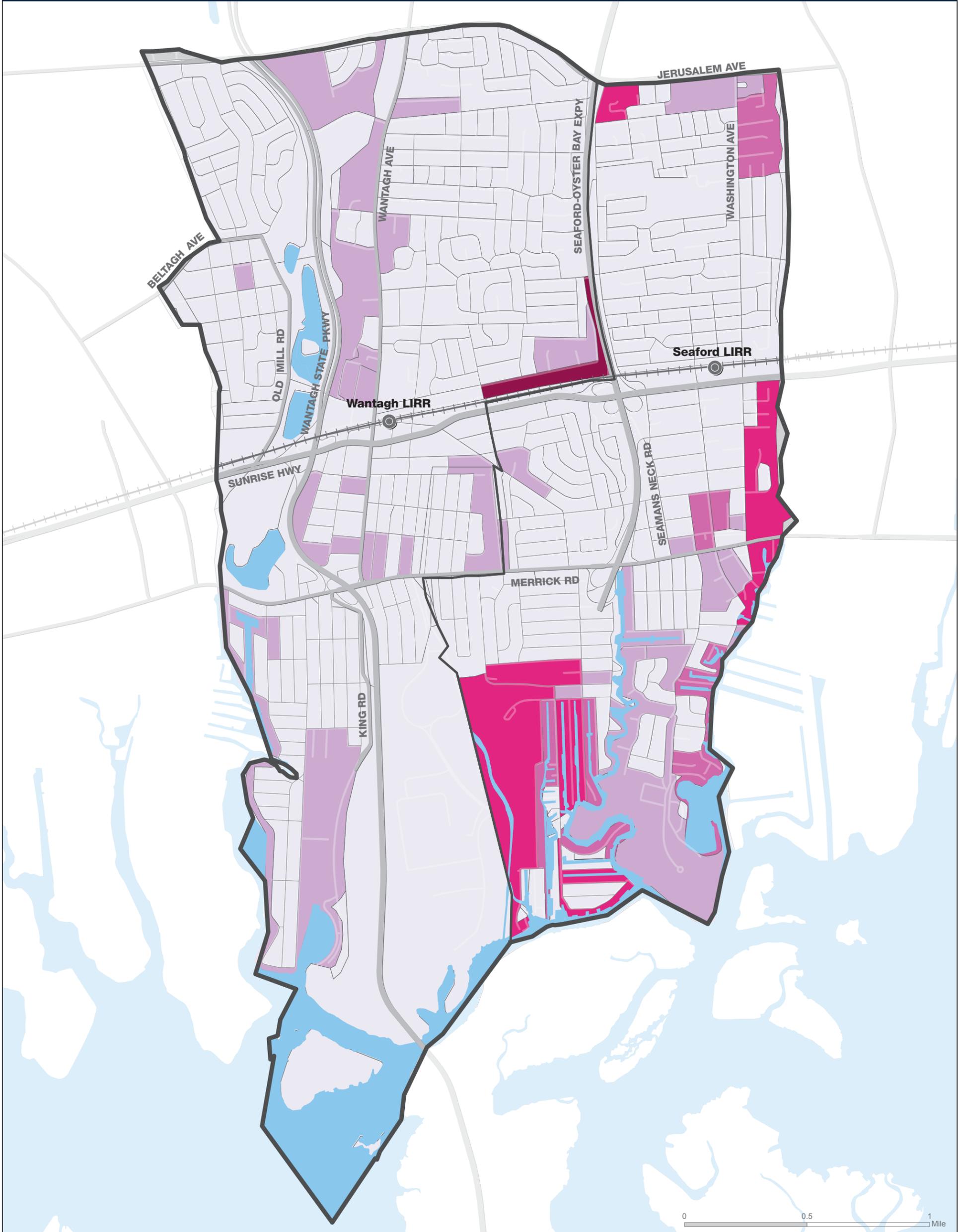
Most of the key infrastructure assets in the Community are located outside of the risk zones. Key assets within the high and extreme risk zones include Cedar Creek Water Pollution Control Plant (WPCP), which is located in Wantagh. While it remained in operation throughout Superstorm Sandy, the flood and rain waters caused peak flows to be 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.

Although Merrick Road is in the moderate risk zone, flooding at key points significantly impaired function, most significantly access to the Seaford-Oyster Bay Expressway and the Wantagh State Parkway, the former being a County-designated evacuation route. While the LIRR skirts the northern edge of a moderate risk zone, it is unlikely that either of the station areas would be significantly affected by a future storm.

### Natural and Cultural Resources

Like all of the south shore communities in Nassau County, the Community's bay and tidal marshlands are important recreational assets. Over the last 80 years, significant areas of coastal wetland have been lost to residential development. This infill of wetlands to provide housing for increasing population has reduced the Community's natural protection against storm events, which has been further exacerbated by the construction of canals for boat access to waterfront homes.

# Figure 05: Rental Housing



0 0.5 1 Mile

### Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

### US Census Blocks, 2010

- |                           |                             |
|---------------------------|-----------------------------|
| < 6 Renter Households     | 50 - 149 Renter Households  |
| 6 - 19 Renter Households  | 150 - 218 Renter Households |
| 20 - 49 Renter Households | No Data                     |

### Data Sources

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



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The Community also has a number of parks. Tackapausha Nature Preserve, Seamans Neck Park, and Wantagh Park are located along extreme and high risk zones, while Mill Pond and Cedar Creek Park are located in a moderate risk zone.

Wantagh Park suffered significant damage during Superstorm Sandy, including extensive electrical damaged caused by the saltwater throughout the park and marina. In addition to the replacement of all electrical facilities at Wantagh Park, other repairs and improvements include a new concrete walkway at the entrance to the pool, the repainting of the pool facility, new landscaping, and new lifeguard chairs.

A number of designated nature preserves are located along ponds and stream channels in the Community. These assets contribute to stormwater retention during significant inundation events.

## Asset Inventory

As the Community has more than six thousand at-risk assets, it was considered impractical to run a quantitative risk assessment for each. For this reason, the inventory used for risk assessment was refined to include only key assets, which were identified using the critical asset criteria established by the Federal Emergency Management Agency (FEMA), or that were highlighted through NYRCR Planning Committee (Committee) feedback and Public Engagement Events. Key asset locations identified through this methodology are shown in Figure 06.

Assets identified by the Committee include schools, pharmacies, medical facility, and cell towers. Critical assets defined by FEMA guidelines include buildings, infrastructure, and facilities deemed essential to the health and welfare of the community's population and the protection of which is important during and following hazard events.<sup>64</sup> Key asset locations identified through this methodology are shown in Figure 6.

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 applied individually or collectively. 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 parkland used for food distribution). Generally, community value is identified as:

- **High:** 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:** Assets whose function could be duplicated or replaced by similar assets in adjacent areas, or whose loss could be temporarily tolerated.
- **Low:** Assets which play an important role in the community, but whose loss could be tolerated in the short to medium term.

The complete key asset inventory is located in Section V.

**Table 03:** Community assets located in risk areas

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Health and Social	Assisted Living	1	0	0
	Community Center	3	0	0
	Day Care Facilities	12	2	1
	Emergency Services	9	0	2
	Government	1	1	0
	Library	2	0	0
	Other Medical	4	0	0
	Pharmacy	3	2	0
	School	10	0	0
	Veterinary	1	0	0
Natural and Cultural	Cultural	3	0	0
	House of Worship	6	0	0
	Parks	1	7	4
	Recreation	5	1	0
	Wetlands (acres)	86	44	16
Infrastructure Systems	Power Facilities	0	1	0
	Rail Bridges	7	0	0
	Rail Stations	2	0	0
	Roads (miles)	57	16	12
	Road Bridges	8	1	1
	Sewer Pump/Treatment	1	1	0
	Water Treatment Plants	1	0	0
	Water Wells	4	0	0

**Table 03 (cont'd):** Community assets located in risk areas

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Housing	Low Density Residential	3,499	1,139	1,343
	Medium Density Residential	207	65	97
	High Density Residential	38	0	1
	Assisted Living	1	0	0
Economic	Commercial Parcels	93	3	96
	Industrial Parcels	27	0	1
	Mixed Use Parcels	59	10	5
	Retail Parcels	96	7	7
	Bank/ATM	14	6	0
	Industrial Facility	5	0	0
	Lodging	1	0	0
	Marina/Boat/Pier	1	0	0
	Post Office	2	0	0
	Restaurant/Food/Caterer	37	5	4
	Retail	45	5	0

**Table 04:** Summary of community assets located in risk areas

Asset Class	Moderate	High	Extreme	Total
Health and Social	46	5	3	54
Natural and Cultural (wetland acres)	15 (86)	8 (44)	4 (16)	27 (146)
Infrastructure (road miles)	23 (57)	3 (16)	1 (12)	27 (86)
Housing	3,745	1,204	1,441	6,390
Economic	380	36	113	529

## ii. Assessment of Risk to Assets and Systems

Risk is the potential for an asset or system to be damaged or destroyed in some future event. The asset inventory provided a baseline to identify the most critical assets in the community to be advanced through the risk assessment tool for further analysis. The Risk Assessment process utilized a quantitative risk tool provided by the State to assess the risk (primarily flood risk) to each of the key assets identified for the Community.<sup>65</sup> The three factors that contribute to the measure of overall risk for each asset are:

- **Hazards:** Hazard is a measure of the likelihood and magnitude of future storm events. The hazard score is based on a standard storm scenario: the chance that a 1% annual risk storm (100 year flood event) would occur within a 100 year planning horizon.
- **Exposure:** Local topographic and shoreline conditions can increase or decrease the effect of hazards on assets. The exposure score is a combination of the risk area in which the asset is located (from NYRCR risk area maps) and the landscape attributes.
- **Vulnerability:** Vulnerability reflects the level of impairment or consequences that assets may experience during and after a storm event. The vulnerability score is selected from a chart in the NYRCR Program Guidance, based on an estimate of the length of time an asset would be disabled by a flood event.

The Risk Assessment Tool calculates a risk score based on the following formula:

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

The risk score represents the relative risk of community assets to one another. The scores can range from 1.5 to 75. Assets with risk scores greater than 53 are considered at severe risk, assets with scores 24 to 53 are considered at high risk, assets with scores 6 to 23 are considered at moderate risk, and assets with scores lower than 6 are considered to have residual risk.

## Findings

Given the high number of assets (4,000+) within risk areas, 70 key assets were identified by their level of risk or the level of importance the Committee assigned to the assets to be carried through for analysis in the risk assessment tool. These assets range from residential areas within moderate, high, and extreme risk areas to economic assets such as the BP Gas Station on Merrick Road in the extreme risk area. Natural and cultural assets such as Wantagh Park are also inventoried. Other asset categories include treatment plants like the Cedar Creek Water Pollution Control Plant (WPCP), emergency services including fire stations such as Wantagh Fire Station 5 and Seaford Fire Station 3, and critical utilities. Risk score classifications range from residual risk to severe risk. Table 05 presents the condensed findings of the risk assessment, categorized by asset class. A more comprehensive list of risk scores for each asset is listed in Section V.D: Community Asset Inventory.

Figure 07 maps the results of the risk assessment, which combines data sets with community feedback to reflect the most comprehensive list of assets and the risks they face based on their location. The map illustrates that flood risk is present for all property south of Sunrise Highway and that areas south of Merrick Road are largely in high or extreme flood risk areas. This map was a foundation for the Committee to identify projects and understand measures that help restore and protect assets at greatest flood risk, while also ensuring appropriate long-term economic growth.

There are over 4,000 assets in these high and extreme risk areas with housing at greatest risk and most of the area south of Merrick Road is developed as residential. These residential areas are interlaced with canals and wetlands and the settlement patterns in the area result in large numbers of homes in areas prone to flooding and erosion, which are vulnerable during major storms. The residential areas at greatest risk for flooding are Mandalay, Seaford Harbor, and Seamans Neck.

Most economic assets are in moderate flood risk areas or outside of flood risk areas altogether. The BP Gas Station on Merrick Road is in an extreme risk area. The Wantagh Park and Marina and the

collection of boat yards, marinas and restaurants around Ocean Avenue are in extreme risk areas and all required extensive repair work after Superstorm Sandy. Marina operators shared with Committee Members and the public at Public Engagement Events that while their businesses were facing hardships before the storms, the experience of both storms made business viability an even greater challenge. All of the privately operated marinas are in extreme flood risk areas while the municipal Nassau County Wantagh Park Marina is in a moderate zone.

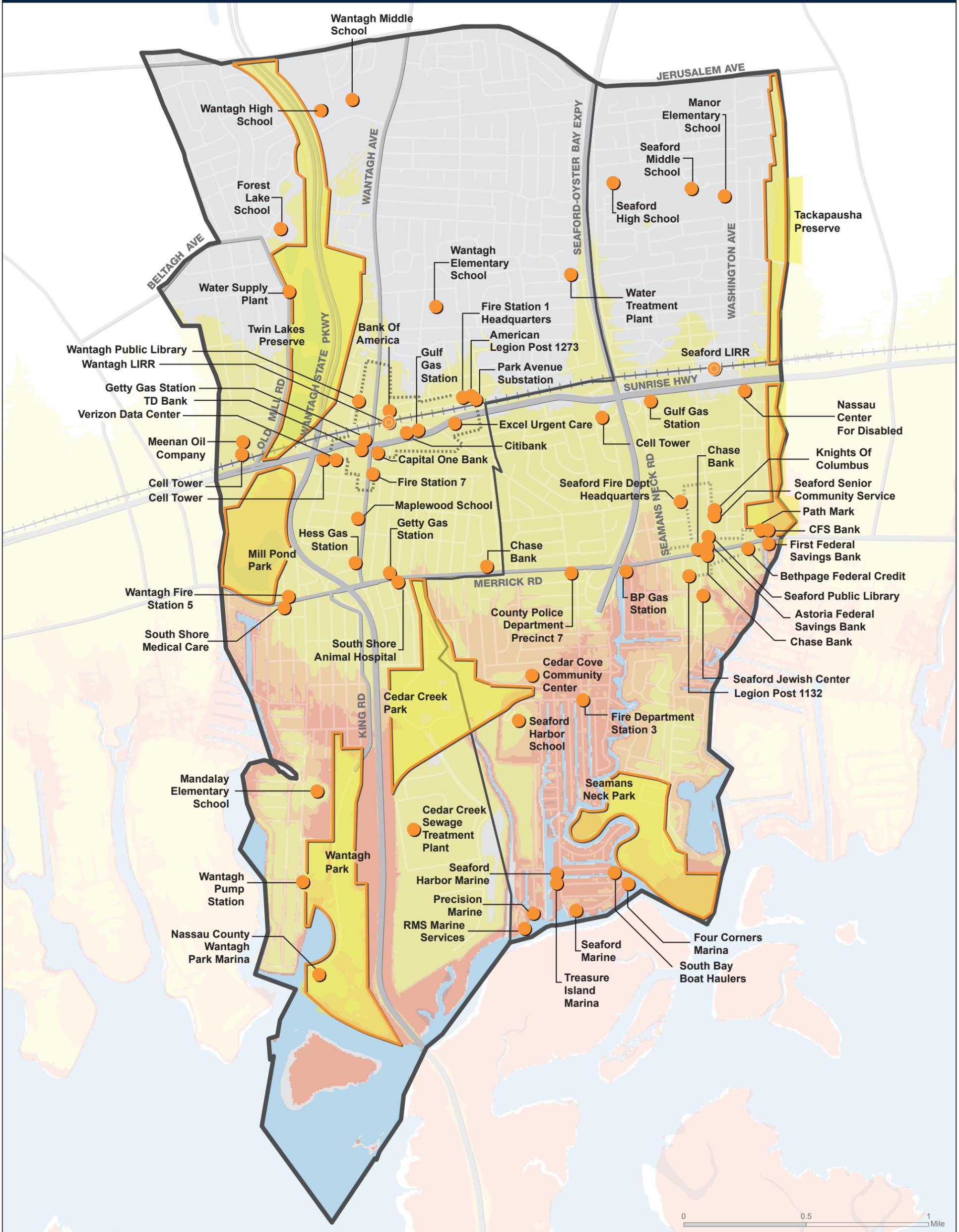
The infrastructure assets at greatest risk for flooding are the Wantagh Fire Station 3, the Wantagh Fire Station 5 and the Wantagh Park Sewage Pump Station. The Community is fortunate that most of the assets identified that are essential for community function are outside of extreme or high risk flood areas. Unfortunately, this also means that land uses in areas of extreme or high risk are largely residential properties or local marinas. The Cedar Creek WPCP experienced some damage that required repair but the plant was able to continue operation during and after Superstorm Sandy. While Cedar Creek Park and WPCP is located in a moderate flood risk area, the areas surrounding are areas of extreme flood risk, where many homes and businesses are located and which were severely affected by Superstorm Sandy and Hurricane Irene.

The scoring of these assets helped to inform, focus, and provide context for the development of needs and opportunities as well as the types of resiliency strategies and management measures considered by the Committee.

**Table 05:** Key asset risk assessment

Asset Name	Risk Zone	Asset Class	Critical Facility	Community Value
BP Gas Station	Extreme	Economic	Yes	High
Cedar Creek Sewage Treatment Plant	Moderate	Infrastructure	Yes	High
Cell Tower - Sunrise Hwy & Old Mill Rd	Moderate	Infrastructure	Yes	High
Cell Tower - Sunrise Hwy & Rt 135	Moderate	Infrastructure	Yes	High
Cell Tower - Sunrise Hwy & Wantagh State Pkwy	Moderate	Infrastructure	Yes	High
Excel Urgent Care (Wantagh)	Moderate	Health & Social	Yes	High
Fire Department Headquarters	Moderate	Infrastructure	Yes	High
Fire Station 1 Headquarters	Moderate	Infrastructure	Yes	High
Fire Station 3	Extreme	Infrastructure	Yes	High
Fire Station 5	Moderate	Infrastructure	Yes	High
Fire Station 7 Dispatch Office	Moderate	Infrastructure	Yes	High
Four Corners Marina	Extreme	Economic	Yes	Medium
Meenan Oil Company (1MG storage)	Moderate	Economic	Yes	High
Mill Pond Park	High	Natural & Cultural	No	Medium
Nassau County Police Department Precinct 7	Moderate	Health & Social	Yes	High
Nassau County Wantagh Park Marina	Moderate	Economic	No	High
Park Avenue Substation	Moderate	Infrastructure	Yes	High
Pathmark (Seaford)	Extreme	Economic	No	Medium
Precision Marine	Extreme	Economic	No	Low
RMS Marine Services	Extreme	Economic	No	Low
Seaford Harbor Marine	Extreme	Economic	No	Medium
Seaford Jewish Center	Moderate	Natural & Cultural	No	High
Seaford LIRR	Moderate	Infrastructure	Yes	High
Seaford Marine	Extreme	Economic	No	Medium
Seamans Neck Park	Extreme	Natural & Cultural	No	Medium

# Figure 06: Community Assets



### Legend

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

### New York Department of State Risk Areas

- Extreme
- High
- Moderate

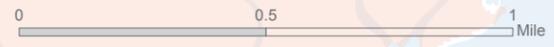
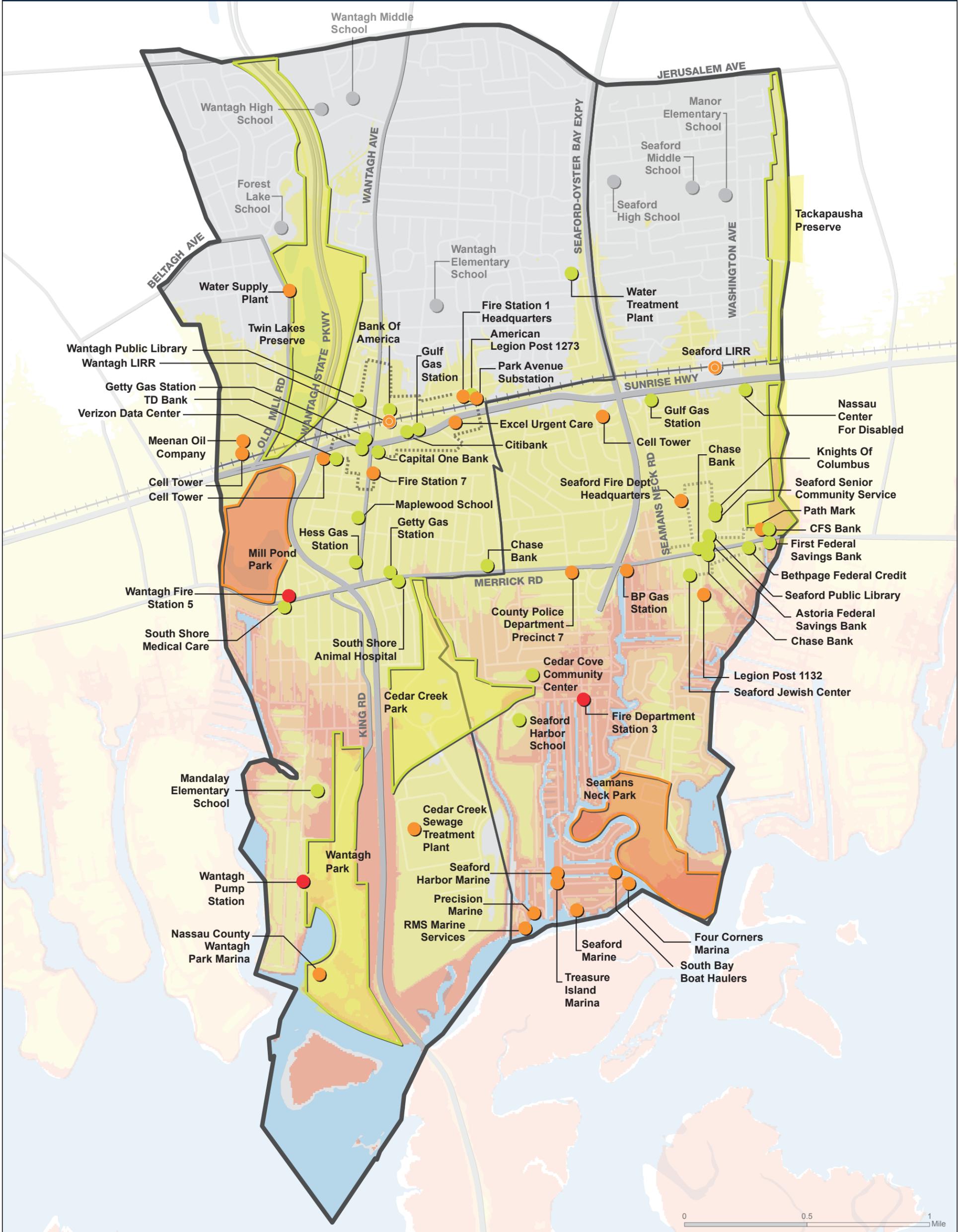
### Data Sources

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



0 0.5 1 Mile

# Figure 07: Risk Assessment Map



### Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station
- Downtown Core

### New York Department of State Risk Areas

- Extreme
- High
- Moderate

### Asset Risk Scores

- Severe Risk Score (>53)
- High Risk Score (24-53)
- Medium Risk Score (6-23)
- Residual Risk Score (<6)
- Asset Not Assessed

### Data Sources

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



**Table 05 (cont'd):** Key asset risk assessment

Asset Name	Risk Zone	Asset Class	Critical Facility	Community Value
South Bay Boat Haulers	Extreme	Economic	No	Medium
Treasure Island Marina	Extreme	Economic	No	Medium
Wantagh High School	Moderate	Health & Social	Yes	High
Wantagh LIRR	Moderate	Infrastructure	Yes	High
Wantagh Pump Station	Moderate	Infrastructure	Yes	High
Water Supply Plant	Moderate	Infrastructure	Yes	High

## B. Assessment of Needs and Opportunities

For the past several decades, Seaford and Wantagh have been unaffected by major storms or natural disasters outside of annual patterns of storm activity. Hurricane Irene and Superstorm Sandy brought the needs of the local community into sharp relief. The needs identified through a combination of research, analysis, Committee feedback and community member feedback from Public Engagement Events shaped the development of resiliency strategies and projects discussed further in this report. The needs and opportunities are organized into FEMA's National Disaster Recovery Framework Recovery Support Functions (Community Planning and Capacity Building, Economic Development, Health and Social Services Housing, Infrastructure, and Natural and Cultural Resources) which combine traditional repair efforts with long-range planning for recovery and growth. The needs and opportunities identified in this section provide a basis for the strategies and proposed projects for the Community.

### Community Planning and Capacity Building

Community planning and capacity building issues concern the Community's ability to implement recovery actions while planning for future storm events. They address the need for public education and preparedness, legislative and regulatory reform, and building code and land use regulations that reflect current vulnerabilities and recent storm experience.

#### Community Planning and Capacity Building Needs

At Public Engagement Events, Committee and Community members often cited emergency communication issues as a concern. Both the Town of Hempstead and Nassau County have independently 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. The County mails an emergency preparedness brochure to property owners and

### Recovery Support Functions

Needs and opportunities were categorized in accordance with the six Recovery Support Functions (RSFs) established by President Barack Obama through the National Disaster Recovery Framework (NDRF). The NDRF focuses on how best to restore, redevelop, and revitalize the health, social, economic, natural and environmental fabric of the community. The six RSFs are:

**Community Planning and Capacity Building:** Addresses the Community's ability to implement recovery actions while planning for future storm events, including public education and preparedness and building code and land use regulations that may influence future rebuilding and recovery.

**Economic Development:** Addresses the needs of local businesses and institutions to recover or relocate following a storm event, and identifies investment opportunities that can provide both economic growth and greater resilience in the community.

**Health and Social Services:** Addresses strategies and management measures needed to ensure that health care facilities and essential social services are accessible to all residents.

**Housing:** Identifies needs and opportunities relative to housing in the Community, prioritizing damaged and at-risk areas.

**Infrastructure:** Addresses the current needs pertaining to the Community's essential systems and services, from energy supply and distribution to transportation routes. Infrastructure opportunities focus on strategies to rebuild in a way that decreases vulnerability to future impacts.

**Natural and Cultural Resources:** 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 also can provide offer significant environmental and commercial benefits such as stormwater management and recreational opportunities.

## Community Needs

### Community Planning and Capacity Building

- Improved emergency notification services are needed that provide adequate information for storm preparation and evacuation procedures through social media and in traditional formats.
- Better communication is needed between emergency response services and community members who may be affected by future storms.

occupants once a year and uses news media, television, radio, and the County website to disseminate emergency information.

Many residents reported not knowing if they were located in flood or storm surge zones, and were unfamiliar with American Red Cross shelter locations. Home and business owners who chose to obey the Evacuation Order said they did not know what to do to secure their properties against damage prior to leaving. Many still may not understand the degree to which they are at risk from a major storm. Changing public education strategies and instituting an appropriate emergency information system may help remedy this and minimize losses from future storms by ensuring that property owners take the appropriate measures to protect themselves and their neighbors.

Community members who chose to stay in their homes reported finding themselves surrounded by water and without electricity. Flooding throughout the Community's southern neighborhoods filled streets with water and carried cars away. Roadway flooding combined with communication issues resulting from the power outage made it difficult for emergency response services to effectively identify areas of need and provide aid to community members affected by the storm.

### Community Planning and Capacity Building Opportunities

Recovery efforts become hampered when information is not shared amongst local residents, public services, and private entities such as utility companies. A

## Community Opportunities

### Community Planning and Capacity Building

- A coordinated communication plan to allocate resources and share information between local residents, public services, and private entities during emergency events.
- A comprehensive public education program to teach residents and business owners about resilience, recovery, and emergency preparedness.
- Designated lifeline roads identified as safe evacuation routes with targeted debris removal and connected to community emergency resources.
- Utilization of community assets for emergency shelters and/or public education centers equipped with generators and stocked with emergency supplies.

program to facilitate communication amongst these groups could supplement existing outreach and coordination measures and facilitate faster recovery.

After Superstorm Sandy, Community members took an active role in recovery and have since become more interested in protecting themselves and their neighborhoods against future storms. There is a clear opportunity for the development of a citizen corps that can utilize this "on the ground" resource of residents and better prepare them to respond to future storms.

A more comprehensive public education program could educate Community members to the risks they face during a storm event, and the benefits of mitigation measures. Education would include safety measures for property owners during and after major storm events, and the circulation of risk zone maps to familiarize residents with evacuation zones. Neighborhood programs could help residents help one another during storms, and provide a point of contact between communities and government officials. Programs within the schools can help better prepare the next generation of citizens for future storms and emergencies.

Designated local roads that provide vital access for recovery and response teams can be identified for targeted debris removal and utility repair. These roads can lead to community resources such as community assistance centers, medical facilities, emergency parking and short term housing for displaced residents.

The Community has a number of assets, such as libraries and public schools, that could be retrofitted for emergency use after a storm event. This would entail designating these facilities as community assistance centers and outfitting the buildings with permanent generators and emergency supplies. These facilities could also be used as a site for public outreach and education, and a central location for all resiliency-related information services.

## 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

Some businesses in the Community affected by Superstorm Sandy have been using their own funds to reopen while waiting for government grants and insurance proceeds.<sup>66</sup> Many small businesses have worked quickly to restore operations and recover revenue flows. In the rush to rebuild, owners may not have considered measures for resilience as part of their efforts. Policies that support mitigation activities are needed to protect the Community's commercial and industrial sector from future storm damage. This includes incentives for flood protection measures in new and existing properties and development policies that promote growth outside of risk areas. Additionally, a number of local business owners have also lost homes to storm damage, and are in need of financial assistance to recover from concurrent property losses.

There are 703 non-residential properties in the Community, which account for 80.6% of the total assessed value in the area, yet they represent a very

## Community Needs

### Economic Development

- Educating local businesses about resilient design as they may not have incorporated resilience measures in their rush to rebuild and reopen, leaving them vulnerable to future storms.
- The establishment of more revenue-generating land uses by creating commercial development opportunities and converting tax-exempt properties to revenue-generating uses.
- Local, affordable workforce housing outside of risk zones, or with resilient designs in risk areas.

small portion of total built land at 5.8% of the total number of parcels in the Community. While this simply reflects the fact the area is dominated by residential land use, it also illustrates that there is a limited amount of land for economic activity that produces a tax revenue stream. Additionally, the most valuable of the non-residential properties are either institutional or open space land use type and are therefore exempt from property taxes. This is a lost opportunity to create revenue and reduce the local homeowner tax burden – more than \$9 million of the total non-residential assessed value does not contribute to municipal tax rolls in any way.

The majority of the local workforce commutes to the Community from elsewhere in the region and is commuting largely to service or retail jobs in the area.<sup>67</sup> As noted at the second Joint Committee Meeting, most local retail and service jobs do not pay sufficient salaries to allow workers to live in the communities where they work. Thus, many of the workers in Seaford and Wantagh come from lower-cost communities in Nassau, Kings, and Queens Counties. The Community has experienced periodic job losses in the past decade, resulting in a loss of 1,142 jobs (12.6%) from 2002 to 2011. Less than one in every five Community jobs is held by a local resident (17.7%), with the single largest share of workers (11.2%) coming from New York City.

## Community Opportunities

### Economic Development

- Redevelop parcels around the Seaford and Wantagh LIRR stations to expand and diversify the commercial tax base.
- Relocate vulnerable commercial properties in extreme and high risk zones to vacant parcels in upland commercial corridors.

Most Community residents work outside the community in high-paying service industries, such as finance and insurance, with 28% of the Community commuting to jobs in New York City. Local residents experienced job losses during the national recession, but the Community has quickly recovered with substantial job gains in service industries. Since 2002, the number of employed residents has grown by 1,332 (7.5%).<sup>68</sup>

### Economic Development Opportunities

While the areas surrounding the Wantagh Long Island Rail Road (LIRR) station appear to have little commercial vacancy, there is little commercial zoning in the vicinity of the Seaford station. Both of these areas are in a moderate risk zone or outside the defined hazard areas. Redevelopment to include a mix of uses, such as housing and commercial, around both station areas could create economic growth and expand the commercial tax base without intruding into existing residential areas. Housing diversity would offer opportunities for residents to relocate out of risk zones (if desired) and it would also offer new options for different types of households who may not want a single-family detached dwelling (seniors, singles or young couples for example). These new residents would support existing businesses in the area or new ones that occupy newly developed commercial spaces. Based on existing demand, there is more than adequate potential to add and expand local retail services.<sup>69</sup>

Given the limited number of commercial properties in flood risk areas, it may be possible to relocate the most vulnerable businesses to upland commercial

corridors. Incentives could be offered to commercial property owners in risk zones, and placement could be coordinated with redevelopment plans.

## Health and Social Services

Health & Social Services assets provide critical services to residents and include schools, health care facilities, day care and elderly care, government buildings, media and communications, and first responders such as police, fire, and rescue. Health and social services concern the strategies and management measures needed to ensure that the Community's healthcare facilities and essential social services can meet the needs of all community members. This includes the immediate and long-term needs of socially vulnerable populations and individuals affected by previous disasters, as well as opportunities to promote health and wellbeing for all residents.

### Health and Social Services Needs

The main concern expressed at Committee meetings and community workshops was the need for seniors, people with illnesses, or those requiring regular medical care to have access to medical facilities and health care service in the aftermath of the storm. One in four residents in the Community are seniors aged 65 and older.<sup>70</sup> An area of secondary concern expressed at community meetings was better access to and egress from Seaford Harbor School.

In areas where power restoration was delayed, due either to the severity of damage or the arrival of a nor'easter one week after Superstorm Sandy that delayed recovery, there were many fuel stations that could not function. This created fuel shortages, limiting access to vehicle fuel and, in turn, making travel to reach physicians, medical facilities, and caregivers extremely difficult for the 92% of residents in the Community who rely on their personal vehicle for mobility, as noted previously. In addition to the limited fuel supply, power outages meant it was difficult to find pharmacies or medical facilities that were open for residents to go and receive care or refill prescriptions. This presents significant challenges to meeting daily medical needs and potentially creates a significant risk for the elderly population, who often need

## Community Needs

### Health and Social Services

- Mobility services for senior community members who are unable to travel and therefore lack access to health care and social interaction in post-storm events.
- Back up or temporary facilities where medical providers can meet with clients and where local residents can access medical supplies and refill essential prescriptions.
- Provision to keep the three community assets affecting Health and Social Services that are in an extreme flood area open and accessible.

routine access to medical professionals and have a greater need to regularly replenish medical supplies. The same is true for those under regular medical supervision due to severe or chronic illnesses.

Three Community assets that affect health and social services are located in extreme flooding areas: the Seaford Harbor School, Wantagh Fire House 5 and Seaford Fire Station 3. These assets lost power during and after the storm event.

### Health and Social Services Opportunities

Creating opportunities not just in shelters, but also in other facilities that are within areas of residential development after a storm can bring medical care, information, and medical supplies closer to where people live. Linking medical support functions with the provision of information, power, and food at decentralized assistance centers can bring necessary support within areas where people are located.

Providing reliable sources of power to fueling stations, medical facilities, and establishments where local community members obtain food, provisions, and medical supplies will ensure continuity of access after a storm event.

Finally, some community members reported checking on seniors living nearby when the person lacked extended family or caregivers in the local area. Creating a network of support for seniors will ensure there is a reliable system for check-in on elderly

## Community Opportunities

### Health and Social Services

- Increased coordination and partnerships among hospitals, doctors, and community-based post-storm support functions to ensure that all community members have access to medical support after a major storm.
- Creation of a network of centers where local residents can find information, obtain support, and have access to essential medical services.
- Utilization of public spaces, such as community centers and places of worship, for community outreach and education campaigns.
- Programs to provide support and assistance to elderly residents, especially those who are homebound.

populations, especially those who are unable to leave home. Postal delivery is a door-to-door service already in place that can provide additional eyes and ears on the ground for those, such as the elderly, who may be in need of help. By reinforcing post offices with the ability to open and operate soon after a storm event, there is an increased capacity within the community to check on the elderly who live alone and provide a communication link in the event there is no phone service or power to operate communication equipment.

### Housing

This section considers the impact of recent storm damage to housing stock and the trends which may affect housing stock in the upcoming years. The type and location of housing needs reflects current and expected demand, as well as the availability of housing units, and the range of housing types available to the Community relative to demographic factors, such as age and income level. The effects of previous storm events are also significant to the planning and identification of future housing opportunities.

## Housing Needs

Despite the number of Federal and State sources of recovery funding, it was reported at Committee Meetings and Public Engagement Events that these programs have not yet provided sufficient aid to meet the needs of the recovering property owners in the Community. There are many affected residents who are not fully covered by public assistance or private insurance. Furthermore, damage estimates and subsequent payouts may not accurately capture the extent of repair work needed. 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 SBA estimates for real property damage in New York State, FEMA dramatically under-reports the value of damages to homeowners.<sup>71</sup>

As FEMA aid is directed primarily to owner-occupied properties, its estimates under-represent damage to rental housing stock. There are approximately 880 units (7.9%) of rental housing in the Community. Of this population, 55.5% are low income households.<sup>72</sup> In extreme and high risk zones, where inundation from Sandy was greatest, rental housing comprises 200 units. The 282 rental units that received FEMA aid for Sandy recovery represented only 14.3% of the Community's FEMA-assisted housing stock. It is not known how many affected households relocated temporarily to rental stock during reconstruction, or left the Community to stay elsewhere.

The Governor's Office of Storm Recovery currently operates the NY Rising Housing 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 100-year floodplains. As of March 11, 2014, \$201 million had been distributed to 4,650 Nassau residents.<sup>73</sup> The deadline for all applications was April 11, 2014.

In the 18 months since Superstorm Sandy, the Community's housing market has seen a sharp decline in asking prices, a rise in vacancies, an

increase in housing foreclosures, and the demolition of properties due to storm damage. In 2013, the median price of single family housing in the Community was \$375,000. This is approximately \$60,000 below the asking price of \$435,000 in 2008, the peak of national housing sales. After the storm, foreclosures in the Community rose to 185, higher than the peak of 168 in 2009-2010, following the housing crises.

Based on the Department of Housing and Development's (HUD) *Analysis of Communities Impacted by Hurricane Sandy* (2013), out of the Community's 11,646 housing units, more than 2,000 (19.7%) were heavily damaged by the storm, with losses exceeding 50% of the home value. Although some houses have been repaired, 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, has severely constrained their budgets. It is clear that with another storm of Sandy's magnitude, many homeowners would not have the resources to recover again.

The Community is expected to grow modestly over the next five years, increasing in population by 1% to 35,071 residents.<sup>74</sup> An additional 156 households are anticipated, with a decline in the number of children between 5 and 19 years of age and a rise in the number of elderly aged 55 and over. Consequently, the median age of residents will rise to 43.6 years. Additionally, the Community's per capita income is expected to increase in current dollars from \$44,100 in 2013 to \$52,130 by 2018.<sup>75</sup> Both age and income trends reflect a likely increase in demand for owner-occupied housing, despite potential damage from future storms.

As new housing is built, it is critical that building and planning regulations are revised to support resilient design measures. This includes locating new residential development outside of risk areas and offering incentives for resilient construction. Additionally, policies are needed to prevent future damage caused by ruptured or displaced residential fuel oil tanks and fuel oil leakage. Abandoned tanks can also pose a threat, as many homeowners who have already converted

## Community Needs

### Housing

- Funding from public disaster relief programs and private insurance proceeds may not be adequate to repair and restore damaged properties to pre-storm conditions.
- A significant number of rental units are located in extreme or high risk zones but lack resilient designs and a large portion of rental units are occupied by low-income tenants with limited means.
- A weakened housing market has eroded the community's tax base and put financial strain on individual property owners already burdened with repair costs.
- New residential development will need to be guided by building and planning regulations that support resilient design measures in risk areas.
- Policies are needed to prevent future damage from residential fuel oil tanks, and incentivize conversion from fuel oil to alternative sources of heating and hot water.

to natural gas may still be affected. A phase-out process is necessary to begin the conversion from fuel oil to alternative sources of heating and hot water.

### Housing Opportunities

For homeowners with unmet repair or rehabilitation needs, public disaster funding and insurance proceeds may not be sufficient. Need-based local funding could cover the cost of repair for damaged property, including environmental hazard mitigation costs. Identifying low-income homeowners in extreme and high risk zones could help residents pay for raising their homes and significantly reduce their flood insurance premium costs. Funding could also be made available for homeowners and owners of rental properties to implement green building measures such as HUD's Green Building Standards for repairs and retrofits.

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.<sup>76</sup> 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.<sup>77</sup> 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 and tourism opportunities. In high risk zones, property acquisitions could be offered at pre-storm value for redevelopment as resilient green housing.

Multifamily housing development could be encouraged in upland areas outside of risk zones as an opportunity for relocation, especially for the elderly, and for attracting growth. The Community is forecasted to expand by more than 150 households over the next decade, a majority of which will be headed by elderly persons.<sup>78</sup> However, there is an opportunity to attract younger residents and low-income workforce residents with new affordable housing options that are linked to transit oriented development in the Community's center.

Plans for new housing should target land within one-quarter mile of the Seaford and Wantagh LIRR stations. Potential parcels would need to be rezoned for multifamily or mixed use development and incentives and financing could be offered to attract private investment. Future residents would have the advantage of frequent and relatively fast rail service to Manhattan, as well as access to a variety of commercial and community services locally. Offered at market competitive rates, these units could attract and retain younger households in the commuter workforce.

## Community Opportunities

### Housing

- Additional funding for repair and reconstruction costs not covered by public disaster funding or private insurance proceeds.
- Better education for homeowners about resilient home retrofits and ways to reduce risks to property or bodily harm, such as keeping sensitive materials or electrical equipment in basements.
- Additional funding for mitigation costs not covered by public disaster funding or private insurance proceeds to raise homes in extreme and high risk zones.
- Incentives for property owners in extreme and high risk zones to rebuild in accordance with green building standards.
- An incentivized housing buyout program to acquire extreme and high risk properties for coastal buffer areas or redevelopment as resilient green housing.
- Redevelopment around the Seaford and Wantagh LIRR stations to provide multifamily housing for young people that would like to commute into New York City, seniors, and low-moderate income residents.
- Continuing care residential development for elderly residents, located outside of risk zones and paired with an acquisition program and relocation services.

Almost 400 households in extreme and high risk zones are headed by older Community members. Some of these older and retired Community homeowners now face the subsequent cost of recovery and repair along with the potential future physical access challenges of living in a raised home. Increasingly, elderly households are moving to “continuing care” environments that combine healthcare-intensive amenities with community facilities in a clustered development. An acquisition program could be coupled with incentives to develop such a facility in an upland low risk area.

## Infrastructure

Infrastructure issues involve the rebuilding and recovery of 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 meet the Community’s current and projected demand in a way that encourages resilience and economic growth.

### Infrastructure needs

Flooding in the Community is not limited to major storm events; it is a regular occurrence during heavy rainfall and/or high tide in many areas south of Merrick Road. Flooding had been reported along Sunrise Highway at Wantagh State Parkway, Merrick Road at Mill Pond Park, Merrick Road at Wantagh State Parkway, Merrick Road at Seaford Oyster Bay Expressway, and Park Avenue in Wantagh. These areas became impassable during Hurricane Irene and Superstorm Sandy, which impeded the transportation of people and goods and limited local parking capacity. There is a need to address these drainage issues, especially at some of the areas identified above, as they are major thoroughfares not only for the Community but for the wider region.

The ownership and maintenance of drainage systems (storm drains, outfalls, bulkheads, stream creek corridors) falls under multiple jurisdictions, which makes it difficult to address drainage issues that may not be caused by the infrastructure within one single entity. This multi-layered structure also makes it difficult to find more regional solutions that would allow for a more proactive management of infrastructure and preventative maintenance, rather than a reactive management of infrastructure and deferred, and often more costly, maintenance.

The large area of impervious surfaces in the Community prevents stormwater from infiltrating the ground naturally and diverts stormwater down major drainage corridors, which compound and converge often in low lying areas along the coast and at key roadways in the Community.

## Community Needs

### Infrastructure

- Multiple jurisdictions make it difficult to identify and contact the party responsible for performing infrastructure maintenance and/or repair work.
- Low-lying streets suffer from routine flooding during high tides and/or heavy rainfall, and can become impassable during major storm events.
- Large areas of paved and impermeable surfaces in the Community prevent stormwater from infiltrating the ground naturally, and burden storm sewers that do not have the capacity to manage runoff.
- Aging and non-functional bulkheads exacerbate coastal flooding and erosion issues.
- Transportation infrastructure is primarily automobile-oriented and lacks alternative options for residents who do not have access to a vehicle.
- Upgrades to electricity infrastructure assets are underway, but may not be complete for some time.
- Energy needs cannot be met by local resources. Additional generation capacity combined with energy efficiency measures will be necessary to meet future demand.

More than 140 drainage outfalls along the coast of the Community discharge directly into the Estuary. Most of these outfalls are not protected and allow water to backflow into the drainage system, which contributed to the flooding inland during Hurricane Irene and Superstorm Sandy. These situations can be exacerbated by failing bulkheads or drainage systems which feed into these outfalls. Debris and sediment can also enter these drainage systems through the outfalls and accumulate, particularly if the outfalls are submerged.

There are several roads and bulkheads that have been identified by the Town of Hempstead as areas that would benefit from road raising and bulkhead reconstruction, respectively. In Seaford, some roads

that continually experience flooding are Narragansett Avenue, Miami Street, Anchor Place, Plover Place, Widgeon Place, and Anglers Place. In Wantagh, some roads that continually experience flooding are Mermaid Avenue, Canal Place, Wantagh Avenue, and Mariners Avenue.

Unmanaged trees around streets and power lines can damage energy and transportation infrastructure during major storms. Wind-damaged and felled power lines 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 typically takes up to several days. There is a need to make the power network smarter and more resilient with the ability to shut down specific areas of system sooner to make travel along these streets safe.

There are several critical infrastructure assets and facilities in the Community that need protection from flooding to ensure that systems stay functional after future storms. These assets include electrical substations, the Wantagh sewage pump station, traffic lights, street lights, and the Cedar Creek Water Pollution Control Plant (WPCP). The Cedar Creek WPCP is a critical asset for the Seaford and Wantagh communities, and it receives and treats wastewater from surrounding areas in Nassau County. While the plant remained in operation during the storm, it is important to the Community that the plant is prepared and protected against any future hazards.

### Infrastructure Opportunities

The ownership and maintenance of the storm infrastructure (drainage, storage, and outfalls) fall under different jurisdictions and there is a key opportunity to address many of the flooding issues within the Community with a coordinated and regional effort to address flooding from both extreme events like Sandy and from more regularly occurring events like intense rainfall and high tides.

There is no single infrastructure solution that can protect the entirety of these two communities from flooding during major storm events; their geography, hydrology and proximity to water make that impossible. It is not only impracticable from a cost

standpoint, but potential infrastructure barriers along the waterfront to protect this area from a storm surge would also only shift the risk to the community on either side of a flood barrier or sea wall. This type of solution is also likely to have a detrimental impact on the network of marinas along the shore. Given how integrated Seaford and Wantagh are with their natural environments, greener solutions will offer a higher degree of protection to the area and complement the human settlements that exist. Natural solutions can and should be strengthened to increase their water absorption capacity and deflect wave energy to slow intruding waters and lessen their impact. In addition, natural features have the ability to capture storm surge-related debris and prevent it from floating inland.

Green infrastructure solutions, like permeable pavement, can lessen the burden of the downstream flooding issues by allowing for more infiltration of stormwater upstream. Check valves can be installed on key outfalls that would prevent any backflow flooding.

A coordinated roadway management plan 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. The plan could identify existing capabilities among public entities and establish responsibilities to best use shared resources in emergencies. Information sharing protocols could reduce overlap and efficiency during regular operations by facilitating communication and reducing redundant work, ultimately lowering tax and ratepayer costs.

To ensure that southern neighborhoods in the Community are accessible in storm conditions, critical roadways can be elevated to reduce the impact of flooding on mobility. Raised roadways should be coordinated with local evacuation routes and identified for debris removal following emergency weather events. These evacuation routes should also be well publicized to residents; routes should be clearly marked and provide directions to higher ground as well as connection to community resources, such as safe parking areas and emergency shelters. Traffic

## Community Opportunities

### Infrastructure

- A regional stormwater management program to bring together multiple levels of jurisdiction to address flooding issues.
- A roadway management plan to coordinate maintenance and recovery work across transportation jurisdictions and utility zones.
- Elevate critical roadways in risk areas to maintain transportation access during flood events.
- Designate emergency parking areas so evacuating residents can safely store their vehicles.
- Implement street improvements in conjunction with repair and recovery work to increase pedestrian access, specifically in downtown commercial areas.
- Pursue federal funding for infrastructure reconstruction and mitigation projects.

signals along emergency routes should incorporate backup power to maintain function in the event of an outage.

Transportation recovery and reconstruction efforts should be coupled with street improvements to make the Community more accessible to pedestrian activities. Many streets in the Community and downtown areas, including those around the Seaford and Wantagh LIRR stations, are not designed for pedestrian use and do not have sidewalks. Increasing sidewalk connections and introducing traffic-calming measures, such as medians and curb extensions, can improve driver and pedestrian safety and make walking more attractive and enjoyable for residents and visitors. Street improvements in downtown commercial areas can help local businesses attract more customers by increasing visibility and access.

## Natural and Cultural Resources

Natural and cultural resource issues concern the impact of Superstorm Sandy on the Community's 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.

### Natural and Cultural Resources Needs

Approximately 284 acres of tidal wetlands have been lost in Nassau County's South Shore over the past five decades.<sup>79</sup> Erosion and the growth of phragmites, also known as the common reed, are primarily responsible for today's wetland loss, although the South Shore's history of development has also significantly contributed to their disappearance. The popularity of waterfront homes peaked after World War II when hundreds of acres of marshland were filled and developed for residential purposes. With the passage of the Water Quality Act of 1965 the Town of Hempstead stopped granting permits for shoreline development, but the damage had been done. Extensive building left little space for waterfront parks and public spaces and the loss of tidal wetlands left the community without an important natural barrier against coastal flooding.

These development patterns have also resulted in an increase of overland flooding; the storm sewer system is unable to manage the increase in stormwater run-off from parking lots and roadways. Impervious surfaces prevent stormwater from infiltrating the ground naturally and prevent groundwater recharge. As stormwater runs over these surfaces it collects pollutants, such as gasoline and motor oil, and excess nutrients from fertilizers before being channeled into sewers and eventually the bay.

The Community's cultural assets, such as nature preserves and parkland, serve an important role in the community. Undeveloped land provides a buffer around wetlands and inland streams and a space for recreation and leisure. Following Superstorm Sandy, parks like Seamans Neck served as a food distribution center for affected residents. While NYRCR Seaford/Wantagh's parks were relatively unharmed by the storm, many are still vulnerable to flooding and storm damage. Seamans Neck Park is located in an extreme risk area and it is likely that the park's

## Community Needs

### Natural and Cultural Resources

- Development patterns have resulted in a loss of natural protection from flooding and wave action.
- Wetlands along the shoreline are being lost to erosion and invasive species.
- Large areas of impermeable surfaces prevent stormwater from naturally infiltrating the ground, and can lead to localized flooding.
- Seamans Neck Park, Mill Pond Park and Wantagh Park are located in extreme and high risk zones. Tackapausha and Twin Lakes Preserve are also vulnerable to storm damage.
- Community needs better protection and maintenance of green and open space. Parks and recreational spaces are ready for upgrades.

sports fields and facilities will be heavily inundated in future storm events. Mill Pond Park and Wantagh Park are both located in a high risk zone and also face potential storm damages. Tackapausha Nature Preserve and Twin Lakes Preserve are also vulnerable, and although they are located in moderate risk areas their ecological value is significant.

### Natural and Cultural Resources Opportunities

Natural systems can provide a solution to storm management and include restoration and expansion of wetlands and tidal marshes. It is estimated that an acre of wetland can store approximately 1 to 1.5 million gallons of water, equal to about three-quarters of a football field covered in 3 ft. of water.<sup>80</sup> 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. While a natural systems approach to resilience typically costs less than traditional hard infrastructure solutions, measures such as wetland restoration require regional coordination to be effective. Additionally, natural systems may take longer to implement and are subject to potentially high ongoing maintenance costs.

## Community Opportunities

### Natural and Cultural Resources

- Long-term planning to protect parkland and nature preserves in extreme and high risk areas.
- Planning to protect and enhance undeveloped public land to manage stormwater and provide a habitat for local wildlife.
- Incentives for property owners and developers to implement green infrastructure strategies to manage stormwater runoff.
- A program for acquiring severely damaged properties for use as public open space, wetland buffers, stormwater retention, and wildlife habitat.
- Regional collaboration to restore and protect south shore marshlands.
- Increase walking and bike paths within the community to provide residents with access to parkland. Paths should incorporate safety measures for crossings in heavily trafficked roads.
- A campaign to educate community members about ecological issues and how resilience can be addressed using natural systems, and the co-benefits of ecological preservation.
- Natural bank stabilization techniques such as “Living Shorelines” utilize plants, sand, and a limited amount of rocks to provide shoreline protection and maintain habitats.

Wetlands in coastal areas are especially important, as the flat coastal terrain leaves land and property exposed to hurricanes and other storms. Coastal wetlands protect these assets from storm surge and provide a sustainable buffer against storm-generated wave action.<sup>81</sup> The U.S. Environmental Protection Agency (EPA) has stated that wetland preservation, along with other natural flood control measures, provides more effective and less costly flood protection than engineered defenses.<sup>82</sup> Traditionally bulkheads, rip-rap, or other engineered structures have been used to control coastal erosion and protect property from storm damage. However, these measures can

potentially increase erosion in adjacent areas. Wave energy from boat wakes, wind, and storm events creates scouring in front of these structures, resulting in the loss of vegetated shallow areas 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 reduced cost to the landowner.<sup>83</sup>

Restoration and protection measures should be pursued to further preserve and enhance the function of the Community’s natural and cultural resources. Marsh nourishment can be used to rehabilitate damaged wetlands or restore areas where wetlands have been destroyed. In this process dredged sediment is sprayed or slurred over the marsh surface being restored to stabilize or rebuild the existing shoreline and reduce future erosion.

Seagrass restoration is an economic and environmentally beneficial way to improve water quality and stabilize sediment, while providing a buffer against wave and storm surge energy. Seagrass restoration entails either the transplant of adult shoots from existing meadows or the seeding of previously damaged seagrass beds. Oyster reef restoration may also be considered as a means to protect shoreline areas from erosion and its potential use is currently under study by the Town of Hempstead Department of Conservation and Waterways.

In addition to these measures, the use of green infrastructure presents an opportunity for the Community to increase resilience while enhancing the community’s cultural resources. Green Infrastructure approaches use engineered systems that mimic natural processes to infiltrate, evaporate, retain, and reuse stormwater runoff. This includes the use of stormwater ponds and constructed wetlands to contain and naturally treat runoff on a large scale, as well as localized installations, such as bioswales, that naturally filter sediment and pollutants from stormwater as it enters the ground. Materials such as permeable paving can also be used to capture pollutants and improve runoff quality. These approaches can mitigate flood issues by diverting stormwater from the Community’s already overloaded storm sewers. Green Infrastructure can be implemented in public or vacant land, or in areas that are subject to routine flooding.



## Section III: Reconstruction and Resiliency Strategies

The process of identifying the needs and opportunities of the NYRCR Seaford/Wantagh community (Community) discussed in Section II informed the NYRCR Planning Committee's (Committee) development of the reconstruction and resiliency strategies to resolve these needs and realize opportunities. The reconstruction and resiliency strategies put forward in this plan address pre-existing needs in the Community while also responding to the needs and risks revealed during Hurricane Irene and Superstorm Sandy and their aftermath. In considering the long-term recovery of the hamlets, the strategies create opportunity for the Community to conceive and implement projects that allow it to rebuild in a safer, more resilient, sustainable manner with vulnerability and exposure to risks in order to achieve a better future for current and future residents.

## A. Reconstruction and Resiliency Strategies

As described in Section II, the Community is an area of older, single-family or multi-family dwellings interspersed with a number of local retail and commercial establishments. These features, combined with its natural and cultural assets, create a quality-of-life that is valued throughout the Community. A majority of housing assets, both single- and multi-family units, are located in the Community's extreme and high risk zones, such as the neighborhoods of Seaford Harbor and Mandalay. The Seaford Marina, Treasure Island Marina, and Fire Department Station 3 are also located in extreme and high risk areas. Other nearby assets, such as the Cedar Creek Sewage Treatment Plant, Seaford Harbor School, and the County Police Department Precinct 7 are within moderate flood risk areas due to site characteristics or design features that reduce their flood exposure. These assets all face risks because of their proximity to water – they are all located near shoreline, canals, creeks, and watersheds. However, these locations offer access to the excellent natural resources and Community assets that are so prized by local residents and visitors.

The Reconstruction and Resilience Strategies described below were developed to achieve rebuilding goals, increase resilience and promote economic growth within the Community. These strategies address regional concerns, an analysis of problem areas, community feedback on local issues, and iterative development by the 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. These resiliency strategies are then addressed through the projects identified by the Committee and Community members as important for consideration in the NYRCR process.

The projects represent actions, plans, and projects that offer a higher degree of flood protection, a greater degree of preparation so the area can bounce back more quickly after the next event, and the strengthening of both the physical and natural networks around the community to allow for a higher level of support before, during, and after a storm event. These same projects improve the day-to-day functioning of the local infrastructure and strengthen and enhance community characteristics, contributing

to the quality-of-life identified by local community members as being important. The strategies on the pages to follow have been organized into the following areas:

- Invest in Resilience Enhancements for Critical Assets;
- Improve Stormwater Management and Drainage Systems;
- Improve Transportation and Communication Connectivity; and,
- Establish Programs and Policies for Resilient Planning and Design.

A description is provided for each strategy, followed by tables presenting Proposed Projects and Featured Projects (see sidebar for definitions) that would contribute to its implementation. A full description of each project can be found in Section IV: Implementation. Project Profiles, Proposed and Featured Projects, and Additional Resiliency Recommendations are included in Section V: Additional Materials.

### Project Types

**Proposed Projects:** Projects proposed for funding through Community Development Block Grant (CDBG-DR) funding.

**Featured Projects:** Innovative projects where an initial study or discrete first phases of the project is proposed for CDBG-DR funding but additional funding is required, an important project where other identified funding opportunities exist, and regulatory reforms and other programs that do not involve capital expenditures.

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

## Invest in Resilience Enhancements for Critical Assets

Investing in resilience enhancements for critical Community assets will help the Community to withstand and recover quickly from future disaster events. Resilience enhancements address the Recovery Support Function (RSF) of Infrastructure and may benefit the Community Planning and Capacity Building and Economic Development RSFs as well.

Flooding and drainage was a critical issue that impacted many of the Community’s infrastructure assets. The Cedar Creek Water Pollution Control Plant suffered minimal damage from Superstorm Sandy, but it is likely that it could be seriously compromised by a future storm. A hazard mitigation strategy for the plant would identify what hazard events could seriously compromise the plant and what mitigation strategies are necessary. The implementation of a microgrid system from Cedar Creek could provide redundant and backup power to key critical facilities near the plant, such as nearby schools and fire stations.

Energy infrastructure is another critical issue that needs to be addressed. The Community’s overhead power lines are vulnerable to damage from surrounding trees and vegetation and substations in risk zones face damage from flooding. Economic challenges are a critical issue for many local businesses and power outages can damage perishable goods, result in the loss of electronic records, and stall recovery after a storm event. Undergrounding power lines could reduce power outages caused by damage to utility lines and could be coordinated with other roadway projects to reduce costs and disruptions.

Power outages may also prevent American Red Cross shelters and local community assistance centers from providing support to community members. Resilience enhancements, including backup generation and improved access, would improve the effectiveness of disaster recovery activities.

**Table 06: Strategy:** Invest in Resilience Enhancements for Critical Assets

Project Name	Project Description	Cost Estimate	Category	Regional
Bulkhead Replacement/ Upgrade	Inspect and identify bulkheads on public property at street ends and canal ends that require replacement and raising. Replace bulkheads at an appropriate height and with materials that are more resilient to erosion and wind.	\$1,000,000	Proposed	N
Wantagh High School County Shelter Resilience Enhancement	Wantagh High School is a designated emergency shelter for Nassau County. Ensure that Wantagh High School is accessible and able to accommodate the needs of community members by implementing resiliency upgrades, including backup generation capacity.	\$1,900,000	Proposed	N
Cedar Creek Microgrid Design	The New York State Energy Research and Development Authority (NYSERDA) is currently conducting a feasibility study for a microgrid at the Cedar Creek WPCP and surrounding facilities. Based on the results of this study, this project would fund the design of the microgrid system.	\$500,000	Proposed	N

**Table 06 (cont'd): Strategy: Invest in Resilience Enhancements for Critical Assets**

Project Name	Project Description	Cost Estimate	Category	Regional
Wantagh High School and Seaford High School Solar Power and Battery Storage	Seek funding through New York State "K-Solar" Initiative to expand current array of solar panels at both schools and add battery backup for storage.	\$8,700,000	Featured	N
Wantagh Library and Seaford Library Solar Power and Battery Storage	Seek funding through New York State "Community Solar NY" Initiative to install solar PV panels and battery backup for storage.	\$1,000,000	Featured	N
Cedar Creek Hazard Mitigation Strategy	Develop a hazard mitigation strategy to mitigate damage to the Cedar Creek WPCP from future storm events.	Included in Nassau County capital budget	Featured	Y
Wastewater Facilities Hardening Study	Wastewater facilities must be kept in continuous operation. Identify ways to harden wastewater treatment facilities to prevent further damage from inundation.	Included in Nassau County capital budget	Featured	Y
Wastewater Facilities Odor Control Improvements	Implement improvements to the odor control systems at the Cedar Creek Water Pollution Control Plant to mitigate community nuisance.	\$24,767,700 authorized by Nassau County Legislature	Featured	Y
Comprehensive Gas Station Backup Power	State mandate to install generators or other provision backup power for gas stations in critical areas to facilitate evacuations and disaster recovery.	\$25,000,000 made available by New York State	Featured	Y
Harden the Electrical Grid	Specific resilience measures including undergrounding overhead primary wire, elevating substations, and creating outage response system.	Funded by New York State	Featured	Y

## Improve Stormwater Management and Drainage Systems

Hurricane Irene and Superstorm Sandy caused major flooding in the Community. Stormwater management and drainage system improvements are needed to mitigate both periodic and surge-related flood events. These improvements address the Recovery Support Functions of Infrastructure and Natural and Cultural Resources, as stormwater management improvements will improve the quality of local water resources.

Stormwater management and drainage system projects include the cleanout, survey, and verification of storm sewer infrastructure along major roads and areas at risk of flooding. Additional projects include the study and design of solutions to improve stormwater management and drainage along major roads where localized flooding has been reported. Tidal check valves could also be installed in outfalls along the Community's shoreline. This project would help alleviate tidal flooding by blocking seawater from entering the storm sewer system.

**Table 07: Strategy: Improve Stormwater Management and Drainage Systems**

Project Name	Project Description	Cost Estimate	Category	Regional
South of Merrick Road Outfall, Bulkhead and Drainage Survey, Inspection, and Check Valve Installation	Survey and inspect the location, condition, and elevation of the Community's drainage system south of Merrick Road, including outfalls, bulkheads, underground pipes, manholes and catch basins. Install check valves in key locations.	\$2,100,000	Proposed	N
Sunrise Highway, Merrick Road, Park Ave Drainage Improvement Study and Design	Study and design improvements for stormwater management and drainage systems located along Sunrise Highway, Merrick Road, and Park Avenue. This study should consider the potential for green infrastructure solutions to meet the assessed needs. Once the likely improvements have been identified, the project will proceed into the design of the drainage improvements.	\$1,200,000	Proposed	N
Seaford Creek Stormwater System Modeling, Analysis, and Pilot	Conduct Hydrologic and Hydraulic study of Seaford Creek watershed to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	\$950,000	Proposed	N
South Shore Stormwater System Modeling and Analysis	Conduct Hydrologic and Hydraulic study of six South Shore watersheds to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	\$725,000	Proposed	Y

**Table 07 (cont'd): Strategy: Improve Stormwater Management and Drainage Systems**

Project Name	Project Description	Cost Estimate	Category	Regional
Sunrise Highway, Merrick Road, Park Ave Drainage Improvements	Improve stormwater management and drainage systems located along Sunrise Highway at Wantagh State Parkway, Merrick Road by Mill Pond Park, Wantagh State Parkway, Seaford Oyster Bay Expressway, and Park Avenue. Green infrastructure solutions should be incorporated where possible.	TBD	Featured	N

## Improve Transportation and Communication Connectivity

Improving transportation and communication connectivity addresses the Recovery Support Functions of Community Planning and Capacity Building and Infrastructure, in addition to Economic Development and Health and Social Services. Flooding of streets and drainage was a critical issue, as Community residents who did not adhere to the mandatory evacuation south of Merrick Road had difficulty navigating flooded streets. After the flooding and high winds subsided, building debris and fallen trees left many roads impassable.

Prolonged power outages after the storm left street lights and signals and cellphone towers inoperable. Improvements along critical roads within the Community would help residents access emergency shelters and services, while allowing emergency responders to access flooded or heavily damaged neighborhoods. The projects proposed for implementing this strategy include a study to determine these roads and capital projects to build resilience and maintain access during and after disaster events.

Communication and access to information is another critical issue that needs to be addressed. With limited means for communication the location and operating hours of food and drink distribution points, shower facilities, warming centers, and County shelters was unclear to many residents in the Community. Overlapping sources of emergency information from the County and Town also added to the confusion. An integrated communication network would provide a single source of emergency information and could include a physical information center located within the Community.

**Table 08: Strategy: Improve Transportation and Communication Connectivity**

Project Name	Project Description	Cost Estimate	Category	Regional
Merrick Road Streetlight Retrofits Project	Install LED streetlights with solar PV and battery backup on existing utility poles. Merrick Road will serve as the pilot for the streetlight retrofit project.	\$1,100,000	Proposed	N
Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. Establish a communication network that more effectively links government services with non-profit and other emergency recovery organizations.	\$20,000	Proposed	Y
Lifeline Corridor Study and Guidelines	Study and design guidelines for infrastructure improvements along critical roads to maintain access during storm events.	\$120,000	Proposed	Y
Seaford Road Raising	Rebuild local streets in Seaford at higher elevation to alleviate monthly spring tide flooding.	\$2,500,000	Featured	N
Wantagh Road Raising	Rebuild local streets in Wantagh at higher elevation to alleviate monthly spring tide flooding.	\$3,250,000	Featured	N

## Establish Programs and Policies for Resilient Planning and Design

Resilient planning and design initiatives include programs and policies that support and incentivize resilient building and reconstruction. This strategy addresses the Recovery Support Functions of Community Planning and Capacity Building, Economic Development, Housing, and Natural and Cultural Resources. Because the projects for implementing this strategy require support from the Town of Hempstead and Nassau County they highlight the need for a regional approach to effectively solve issues shared between South Shore communities.

A business continuity program would provide assistance for businesses to maintain operations under adverse conditions, such as a major storm event. Increased resilience guidelines for marinas would protect these businesses and neighboring properties from storm damage, unsecured boats, and debris from destroyed waterway structures.

A program for establishing designated Community Assistance Centers (Centers) throughout the Community should be initiated to provide residents a place to find emergency preparedness information throughout the year. The program should include public education initiatives to provide regular education sessions and training for emergency response and preparedness. After a storm or disaster event the Centers could be used as a place to gather, distribute resources, charge cellphones, and access the Internet.

Building codes and zoning should be revised to incorporate or amend regulations to support resilient building measures. Regulations for residential fuel oil use and storage could also prevent damage from spills and dislodged tanks, and could be coupled with incentives for converting to natural gas heating.

**Table 09: Strategy: Establish Programs and Policies for Resilient Planning and Design**

Project Name	Project Description	Cost Estimate	Category	Regional
Community Assistance Centers and Protecting Critical Community Infrastructure	Create network of Community Assistance Centers and complimentary public education program. Community Assistance Centers are places for residents to find emergency preparedness information. After a storm, these centers would become a place to collect and distribute resources, charge cell phones, and access the internet.	\$2,100,000	Proposed	N
Business continuity program	Create a business continuity program that provides small businesses with a roadmap for continuing operations under adverse conditions.	\$40,000	Proposed	Y
Neighborhood Preservation Guidelines	Create new residential design guidelines for improving architectural quality and functionality in newly raised homes. Recommend changes to TOH building, planning, and zoning to encourage resilient design.	\$100,000	Featured	N
Marina and Dock Resilience Guidelines	Develop and adopt new guidelines on the siting and design of new marinas, as well as the reconstruction of existing marinas. Develop emergency preparedness and evacuation procedures for marinas, including uniform procedures for securing vessels.	\$100,000	Featured	N

**Table 09 (cont'd): Strategy: Establish Programs and Policies for Resilient Planning and Design**

Project Name	Project Description	Cost Estimate	Category	Regional
Home Heating Upgrades	Amend building and planning regulations to phase out the use of oil fuel tanks south of Merrick Road. This incorporates requirements and enforcement for correct tank anchoring procedures, and incentives for residents to convert to natural gas or other alternative fuel sources.	\$50,000	Featured	N



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## Section IV: Implementation – Project Profiles

The New York Rising Community Reconstruction (NYRCR) Program has allocated to the NYRCR Seaford/Wantagh Planning Committee (Committee) up to \$11.2 million (Seaford: \$7.9 million; Wantagh: \$3.3 million). The funding is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program. While developing projects and actions for inclusion in the NYRCR Plan, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. The projects and actions set forth in the NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in the NYRCR Plan does not necessarily indicate the Community's prioritization of these projects and actions. Proposed Projects are projects proposed for funding through the Community's allocation of CDBG-DR funding. Featured Projects are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYRCR Program. Additional Resiliency Recommendations (see Section V) are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects. The total cost of Proposed Projects in the NYRCR Plan exceeds the NYRCR Community's CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in the NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in the NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented.

This section provides a complete project profile for each Proposed or Featured Project identified by the Committee. The Project profiles for the following Proposed and Featured Projects include a description and information on two important elements to evaluate the value of each project: a Cost-Benefit Analysis and a Risk Reduction Analysis.

### Cost-Benefit Analysis

A cost-benefit analysis (CBA) is a tool used to describe 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 inform the Committee as they formulated and selected projects for inclusion in this NYRCR Plan.

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 estimated capital costs. 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 is just one aspect of the justification for funding these Proposed Projects. Conversely, another important variable is the future cost 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 these costs 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 from an inability to access vast areas of the community.

For five Proposed Projects that are more regional in scale, the Community is partnering with neighboring NYRCR communities to fund these projects. When the estimated project cost is a portion of a shared project, it is noted in the Project Profile.

### Project Benefits

- **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 discussed includes the 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 positively impacted; 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. (The extent to which a project reduced such risk is also considered as a benefit in the Cost Benefit Analysis - see “Project Benefits” above.) 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.

The Risk Reduction Analysis looks at risk mitigation and explains how a project can affect or reduce the risk of flooding to a community asset or area, mitigate potential impacts from a major storm associated with power loss, harden assets that are critical for weathering a storm, harden assets that are critical for returning to areas after an event occurs, and preparing people for major events through educational programs. After community assets were identified and risks assessed, projects were put forward to help address the known risks to the community asset(s). In addition to the analysis provided in the Project Profiles, the Risk Reduction Analysis uses a tool called “Scenario Planning.” Scenario planning measures a project’s potential to reduce risk under a variety/range of potential future environmental conditions or scenarios (e.g., different levels of projected sea level rise). A risk reduction score is then assigned to each project scenario. This helps communities and decision-makers understand the potential environmental, social, and economic outcomes associated with each scenario. (For a more detailed discussion of the methodology and factors used in the risk reduction analysis, see Section V.)

A full list of Proposed and Featured projects can be seen in Table 10 on the following page. Table 10 includes a “Key” column that references the project map in Figure 08, which provides the geographic location of projects included in the NYRCR Plan (note: project numbering is used for location purposes and does not indicate prioritization). Some projects are not included on the map as they cover a larger geographic area, or require additional analysis and study to determine the appropriate location. When possible, project locations will be specified in the individual project profiles.

**Table 10:** Project list and location key

Key	Category	Project Name	Notes
P1	Proposed	South of Merrick Road Outfall, Bulkhead and Drainage Survey, Inspection, and Check Valve Installation	Not shown, coastline
P2	Proposed	Bulkhead Replacement/Upgrade	Not shown, coastline
P3	Proposed	Sunrise Highway, Merrick Road, and Park Avenue Drainage Improvement Study And Design	
P4	Proposed	Merrick Road Streetlight Retrofits Pilot	
P5	Proposed	Community Assistance Centers and Protecting Critical Community Infrastructure	
P6	Proposed	Wantagh High School County Shelter Resilience Enhancement	
P7	Proposed	Cedar Creek Microgrid Design	
P8	Proposed	Public Communication and Education Gap Analysis	Not shown, Community-wide
P9	Proposed	Business Continuity Program	Not shown, Community-wide
P10	Proposed	Seaford Creek Stormwater System Modeling, Analysis, and Pilot	Not shown, Community-wide
P11	Proposed	South Shore Stormwater System Modeling and Analysis	Not shown, Community-wide
P12	Proposed	Lifeline Corridor Study and Guidelines	
F1	Featured	Sunrise Highway, Merrick Road, and Park Avenue drainage improvements	
F2	Featured	Seaford Road Raising	
F3	Featured	Wantagh Road Raising	
F4	Featured	Wantagh High School and Seaford High School solar power and battery storage	
F5	Featured	Wantagh Library and Seaford Library solar power and battery storage	
F6	Featured	Neighborhood Preservation Guidelines	Not shown, Community-wide
F7	Featured	Marina and Dock Resilience Guidelines	Not shown, coastline
F8	Featured	Home Heating Upgrades	Not shown, Community-wide
F9	Featured	Cedar Creek Hazard Mitigation Strategy	

# Figure 08: Proposed and Featured Projects



### Legend

- NYRCR Boundary
- Proposed Project
- Proposed Project Area
- Featured Project
- Long Island Rail Road
- LIRR Station

Refer to Table 10 for Project list and location key

### Data Sources

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

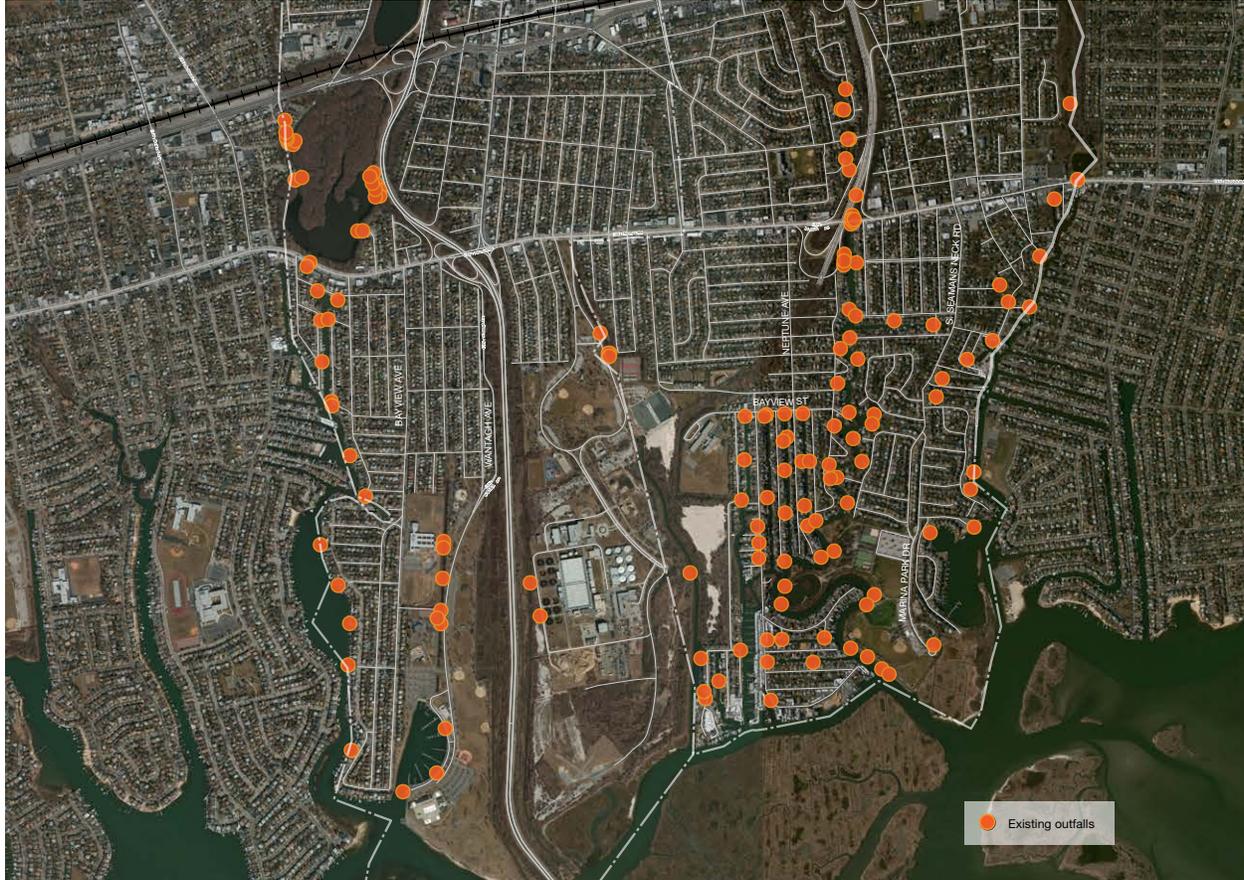


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**Table 10 (cont'd):** Project list and location key

Key	Category	Project Name	Notes
F10		Wastewater Facilities Hardening Study	
F11		Wastewater Facilities Odor Control Improvements	
F12		Comprehensive Gas Station Backup Power	Not shown, Community-wide
F13		Harden The Existing Electrical Grid	Not shown, Community-wide

## Proposed Project: South of Merrick Road Outfall, Bulkhead and Drainage Survey, Inspection, and Check Valve Installation



Drainage outfall locations throughout the Community (source: Arup)

South of Merrick Road, the Community is characterized by peninsulas stretching into the East Bay and South Oyster Bay, with several narrow inlets reaching as far north as Merrick Road. The combination of the area's low elevation and high groundwater table has led to chronic flooding problems.

There are more than 140 drainage outfalls along the coast of Seaford and Wantagh that discharge directly into the East Bay and South Oyster Bay. These outfalls discharge stormwater that has been collected upland from runoff from impervious surfaces, such as building roofs and streets. A check valve at the end of an outfall or within the pipe prevents the flow of tidal or surge water from the bays into the stormwater drainage system. Open or damaged outfalls can be a conduit for floodwater to inundate the drainage system and flood roadways with saltwater upstream of

the outfall. During Superstorm Sandy, several outfalls did not have check valves, or had check valves that were broken or filled with storm debris. This caused the storm surge and high tide to inundate the drainage system, causing surface water to back up and flood. In all, approximate 32% of the Community's land area was inundated.

This project proposes to survey and inspect the location, condition, and elevation of the Community's drainage system south of Merrick Road, including outfalls, related bulkheads, underground pipes, manholes, and catch basins. This information will not only inform the appropriateness of the installation of a check valve, but also help to identify key locations for installation that will be most effective at mitigating flood risk.

The project will include four phases including an area-wide system survey and inspection, an assessment of check valves, check valve installation, and conveyance system cleaning and repair.

**Phase 1:** Area-wide Survey and Inspection will focus on all outfalls along the coastline to determine the condition of each outfall and any associated bulkheads; a survey and inspection of drainage pipes leading upstream from each outfall upland to the next drainage structure; and the size, type, and location of any check valves that may be present.

**Phase 2:** Check Valve Assessment will assess and categorize all outfalls in need of improvements.

**Phase 3:** Check Valve Installation and Conveyance System Cleaning will, based on the Phase 2 analysis, install check valves at locations where valves are determined to be an effective method of flood mitigation and where the most critical need exists.

**Phase 4:** Bulkhead Replacement will replace a limited number of bulkheads owned by the Town of Hempstead (Town) where existing damage would prohibit the upgrade of an outfall and/or installation of check valve.

### Estimated Project Cost

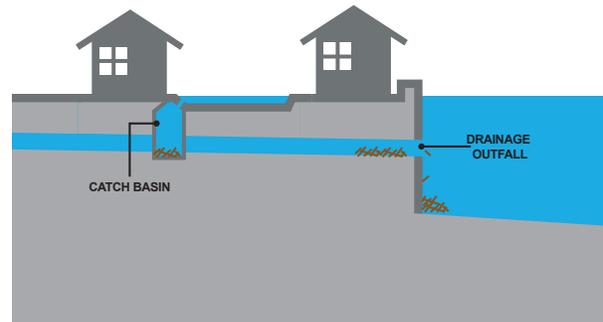
The total estimated project cost is \$2,100,000.

### Project Benefits

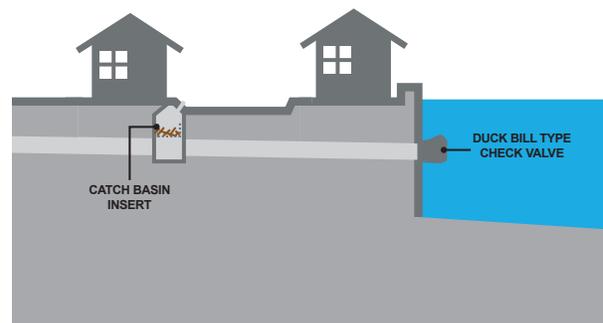
This area is subject to episodic flooding and has a high level of vulnerability during a storm event. The proposed project addresses the Infrastructure Recovery Support Function (RSF) and provides risk reduction and resiliency, economic, environmental, health, and social benefits. The proposed project will increase the efficiency of the existing drainage system by upgrading stormwater defense in critical areas prone to flooding.

### Risk Reduction and Resiliency Benefits

This area is low-lying and is especially vulnerable to extreme rainfall and storm events given its low elevation and proximity to water bodies. This project will reduce risk of repetitive flooding to a broad spectrum of asset classes, including homes, infrastructure, parks, schools, marinas, and fire department



Several outfalls do not have check valves, allowing storm surge, high tide, and debris to enter the drainage system (source: Arup)



A check valve at the end of an outfall prevents storm surge of high tides from entering the drainage system. Catchbasin inserts prevent debris accumulation (source: Arup)

facilities, reducing the risk for damage to community assets along the shoreline and in areas south of Merrick Road. These improvements would offer reliable performance of infrastructure systems on a day-to-day basis by ensuring adequate drainage of rainfall and preventing the back flow of floodwaters during a significant high tide or storm surge. This, in turn, maintains access to the local community, offers greater protection for property in vulnerable areas, and reduces harm done during storm events by lessening the volume and speed of floodwaters should they enter the community.



Existing catch basin (source: Arup)



Example of catch basin insert (source: Fabco Industries)

### Economic Benefits

By reducing the exposure to damages from flooding, this project will reduce the risk for economic loss associated with rebuilding and repair in future flood events. It also reduces the likelihood that businesses in the area would close by removing the risk for flood damage and closure for both personal and public property and assets.

Finally, the project provides an information basis for additional system improvements, better asset management, and reduced future costs associated with deferred maintenance.

### Health and Social Benefits

In addition to reduced flood damages the benefits include reduced delays in accessing schools, parks, and homes during tidal flooding events or after heavy rainfalls. 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 the exposure to contaminated water are reduced.

### Environmental Benefits

Installation of trash/bar screens will have an environmental benefit by reducing the amount of debris reaching water bodies.

### Cost-Benefit Analysis

Stormwater and drainage issues are important to the NYRCR Committee, and Community. There is regular flooding throughout the Community and the current drainage system is directly exposed to both tidal and storm surge inundation events. For a cost of \$2.1M, this investment will bring the current infrastructure systems into a state of good repair and offer another line of defense against flooding from rainfall, storm surge or high tide. It also protects community assets, both public and private, reducing their risk of flooding and reducing the potential costs for rebuilding after a major event. The project will reduce flooding to thousands of homes south of Merrick Road in the Community, as well as several parks, schools, marinas, and fire department facilities.

### **Risk Reduction Analysis**

Because of the low-lying nature of the area and its proximity to water, the risk of flooding is extremely high during regular or extreme weather events. This project will reduce the risk to thousands of homes south of Merrick Road, as well as the following: Mandalay Elementary School, Wantagh Pump Station, Wantagh Park, Cedar Creek Park, Cedar Creek WPCP, Seaford Harbor School, Seaford Fire Station 3, Seamans Neck Park, Cedar Cove Community Center, Seaford Jewish Center, County Police Department Precinct 7, BP Gas Station, Legion Post 1132, Chase Bank, Bethpage Federal Credit, and First Federal Savings Bank. The risk is reduced by closing off outfalls and preventing storm surge waters from inundating the drainage system by blocking access to the system. This, in turn, would prevent waters from a high tide or a surge to back up and flood the drainage system or overwhelm the drainage system and push waters into community areas. By reducing or eliminating this possibility, the community assets in the surrounding area have a higher degree of protection.

### **General Timeframe for Implementation**

24 months

### **Regulatory Requirements Related to Project**

This project will require permits and/or coordination with Nassau County, Town, and New York State Department of Environmental Conservation (NYS DEC). NYS Department of State (NYS DOS) Coastal Consistency approval may be required for any activity within the coastal zone.

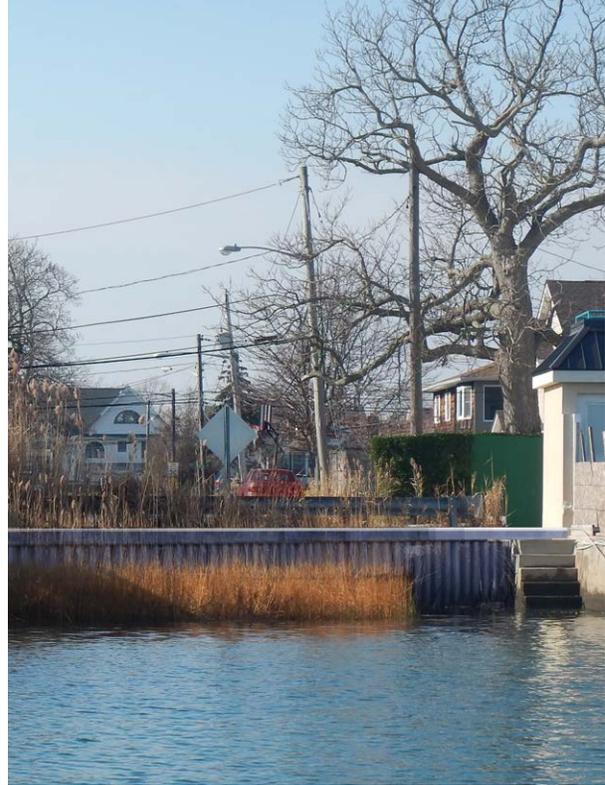
### **Jurisdiction**

This project would fall under the jurisdiction of Nassau County and the Town of Hempstead.

## Proposed Project: Bulkhead Replacement/Upgrade



Existing street end bulkhead (source: Arup)



Artist's impression of raised bulkhead (source: Arup)

Bulkheads are structures designed to prevent erosion along the shoreline. While not necessarily intended to serve a flood protection function, weak links or gaps in the system can increase the impact of coastal flooding in certain areas. Superstorm Sandy caused damage to many bulkheads along the South Shore Estuary and within the Community. Many bulkheads are old and are too low, allowing water to pass over them and contributing to significant flooding to adjoining properties and erosion behind the bulkheads.

This project will fund the inspection and identification of the bulkheads on public property at street ends and canal ends that require replacement and raising. Bulkheads would be replaced at an appropriate height within the recommended Town of Hempstead height range of 6.5 – 7.5 feet above National Geodetic Vertical Datum (NGVD) and with best practice materials, based on site-specific requirements and research into materials that are more resilient to water damage than traditional timber bulkheads.

Potential street/canal ends that have been identified through Committee and municipality discussion include: Almo Place, Ocean Avenue (Naomi, Nimrod), Bayview St (Treasure Lagoon, Silver Lagoon), Riverside Dr, Bayview St (Sunset Lagoon), Ocean Ave (Angler, Widgeon), and Naomi St.

### Estimated Project Cost

The total estimated project cost is \$1,000,000.

### Project Benefits

This project will address the Infrastructure Recovery Support Function (RSF).

### Risk Reduction and Resiliency Benefits

The investment will bring the current infrastructure into a state of good repair and help avoid the cost of erosion that would otherwise occur during rainfall, storm surge, or high tide. This line of defense would



Damaged bulkhead along a canal (source: Arup)

directly protect roads that would allow reliable performance on a day-to-day basis, maintaining access to the local community, providing greater protection for property in vulnerable areas, and reducing harm done during storm events. This protection, in turn, reduces the ongoing need for maintenance and the future cost for road rebuilding and repair during the natural life cycle of the asset.

### **Economic Benefits**

By reducing the exposure to erosion, this project will reduce the risk for economic loss associated with deterioration and subsequent rebuilding and repair of roadway systems. This project will also heighten property and infrastructure security through the strengthening of the edges of the built environment along canals and waterways.

### **Environmental Benefits**

An environmental benefit will also be realized by reducing erosion and sedimentation that has been observed to occur with older bulkheads.

### **Cost-Benefit Analysis**

The reconstruction of the bulkheads will reduce erosion and potential damage to important community assets by having higher and stronger barriers at street ends or along public properties.

### **Risk Reduction Analysis**

The project reduces the risk of the deterioration of roadways within the community, which will, in turn, protect access to many essential community assets such as: Treasure Island Marina, Seaford Harbor Marine, Seaford Marine, South Bay Boat Haulers, Four Corners Marina, Seaford Harbor School, and Seaford Fire Station 3. By maintaining a state of good repair, these facilities will be more likely to survive intact during a major storm event.

### **General Timeframe for Implementation**

Two months

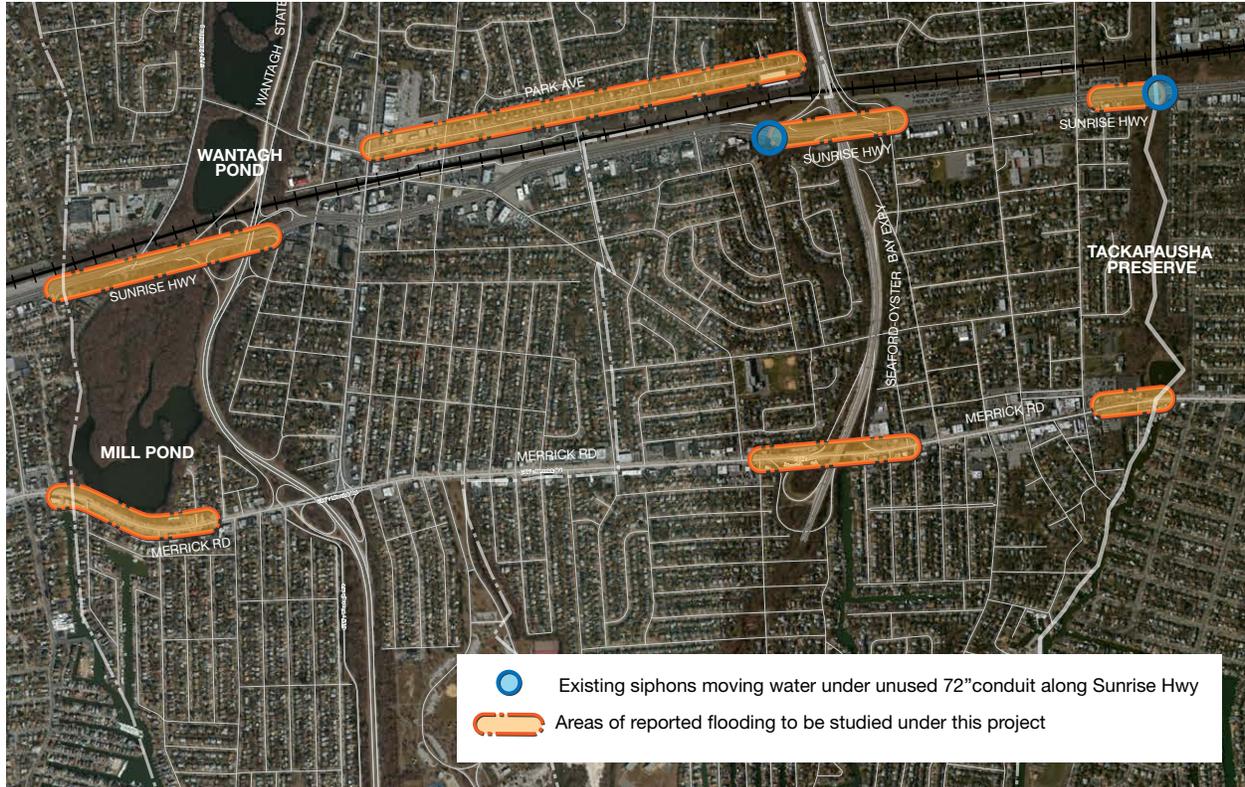
### **Regulatory Requirements Related to Project**

This project will require permits and/or coordination with the Town of Hempstead and New York State Department of Environmental Conservation (NYS DEC). This will also involve the U.S. Army Corps of Engineers and Coastal Zone Management (CZM) consistency concurrence (NYS Department of State).

### **Jurisdiction**

The Town of Hempstead has jurisdiction over bulkheads located on town owned property.

## Proposed Project: Sunrise Highway, Merrick Road, and Park Avenue Drainage Improvement Study and Design



Existing siphons and areas of reported flooding along Sunrise Highway, Merrick Road, Park Avenue (source: Arup)

Several major and critical roads have been identified as having flooded during Superstorm Sandy and/or Hurricane Irene. These areas have been identified as Sunrise Highway at Wantagh State Parkway, Merrick Road at Mill Pond Park, Merrick Road at Wantagh State Parkway, Merrick Road at Seaford Oyster Bay Expressway, and Park Avenue by Fire Station #1 and West Seamans Neck Road. Flooding of these major transportation and evacuation routes impeded the evacuation and access to emergency facilities, as well as putting critical facilities, such as Wantagh Fire Station #1 on Park Avenue and the Long Island Rail Road (LIRR) substation by the Wantagh station by Oakland Avenue, at risk of flooding.

This project will study and design the improvements that are necessary to improve stormwater management and drainage at these particular locations. The areas along Sunrise Highway and Merrick Road coincide with the locations of several ponds that likely contribute to the flooding. The study will analyze

the condition of all local ponds (Mill Pond, Wantagh Pond, Seaman Pond and Tackapausha Pond) and the potential to improve storage capabilities. In order to drain the ponds north of Sunrise Highway, Nassau County has indicated that siphons are used to move water under the 72 in. conduit that runs underneath Sunrise Highway. A siphon study will be part of the study to analyze the drainage and storage potential of the ponds. Siphons exist under Sunrise Highway at Seamans Creek and under Sunrise Highway at Tackapausha Preserve.

Once the likely improvements have been identified, the project will proceed into the design of the drainage improvements. The design will consider and incorporate green infrastructure solutions, like bio-swales or permeable pavement, to address drainage issues where possible.

### Estimated Project Cost

The total estimated project cost is \$1,200,000.

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will improve access to critical assets and facilities during storms and improve access for fast and safe evacuation. It will also minimize road congestion, which, in turn, affects travel times and vehicle operating costs.

### Risk Reduction and Resiliency Benefits

By diverting or delaying stormwater from entering the drainage system, green infrastructure will protect community assets, homes, and businesses from flooding. Improved drainage will reduce ponding and other localized effects that occur during regular, non-catastrophic rain events. By reducing the amount of standing water on roadways, improved drainage makes vehicle operation safer during all types of inclement weather. It also lengthens the life span of the asset by reducing erosion associated with episodic or catastrophic flood events.

### Economic Resiliency

By reducing the exposure to damages from flooding, this project 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 with road closure, which would affect access to businesses in the area.

### Health and Social Benefits

During major storms, improved drainage will increase the amount of time that roads are available to emergency services at the storm's outset and can return a flooded road to service more quickly, allowing for more rapid response after a storm event.

### Environmental Benefits

The co-benefits of the project for the local environment include groundwater recharging, pollutant reduction in bays and wetlands, aesthetics, air quality improvements, and shade and cooling on hot

days. Improvement plans for the ponds will likely include habitat restoration and enhancing the health and vitality of the natural area around the ponds.

### Cost-Benefit Analysis

This investment will bring the current infrastructure systems into a state of good repair and offer another line of defense against flooding from rainfall, storm surge or high tide. This line of defense would directly protect roads that would allow reliable performance on a day-to-day basis maintaining access to the local community, greater protection for property in vulnerable areas, and the reduction in harm done during storm events. It also establishes healthier and more productive natural areas, which, in turn, protect the community assets in the surrounding areas, while also filtering and removing potential pollutants that would otherwise intrude in the bays and waterways further downstream.

### Risk Reduction Analysis

This project would reduce the risk of flooding along major transportation and evacuation routes, including Sunrise Highway at Wantagh State Parkway, Merrick Road at Mill Pond Park, Merrick Rd at Wantagh State Parkway, Merrick Rd at Seaford Oyster Bay Expressway, and Park Avenue by the Fire Station and West Seamans Neck Road.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

This project may require approval by New York State Department of Transportation (NYS DOT), Nassau County and the Town of Hempstead. This may also involve the U.S. Army Corps of Engineers and Coastal Zone Management (CZM) consistency concurrence (NYS Department of State).

### Jurisdiction

This project would fall under the jurisdiction of NYS Department of Transportation, Nassau County, and the Town of Hempstead.

## Proposed Project: Merrick Road Streetlight Retrofits Pilot



Artist's impression of Merrick Road with new high-efficiency LED street lights powered by solar panels, underground power lines, and additional tree planting (source: Arup)

Committee Members and Community residents reported that a lack of street illumination following Superstorm Sandy was a safety hazard because it was difficult to navigate at night and made the neighborhood feel unsafe - they described a "Wild West" feeling. First responders were negatively impacted, as recovery work was limited to daylight hours.

Having select local roads lit with independently powered streetlights will provide a lighted pathway for evacuation and increase the safety and security of these streets for access after a power outage, especially for pedestrians.

This project will install high-efficiency LED street lights powered by solar panels with battery backup on existing utility poles along Merrick Road. If this pilot is successful, more lights could be retrofitted onto Merrick Road or other local roads. If future undergrounding



Existing condition along Merrick Road (source: Arup)

of utility lines occurs and new separate streetlights are installed, the new streetlights could be reused in other parts of the Community.

Backup batteries for these units can typically store enough energy to function for three days – about the amount of time the electric distribution system took to be fully restored after Superstorm Sandy.

### Estimated Project Cost

The total estimated project cost is \$1,100,000.

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will improve public safety at night for emergency responders, officials, residents, and businesses who may require access to shelter, supplies, or assistance after a storm event – be it a hurricane, wind storm or major rainfall.

### Health and Social Benefits

With solar back up, nighttime movement of emergency responders, officials, or local residents is possible in a safe manner. 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 economy recovery.

If areas were illuminated after storm events and thus more accessible for patrols and monitoring, another major potential benefit would be the confidence local residents would have knowing their property would be secured when the storm passed, and thus allowing them to evacuate before a storm.

### Cost-Benefit Analysis

The issue of street lighting, public safety, and mobility after both storm events was often cited as a significant concern and a contributing factor for some members of households remaining in place and disregarding the order to evacuate. This investment has a significant return on the public safety of the area

where these streetlights are located and allows for the protection of key asset classes including housing, public facilities, and infrastructure. The project will allow for emergency responders to move to the necessary locations at night quickly and safely.

### Risk Reduction Analysis

This project will reduce risk to the population by improving public safety and by securing access to evacuation routes and community facilities during and after a storm. If it also lowers the number of people who choose not to heed warnings or evacuation orders in an effort to secure their private property, it reduces the number of people in high risk areas during a major storm event.

### General Timeframe for Implementation

10 months

### Regulatory Requirements Related to Project

This project will require permits and/or coordination with Nassau County and the Town of Hempstead.

### Jurisdiction

The utility poles to be retrofitted may fall under the jurisdiction of Nassau County, PSEG and potentially private telephone companies.

## Proposed Project: Community Assistance Centers and Protecting Critical Community Infrastructure



A artist's impression of interiors retrofit of Seaford Library to function as a Community Assistance Center (charging stations and emergency alert monitors) (source: Arup)

During Superstorm Sandy and other storms, there was a lack of clarity on where to go for information, comfort, and relief services. At the Public Engagement Events, residents expressed frustration with the lack of information on how and where to go for help. Major concerns cited included safety, displacement from homes, lack of access to potable drinking water, communication access, social isolation, and limited access to food resources. As a result, a number of needs have been identified to enable the community to recover after a storm, including being better prepared by having more information after storms; having access to computers, internet and cellphones; and having stockpiles of supplies.

This project proposes to establish three Community Assistance Centers (CAC), across Seaford and Wantagh, as places that provide information to residents before storms or disasters, and resources, information and comfort after storms. Proposed locations are the Seaford Library, Wantagh Library, and Seaford High School - all chosen because of their respective community familiarity, their locations

on or near County Evacuation Roads or key local streets, their locations in moderate or no-risk areas, and the fact they suffered no damage during the recent storms.

This project also proposes to reinforce the Seaford Fire Department facility with backup power generation. While the Seaford Fire Department will not act as a CAC, it is a critical community asset that needs the additional protection from power failure.

This project would include an assessment of the current requirements at each location (three proposed CACs and the Seaford Fire Department) followed by the installation of an emergency backup natural gas generator, additional electrical outlets, wireless internet access, FM radio receiver, and electronic dynamic notification signage at each location. The electronic dynamic signage will provide status updates in the community and updates from the Emergency Management Office and will list resources available at the Center. Finally, this project proposes the employment of a Local Disaster Recovery Manager working 20 hours per week for



Existing interiors of Seaford Library (source: Arup)



Existing interiors of Seaford Library (source: Arup)

the Community. When combined with other South Shore NYRCR Communities, this could result in 1-2 full time staff. Responsibilities of the Local Disaster Recovery Manager are defined as:

- Developing a Resiliency Education Program that provides preparedness training sessions geared towards businesses and community members.
- Providing workshops to the Community on what types of assistance will and will not be available in pre-disaster, during-disaster, and post-disaster phases.
- Ensuring all information is accessible and understandable to all residents (including bilingual materials).
- Establishing a list of resiliency features and supplies to be added to Community Assistance Centers and implement them (not funded by project), such as toiletries, water, food, etc.

### Estimated Project Cost

The total estimated project cost is \$2,100,000.

### Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services Recovery Support Functions (RSF), will enhance preparedness/resilience to natural disasters; enhance community structure, place-making, and cohesiveness; and create a redundant power supply at critical assets.

### Health and Social Benefits

A major concern cited at NYRCR Committee meetings and at Public Engagement Events was the need to access information, connect with family and friends, and learn more about what was happening in the region. The CACs address urgent human needs before and after a major storm event by providing information and communication support within local areas. The CACs will provide educational benefit by increasing the Community's access to and understanding of emergency procedures and responsibilities. After an event, each CAC will directly provide basic health and social services including food, water, electricity, and communication services. Dynamic signage will provide updates and information, keeping the public informed. In turn, people whose basic needs are met will be able to turn their attention to recovery, using information and communication



Wantagh Library (source: Arup)

services available at the Centers to minimize time needed to rebound from a storm event. This project will also reduce the risk of power loss by equipping each Center with a backup generator.

### Cost-Benefit Analysis

The funding for this project provides an opportunity for people who are in the local areas – storm affected or not – to learn how to be prepared and to respond before, during and after an event. Greater preparedness levels, as well as a response plan for every home or business in the local area, ensures people are ready to act when a storm is approaching. The Community becomes more informed by the community education program supported by the CAC. This helps build support for following directives from local, state, and federal officials. It also reduces the possibility that local community members won't know what to do and, therefore, stay behind by default.

After an event, it provides a one-stop-shop to get information about important matters such as the suitability of drinking water, the availability of power, where to find fuel, or where to obtain food or medicines. This helps protect the health and well being of people in the area after an event occurs. In the case of a significant event like Superstorm Sandy it also

offers the opportunity for local community needs to be communicated to support functions outside the area in the event clean drinking water, medications, food, or other supplies are needed locally. The centers can tabulate the needs and issue requests for support to the local areas.

This project cultivates preparedness in the local area and allows for a more informed population to take appropriate actions before and after events occur.

### Risk Reduction Analysis

The educational programming associated with this project reduces risks by creating a more educated and prepared public. Preparation before a crisis occurs means more people will know what to do when a crisis occurs. On a day-to-day level, the CAC can distribute information about preparedness.

### General Timeframe for Implementation

8 months

### Regulatory Requirements Related to Project

This project may require approval and/or permits with the Town of Hempstead buildings department.

### Jurisdiction

The jurisdiction will depend on what locations are selected.

## Proposed Project: Wantagh High School County Shelter Resilience Enhancement

Wantagh High School is an emergency shelter in Nassau County, designated by Nassau County Office of Emergency Management (OEM) and the American Red Cross. According to the Nassau County Office of Emergency Management (OEM), however, the school was not listed as an emergency shelter during Superstorm Sandy because the school lacked a backup power generator. Since the school did not lose power after Superstorm Sandy, it was used as a warming center for the community.

This project proposes the installation of air conditioning and heating for the cafeteria or any other rooms used as the shelter locations and the installation of a permanent natural gas-powered generator that will provide backup power to the heating, cooling, lighting, and other critical needs for the shelter locations within the school in the event of a local power failure.

This project would also include a comprehensive assessment of Wantagh High School to identify the additional resources and mitigations necessary to ensure that it is accessible and able to accommodate the needs of community members during a future event. The assessment will determine the wind resistant design level and appropriate mitigation measures, including hardening, shutters and hurricane clips, and then seek funding for any mitigation required. In order to ensure the shelter can be reached during an emergency, the study will identify how two points of access will be maintained.

### Estimated Project Cost

The total estimated project cost is \$1,900,000.

### Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services Recovery Support Functions (RSF), will provide the necessary infrastructure to elevate the shelters ability to open to the Community in the event of a disaster.

### Health and Social Benefits

Having a place to go is essential if members of the local community are told to leave. While many may have family or friends in areas outside of the risk zone, many may not want, or be able, to leave. The elderly,

low income, or disabled may not have the ability or the means to leave the area. At Public Engagement Events it was reported that many people simply don't want to leave because they want to be as close to home as possible. Providing an emergency shelter in the area offers the benefit of more people complying with suggested or mandatory evacuations.

### Cost-Benefit Analysis

The benefits of providing an assured power source for a shelter in order to meet the demands of the community and emergency management personnel during and after a hurricane will provide options to allow people to leave their home or business and follow advisory or mandatory evacuation orders.

### Risk Reduction Analysis

Providing safe haven during a storm gives the local community an option to evacuate to a point of safety within their local community. This is especially important for those who cannot leave or do not feel comfortable leaving the area. This removes people from hazardout areas until it is safe for them to return. The shelter increases the likelihood of compliance with evacuation orders and this compliance, in turn, removes people from harm's way.

### General Timeframe for Implementation

5 months

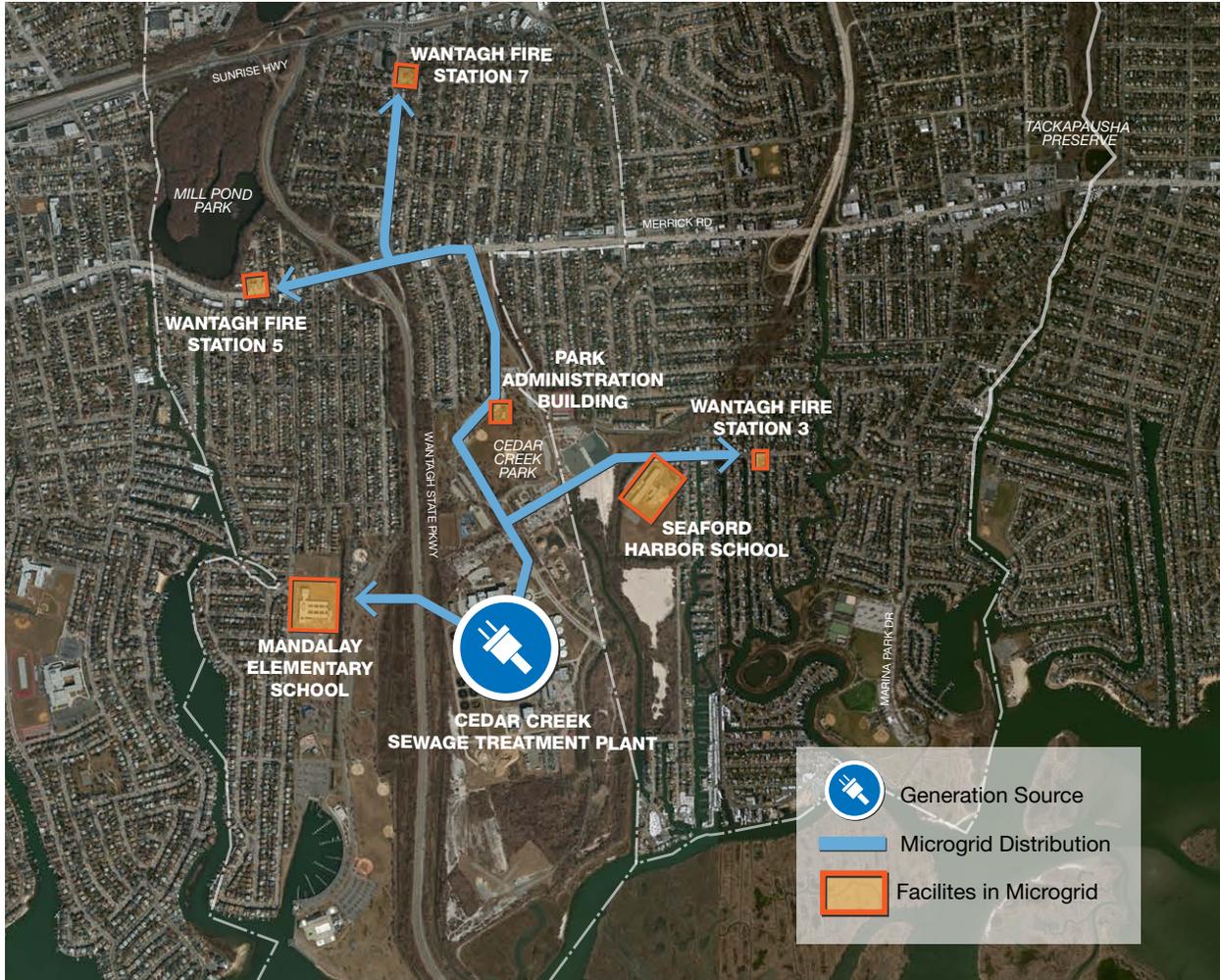
### Regulatory Requirements Related to Project

Construction and building permits may be required from the Town of Hempstead Department of Buildings. Approvals will be required from the Wantagh School District and American Red Cross.

### Jurisdiction

Wantagh School District has jurisdiction over Wantagh High School.

## Proposed Project: Cedar Creek Microgrid Design



The Cedar Creek microgrid service areas (source: Arup)

During Superstorm Sandy, heavy winds and flooding caused damage to the power distribution network, causing a loss of power at critical facilities, such as the Seaford Harbor School, which lacked sufficient backup power and were not able to operate. Seaford Harbor School was the only school to lose power in the area. Many schools in Seaford and Wantagh were opened after Superstorm Sandy as warming centers and charging centers for the local community to combat the lack of heating due to power loss in the local area. This could not be done for Seaford Harbor School, forcing local residents to go elsewhere for warming or charging necessary equipment.

The New York State Energy Research and Development Authority (NYSERDA) is currently conducting a feasibility study of a microgrid at the Cedar Creek Water Pollution Control Plant (WPCP) to serve critical facilities near the WPCP. A microgrid is a small-scale version of the centralized electricity system, which includes all the necessary components to operate in isolation from the centralized grid with local generation of power. Microgrids can operate independently of the centralized grid, or can be connected to the grid allowing the import or export of electricity. The Cedar Creek WPCP current recovers biogas as a form of alternative energy to power some

of the plant. The feasibility study would determine if there is spare capacity at the treatment plant to feed critical facilities close to the plant. Based on the results of the feasibility study, this project would fund the detailed design of the microgrid and build upon the current efforts of NYSERDA. Some of the critical facilities that are under consideration to be fed by the microgrid include the Mandalay School, Seaford Harbor School, Wantagh Fire Station 3, and Wantagh Fire Administration Building.

### Estimated Project Cost

The total estimated project cost is \$500,000.

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will provide resilience to the energy network with the ability to operate in isolation, therefore ensuring the operation of critical facilities even during catastrophic events.

### Risk Reduction and Resiliency Benefits

Power loss was a key issue that affected all recovery support functions in Seaford and Wantagh, as well as the ability of people to return to their homes and businesses after Superstorm Sandy. This investment will bring resilience to the current energy infrastructure system and will reduce the risk of failure for key critical facilities, such as the Seaford Harbor School and the Wantagh Fire Station, in the event the larger power grid fails. Seaford Harbor School was identified repeatedly during committee and community meetings as an important community asset that needed additional resiliency measures. These improvements would offer reliable performance of key critical facilities during storm events, allowing for their use to support local community needs.

### Health and Social Benefits

For seniors in the Cedar Cove area, it provides a potentially closer warming and charging center after a storm event.

### Cost-Benefit Analysis

Superstorm Sandy illustrated the negative impacts that power outages can have on emergency response and community support by interrupting facility function. Connecting critical and locally significant facilities by a microgrid network, at a total design cost of \$500,000, leverages current work being undertaken by NYSERDA and offers the next step in the process to provide reliable power to important Community assets that most directly benefit the residents that neighbor them.

### Risk Reduction Analysis

By providing redundant power and on-site generation, operation of the WPCP can be maintained during a power outage and ensure that pollutants and untreated sewage will not be discharged into the Bay. Risk of power failure to other critical Community facilities within the microgrid will also be reduced and these facilities could be used to benefit the surrounding community in recovery.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

This project will require permits and/or coordination with Nassau County and the Town of Hempstead.

### Jurisdiction

Nassau County has jurisdiction of Cedar Creek WPCP. Coordination may be necessary with PSEG, who has responsibility for the electrical network.

## 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 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



Determining additional needs in emergency communication and education requires engagement with the Community (source: Arup)

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 NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, and Massapequa. The approximate total project cost is \$100,000, with an estimated contribution of \$20,000 by the NYRCR Seaford/Wantagh 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 and 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.

#### 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.

#### 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.

### 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

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 focus 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 Project

No regulatory requirements related to this project.

### Jurisdiction

Nassau County Office of Emergency Management

## Proposed Project: Business Continuity Program

According to data from the U.S. Small Business Administration (SBA) 95 Community businesses, with 288 employees, applied for disaster management assistance after Superstorm Sandy.<sup>86</sup> These applications verified a total of \$3.4 million in real property damage, \$1.5 million of machinery damage, an inventory loss of \$1.2 million, and a leaseholder improvement loss of \$952,077. Of these applications only 25 (26.3%) were approved, for an amount totaling slightly less than \$1.5 million, roughly one fifth of the \$7.1 million in verified damage assistance applied for by the Community.

According to testimony received from Committee Co-Chairs and Members, and business owners at the Public Engagement Events, some businesses did not back up their files or were not able to access and forward phone calls in order to quickly return to business activities after Superstorm Sandy. This led to loss of business. Challenges in the aftermath of the storm, such as the lack of power and communications, displaced workers, fuel shortages, and a lack of access to inventory compounded recovery challenges. Initial repairs were paid for out-of-pocket using credit cards, family loans, and personal savings. Operating losses have continued long after reopening due to loss of customers and the fact that many businesses have not completed repairs. Because of delays in access to recovery funding, most businesses are not incorporating flood mitigation elements into their repairs.



An outdoor Seaford eatery re-opens after 8 months (source: Wantagh Seaford Patch)

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 a 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 NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, and Massapequas. The approximate total project cost is \$200,000, with an estimated contribution of \$40,000 by the NYRCR Seaford/Wantagh Community.

## Project Benefits

This project addresses the Economic Recovery Support Function (RSF). Given this is a shared project across multiple NYRCR areas, the Seaford and Wantagh 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

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 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, allowing businesses to recover more quickly after a major storm event. This project offers access to necessary supplies and services, keeps workers employed, and help sustains the local economy.

Furthermore, 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 Project

No regulatory requirements related to this project

### Jurisdiction

None



This project would involve the following five stages:

- **Phase 1:** An initial phase of key stakeholder meetings, including Nassau County, the Town of Hempstead, New York State 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 is 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 would be carried out 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.
- **Phase 5:** Identify appropriate green infrastructure pilot projects (implementation is not included in this project).

### Estimated Project Cost

The total estimated project cost is \$950,000.

### Project Benefits

This project addresses the Natural Resources and Infrastructure Recovery Support Functions (RSF).

#### Risk Reduction and Resiliency Benefits

Modeling and analysis is necessary to help identify and 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 with 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

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 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 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 to 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.<sup>84</sup>

### Cost-Benefit Analysis

With the ability to identify 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 develop and identify 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

12 months

### Regulatory Requirements Related to 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: South Shore Stormwater System Modeling and Analysis



Watersheds that encompass NYRCR Baldwin, Bellmore/Merrick, Seaford /Wantagh and Massapequa (source: Arup)

During Hurricane Irene and Superstorm Sandy, the stormwater systems within the NYRCR Communities of Baldwin, Bellmore/Merrick, Seaford/Wantagh, and Massapequa 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, 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 run off 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 areas for project implementation; 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



Visualization of a flooding scenario based on the results of H&H modelling (source: Arup)

Sruvey, 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 Massapequa. The approximate total project cost is \$2,900,000, with an estimated contribution of \$725,000 by the NYRCR Seaford/Wantagh Community.

### Project Benefits

This project addresses the Natural Resources and Infrastructure Recovery Support Functions (RSF).

### Risk Reduction and Resiliency Benefits

Modeling and analysis is necessary to help identify and 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

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 to 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.<sup>85</sup>

### Cost-Benefit Analysis

With the ability to identify 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 develop and identify 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 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: Lifeline Corridor Study and Guidelines

Throughout the NYRCR Communities of Baldwin, Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequa, 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.

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.

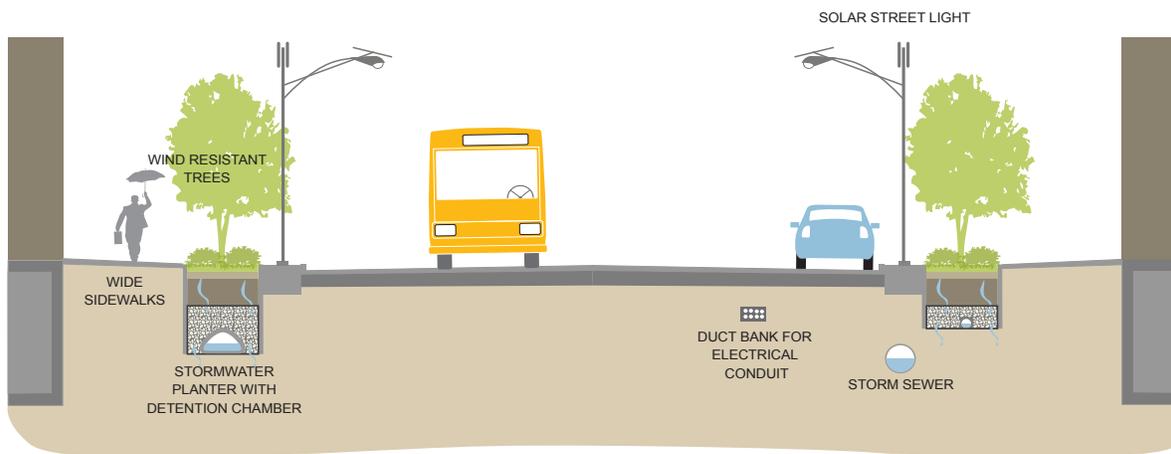
This study seeks to accomplish the following:

- 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.



Cross section of a resilient streetscape (source: Arup)

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 Merrick Road Streetlight Retrofits Pilot”.

### Estimated Project Cost

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

#### 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.



Fallen tree blocking road access from Irene  
(source:Wantagh Seaford Patch)



Flooding from Irene (source:Wantagh Seaford Patch)

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 drainage 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

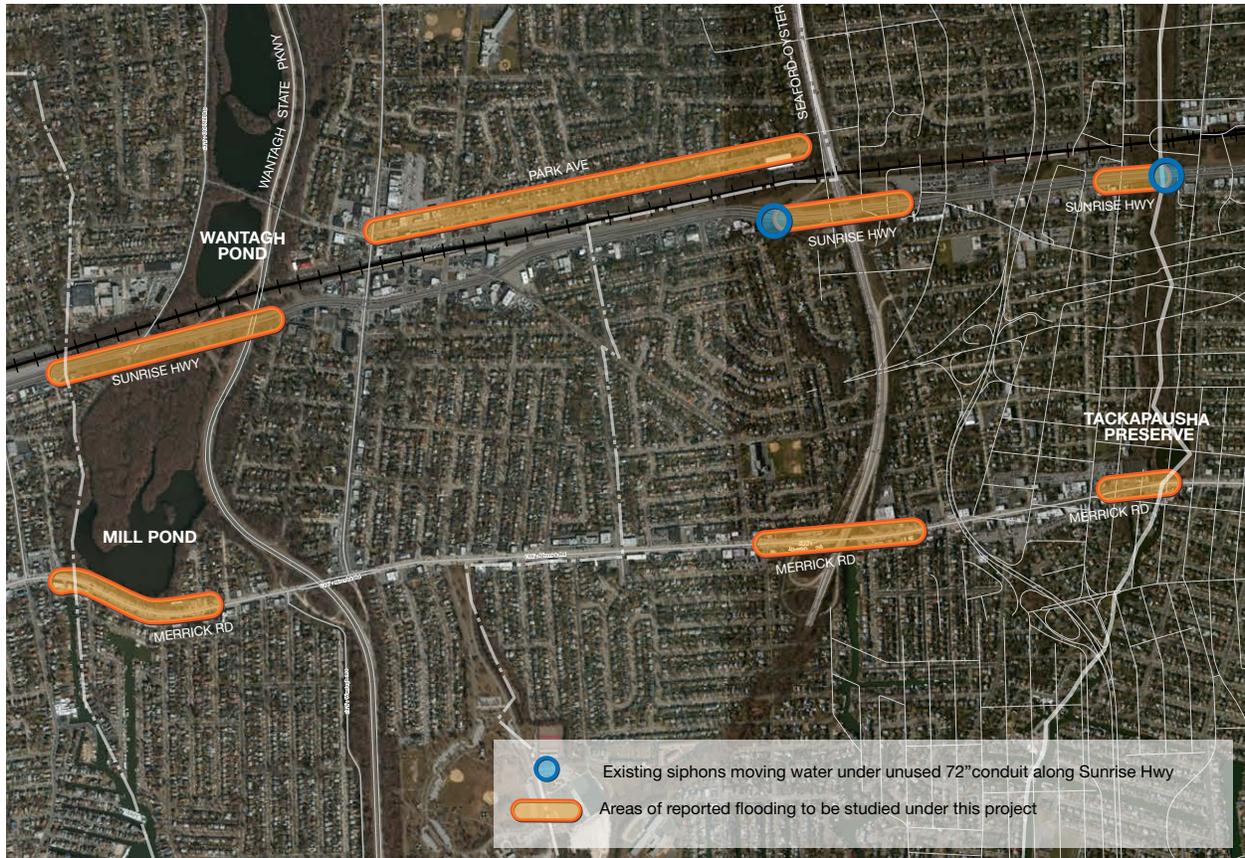
### Regulatory Requirements Related to Project

There are no regulatory requirements related to this project.

### Jurisdiction

NYS Department of Transportation, Nassau County and Town of Hempstead.

## Featured Project: Sunrise Highway, Merrick Road and Park Avenue Drainage Improvements



Existing siphons and areas of reported flooding along Sunrise Highway, Merrick Road, Park Avenue (source: Arup)

Several major and critical roads have been identified as streets that flooded during Superstorm Sandy and/or Hurricane Irene. This project would fund the implementation of the design that is accomplished by Proposed Project “Sunrise Highway, Merrick Road and Park Avenue drainage improvement study and design.” This project would improve stormwater management and drainage along: Sunrise Highway at Wantagh State Parkway, Merrick Road by Mill Pond Park, Merrick Road at Wantagh State Parkway, Merrick Road at Seaford-Oyster Bay Expressway, and Park Avenue at the Fire Station.

### Estimated Project Cost

The proposed project cost would be determined by the findings of the first phase of the project (see Proposed Project Sunrise Highway, Merrick Road, and Park Avenue drainage improvement study and design).

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will improve access to critical assets and facilities during storms and improve access for fast and safe evacuation.

### Risk Reduction and Resiliency Benefits

Improved drainage will also reduce ponding and other localized effects that occur during regular, non-catastrophic rain events. By reducing the amount of

standing water on roadways, this project will make vehicle operation safer during all types of inclement weather. 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**

By diverting or delaying stormwater from entering the drainage system, green infrastructure will protect community assets, homes, and businesses from flooding. It also provides multiple benefits including groundwater recharging, pollutant reduction in bays and wetlands, aesthetics, air quality improvements, and shade and cooling on hot days.

### **Cost-Benefit Analysis**

This investment will bring the current infrastructure systems into a state of good repair and offer another line of defense against flooding from rainfall, storm surge, or high tide. This line of defense would directly protect roads that would allow reliable performance on a day-to-day basis and maintain access to the local community, affording greater protection for property in vulnerable areas and reducing the harm caused by storm events.

### **Risk Reduction Analysis**

This project would reduce the risk of flooding along major transportation and evacuation routes, including Sunrise Highway at Wantagh State Parkway, Merrick Road at Mill Pond Park, Merrick Road at Wantagh State Parkway, Merrick Road at Seaford-Oyster Bay Expressway, and Park Avenue by the Fire Station and West Seamans Neck Road.

### **General Timeframe for implementation**

Project implementation is to be determined based on completion of Proposed Project Sunrise Highway, Merrick Road, and Park Avenue drainage improvement study and design.

### **Regulatory Requirements Related to Project**

This project may require approval by New York State Department of Transportation (NYS DOT), Nassau County and the Town of Hempstead. This may also involve the U.S. Army Corps of Engineers and Coastal Zone Management (CZM) consistency concurrence (NYS DOS).

### **Jurisdiction**

This project would fall under the jurisdiction of NYS DOT, Nassau County, and the Town of Hempstead.

## Featured Project: Seaford Road Raising

In the Hamlet of Seaford, roadways such as Narragansett Avenue, Miami Street, Anchor Place, Plover Place, Widgeon Place, and Anglers Place continually experience tidal flooding during monthly episodes of high tides. Development in the neighborhood began before any flood insurance study or the establishment of flood zones and the roadways were established to accommodate lower elevations of houses. Large portions of these streets are below elevation 4.0 National Geodetic Vertical Datum (NGVD), making them susceptible to varying levels of tidal flooding from the adjacent Seaman's Creek, Treasure Lagoon, and James Creek.

Tidal flooding occurs on a monthly basis and there is significant flooding when major rainstorms coincide with a high tide, often resulting in roadway closures. This flooding often results in a disruption in road-based service, including curbside garbage collection, mail service, and school buses. Residents' lives are affected when one has to plan departing and returning to home around the tide schedule. There is also a threat to safety, especially for the elderly and disabled population who may need access to doctors, hospitals, and/or pharmacies. The continual flooding has directly affected the quality of life throughout the community and property values have suffered. Tidal flooding often causes damage to vehicles parked and/or driven through the salt water that is flooding the roadway. Residents also experience damage to private property including, but not limited to, their lawns and landscaping.

To help alleviate some of the above issues, the proposed project will include the reconstruction of approximately 3,800 ft. of local residential streets that are currently experiencing tidal flooding. Sections of these existing roadways are currently at or below elevation 3.75 NGVD, resulting in flooding during monthly episodes of high tides. The intent of the project is to reconstruct the roads with a minimum gutter elevation of 5.50 NGVD, making them significantly less susceptible to routine tidal flooding and elevating up to 2,160 ft. of roadway that is currently below National Weather Service (NWS) Moderate Coastal Flood Elevation. The project design will include the replacement of concrete curbs and sidewalks, improvements to the storm drain system, installation of check valves, and reconstruction of street end



Seaford roads that experience regular tidal flooding (source: Arup)

bulkheads as necessary. The raising of the roadway grade will have a direct impact on the frontages of private properties throughout the project area. The design will include the re-grading and installation of storm drain inlets on private property. This will necessitate preparation and approval of work easements from the individual property owners affected.

### Estimated Project Cost

The total estimated project cost is \$2,500,000.

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will reduce the risk of flooding to community transportation infrastructure.

### **Risk Reduction and Resiliency Benefits**

The drainage system improvements will reduce both episodic flooding and the likelihood of road flooding during a storm event. The reduced risk extends to private property in the neighborhood, reducing the likelihood of recurring property damage to buildings and vehicles, as well as the risk of injury due to the collapse of buildings.

### **Health and Social Benefits**

Maintaining clear roads will improve access for residents who may require shelter, supplies, or assistance. It will also improve access for recovery crews and equipment following a storm, improving emergency response times and accelerating local recovery. Economic benefits will include improvements in local property values.

### **Costs-Benefit Analysis**

This investment will bring existing infrastructure into a state of good repair and offer another line of defense against flooding from rainfall, storm surge, and high tide. This line of defense would directly protect roads, helping to provide reliable performance on a day-to-day basis. This project would improve access to transportation routes for the local community, provide greater protection for property in vulnerable areas, and reduce the harm caused by storm events.

### **Risk Reduction Analysis**

The roadway reconstruction in this flood-prone neighborhood will reduce the risk of flooding to community transportation infrastructure, namely Narragansett Avenue, Miami Street, Anchor Place, Plover Place, Widgeon Place, and Anglers Place. In addition, the drainage system improvements will extend benefits to private property in the neighborhood, reducing the

likelihood of recurring property damage to buildings and vehicles, as well as the risk of injury due to the collapse of buildings.

### **General Timeframe for Implementation**

12 months

### **Regulatory Requirements Related to Project**

NYS Department of Environmental Conservation (NYS DEC), NYS Department of State (NYS DOS) and/or U.S. Army Corps of Engineer permits and Coastal Zone Management (CZM) consistency concurrence (NYS DOS) will be applied for as necessary.

### **Jurisdiction**

The NYS Department of Transportation and the Town of Hempstead have jurisdiction.

## Featured Project: Wantagh Road Raising

In the Hamlet of Wantagh roads including Mermaid Avenue, Canal Place, Wantagh Avenue, and Mariners Avenue have been continually experiencing tidal flooding during monthly episodes of high tides. FEMA has subsequently rated this area as an area subject to inundation by the 1-percent-annual-chance flood event.

Large portions of these streets are below elevation 4.25 National Geodetic Vertical Datum (NGVD), making them susceptible to varying levels of tidal flooding from the adjacent Bellmore Creek, and Jackson Creek.

Tidal flooding occurs on a monthly basis, and there is significant flooding when major rainstorms coincide with a high tide, often resulting in roadway closures. There is a disruption of services that rely on the roads, including curbside garbage collection, mail service, and school bus services. Residents' lives are affected when one has to plan departing and returning to home around the tide schedule, and there is a threat to safety, especially for the elderly and disabled population of the area who may need access to doctors, hospitals, and/or pharmacies. Continual flooding has directly affected the quality of life throughout the community and property values have suffered.

To help alleviate some of the above issues, the proposed project will include the reconstruction of approximately 6,050 ft. of local residential streets that are currently experiencing tidal flooding. Sections of these existing roadways are currently at or below elevation 4.25 NGVD, resulting in flooding during monthly episodes of high tides. The intent of the project is to reconstruct the roads with a minimum gutter elevation of 5.50 NGVD, preventing routine tidal flooding and elevating up to 325 foot of roadway that is currently below FEMA's 10-year still water level of approximately 5.75 NGVD.

The project design will include the replacement of concrete curbs and sidewalks, improvements to the storm drain system, installation of check valves, and the reconstruction of street end bulkheads to minimum elevations of 7.0 NGVD to decrease storm wave energy. The raising of the roadway grade will have a direct impact on the frontages of the private properties throughout the project area. The design will include the re-grading and installation of storm



Roads in Wantagh the experience regular tidal flooding(source: Arup)

drain inlets on private property. This will necessitate preparation and approval of Work Easements from the individual property owners affected.

### Estimated Project Cost

The total estimated project cost is \$3,250,000.

### Project Benefits

This project, which addresses the Infrastructure Recovery Support Function (RSF), will reduce the risk of flooding on Wantagh roads.

### Risk Reduction and Resiliency Benefits

The drainage system improvements will reduce both episodic flooding and the likelihood of road flooding during a storm event. The reduced risk extends to private property in the neighborhood, reducing the likelihood of recurring property damage to buildings and vehicles, as well as the risk of injury due to the collapse of buildings.

## Health and Social Benefits

Maintaining clear roads will improve access for residents who may require shelter, supplies, or assistance. It will also improve access for recovery crews and equipment following a storm, improving emergency response times and accelerating local recovery. Economic benefits will include improvements in local property values.

## Cost-Benefit Analysis

This investment will bring existing infrastructure into a state of good repair and offer another line of defense against flooding from rainfall, storm surge, and high tide. This line of defense would directly protect roads, help to provide reliable performance on a day-to-day basis, maintain access to transportation routes for the local community, protect for property in vulnerable areas, and reduce the harm caused by storm events.

## Risk Reduction Analysis

The roadway reconstruction in this flood-prone neighborhood will reduce the risk of flooding to community transportation infrastructure, namely Mermaid Avenue, Canal Place, Wantagh Avenue, and Mariners Avenue. In addition, the drainage system improvements will extend benefits to private property in the neighborhood, reducing the likelihood of recurring property damage to buildings and vehicles or the risk of injury due to the collapse of buildings.

## General Timeframe for Implementation

12 months

## Regulatory Requirements Related to Project

NYS Department of Environmental Conservation (NYS DEC), NYS Department of State (NYS DOS) and/or U.S. Army Corps of Engineers permits and Coastal Zone Management (CZM) consistency concurrence (NYS DOS) will be applied for as necessary.

## Jurisdiction

The NYS Department of Transportation, Nassau County, and the Town of Hempstead have jurisdiction.

## Featured Project: Wantagh High School and Seaford High School Solar Power and Battery Storage

There are Proposed Projects that identify Wantagh High School and Seaford High School as critical community facilities that could be enhanced to provide heat, food, shelter, supplies, and other resources to aid residents during and after disasters. Wantagh High School is designated an emergency shelter by the Nassau County Office of Emergency Management (OEM) and American Red Cross (ARC) and Seaford High School is one of three proposed Community Assistance Centers (CAC) in the Community.

This project would seek funding through the New York State “K-Solar” initiative to expand the current array of solar panels at both schools and add battery backup for storage. This project would replace the installation of permanent backup generators as part of the Proposed Projects. Solar panels with battery storage will not only provide emergency backup power, but could also provide clean, renewable energy on a daily basis and even feed electricity back into the grid.

### Estimated Project Cost

The total estimated project cost is \$8,700,000.

### Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services Recovery Support Functions (RSF), will provide these key community facilities with a renewable energy source that can provide backup power during times of power failures.

### Risk Reduction and Resiliency Benefits

This project will reduce the risk of power loss at these critical community facilities during and after a major storm event. As a designated County shelter (Wantagh High School) and a Community Assistance Center (Seaford High School), these facilities address urgent human needs before, during, and after a major storm event.

### Economic Benefits

By providing a generating capacity and battery backup, the facilities each have the potential to feed the power grid with additional clean, renewable power. By being self-reliant on a daily basis during

normal conditions, expenditure on electricity costs will be reduced. The use of solar panels will support sustainability goals by reducing demand on fossil fuel use for electricity generation.

### Cost-Benefit Analysis

This investment will bring resilience to the current energy infrastructure system and offer a line of defense against power failures. These improvements would make these key critical facilities more resilient during storm events. This system can also operate on a regular basis, unlike an emergency back-up generator.

### Risk Reduction Analysis

The improvements to electricity generating capacity and storage at Wantagh High School and Seaford High School will reduce the risk of power loss at these critical community facilities during and after a major storm event, allowing them to serve their purpose as a designated County Shelter or Community Assistance Center, respectfully.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

Construction and building permits may be required from the Town of Hempstead Department of Buildings.

### Jurisdiction

Town of Hempstead

## Featured Project: Wantagh Library and Seaford Library Solar Power and Battery Storage

The “Community Assistance Centers and protecting critical Community infrastructure” Proposed Project identifies Wantagh Library and Seaford Library as critical community facilities that may be enhanced to provide information, heat, and charging resources to aid residents after disasters. The libraries are two of the three proposed Community Assistance Centers (CAC).

This project would seek funding through the New York State “Community Solar NY” initiative to install solar panels and battery backup for storage at both libraries. If funding is available, this project would replace the installation of permanent backup generators as part of the Proposed Projects. Solar panels with battery storage will not only provide emergency backup power, but could also provide clean, renewable energy on a daily basis and even feed electricity back into the grid.

### Estimated Project Cost

The total estimated project cost is \$1,000,000.

### Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services Recovery Support Functions (RSF), will reduce the risk of power loss at these critical community facilities during and after a major storm event.

### Risk Reduction and Resiliency Benefits

As Community Assistance Centers, these facilities would address urgent human needs before and after a major storm event.

### Economic Benefits

By providing a generating capacity and battery backup, the facilities each have the potential to feed the power grid with additional power. By being self-reliant even on a daily basis during normal conditions, expenditure on electricity costs will be reduced. The use of solar panels will support sustainability goals by reducing demand on fossil fuel use for electricity generation.

### Cost-Benefit Analysis

This investment will bring resilience to the current energy infrastructure system and offer a line of defense against power failures. These improvements would make these key critical facilities more resilient to storm events. This system can also operate on a regular basis, unlike an emergency back-up generator.

### Risk Reduction Analysis

The improvements to electricity generating capacity and storage at Wantagh Library and Seaford Library will reduce the risk of power loss at these critical community facilities during and after a major storm event.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

Construction and building permits may be required from the Town of Hempstead Department of Buildings.

### Jurisdiction

Town of Hempstead

## Featured Project: Neighborhood Preservation Guidelines

Superstorm Sandy resulted in heavy damage to 2,413 housing units in Seaford and Wantagh. Across the Community approximately 5,000 parcels of land are within flood-risk areas. Only 41% of all parcels in Seaford and Wantagh are located outside of the risk zones.

Residential neighborhoods in Seaford and Wantagh are characterized by one- and two-story homes with traditional architecture and consistent setbacks from the street. Since Superstorm Sandy, however, many local residents have opted to raise their homes, often as high as 12 ft. from their previous elevation, to protect from future flooding events and/or to meet FEMA guidelines.

While raising homes provides substantial protection from storm surges or other flooding, substantial changes in building height can disrupt existing neighborhood character and impact close neighbors. It is likely that residents will continue to raise homes for years to come.

This project includes the creation of new residential design guidelines for improving architectural quality and functionality in newly raised homes. Topics covered may include garage and parking design, stairway and entryway design, mechanical systems, home appliance placement, structural reinforcement, materials recommendations, and resilient landscapes.

### Estimated Project Cost

The total estimated project cost is \$100,000.

### Project Benefits

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

### Health and Social Benefits

This project will assist individual initiatives to respond to flood risk by providing education and information about important issues to building owners regarding the protection of their property. Guidelines will also convey the Community's expectations for safety, quality, and character to which all developments should abide. By guiding development, the Community's character will be maintained while risks to property

are reduced. This will aid in public safety and the long-term economic resiliency of the Community, as building owners will rely less on emergency response efforts or recovery resources.

### Cost-Benefit Analysis

The design guidelines represent a small investment with multiple returns by changing how buildings are designed, constructed, and rehabilitated in Seaford and Wantagh. While they represent a small up front planning cost, the guidelines can ultimately be integrated into normal maintenance as well as disaster recovery processes. These changes can ensure that neighborhood transformations that occur while residents rebuild their homes do not negatively impact the Community and instead enhance these areas. In turn, Seaford and Wantagh will remain an attractive place to live and tax revenues can be maintained to support town and school district functions.

### Risk Reduction Analysis

Risk to property and population will be reduced as residential flood protection projects are designed in accordance with guidelines that identify issues and address the safety and quality expectations of the Community.

### General Timeframe for Implementation

Six months



A raised house in Seaford (source: Arup)

### **Regulatory Requirements Related to Project**

As the output of this featured project is a set of guidelines, there is no regulatory approval required. However, the adoption of the guidelines may require changes to local building, planning and zoning codes.

### **Jurisdiction**

The Town of Hempstead has jurisdiction over building planning and zoning codes.

## Featured Project: Marina and Dock Resilience Guidelines

During Superstorm Sandy many boats, either at marinas or private docks, were damaged and, in some cases, caused damage to neighboring properties.

Currently the Town of Hempstead Conservation and Waterways Department provides staff to consult with marina owners, but best practices have not yet been documented or presented in guidelines. This project involves the creation of marina and dock resiliency guidelines to assist boat owners in preparation for future storms and to teach them how they will be impacted by sea level rise.

The guidelines will include the following:

- Marina and dock design and site location, such as recommended pile height, in-water structures, bulkheads, and dredging;
- Emergency preparedness education, such as methods for protecting human life, reducing damage to boats, reducing damage to property that cannot be relocated, and restoring normal business operations;
- Evacuation procedures, such as procedures for securing vessels; and
- Climate adaptation education, such as storm frequency and severity awareness, tracking wave height and frequency and identifying infrastructure exposed to storm events.



A boat set adrift by Sandy and ended up on land (source: Wantagh Seaford Patch)

Insurance companies will be invited to assist in the creation of the guidelines to reduce conflicts and confusion around best practices and proper procedures.

### Estimated Project Cost

The total estimated project cost is \$100,000.

### Project Benefits

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

### Environmental Benefits

This project will reduce the chance that boats, fuel tanks, and other debris will be released from marinas during high wind and high water events. The project's education component will increase the knowledge and awareness of people responsible for managing their facilities and property. Recovery time will be reduced following a storm event, as there will be a lower likelihood of damage and pollution.

### Cost-Benefit Analysis

The design guidelines represent a small investment with multiple returns by providing set guidelines for how marinas and docks are designed and sited and the proper procedures for securing boats in advance.



Home damage from Superstorm Sandy (source: Urbanomics)

of a storm. With a small up front planning cost, the guidelines can be integrated into normal maintenance as well as emergency preparedness processes. The benefits of reduced damage to personal property during a storm event justify the costs of this project.

### **Risk Reduction Analysis**

This project will reduce physical damage from boats, fuel tanks, and other debris let loose from marinas during high wind and high water events. Environmental risk of contamination from damaged boats and fuel tanks will be reduced.

### **General Timeframe for Implementation**

12 months

### **Regulatory Requirements Related to Project**

There are no regulatory requirements related to this project.

### **Jurisdiction**

The Town of Hempstead currently works with marina and boat owners to give guidance. Coordination will likely be required with other stakeholders, such as insurance companies and contractors, to create guidelines.

## Featured Project: Home Heating Upgrades

Nassau County staff, NYRCR Planning Committee Members, and Community residents all reported that residential fuel oil tanks used for home heating were a major source of damage during Superstorm Sandy when many of these tanks were torn from their bases and became floating hazards to the Community. Additionally, heating oil spilled from the compromised tanks left homes and businesses permanently damaged and negatively impacted the local environment. Some residents have stated that they still experience the smell of heating oil fumes in their homes. Although existing fuel oil tanks are required to be strapped down, compliance with this regulation has been difficult for Nassau County to enforce due to the added homeowner expense.

This project will develop policy and an incentive program to convert home heating oil to natural gas in extreme and high risk areas. A guideline for all structures in extreme, high, and moderate risk areas to convert to natural gas and/or other heat/hot water supply will be established. The cost for this project includes the administrative cost for changing applicable planning and building regulations and establishing a budget for the incentive program.

### Estimated Project Cost

The total estimated project cost is \$50,000.

### Project Benefits

This project addresses the Housing, Economic, and Natural and Cultural Resources Recovery Support Functions (RSF).

#### Economic Benefits

The economic benefits include the reduced costs of repairs to damages that oil tanks may cause as floating debris in future storms and the costs of cleaning up contamination that displaced fuel from the tanks may leave behind after flood waters retreat.

#### Environmental Benefits

The primary benefit of this project is reducing the risk of contamination and damage to homes, businesses, parks and open spaces, waterways, and infrastructure in flood risk areas.



After Superstorm Sandy, some oil tanks were washed into the bay (source: Operation SPLASH)

The benefits also include reduced contamination of waterways, groundwater systems and surrounding ecosystems caused by displaced fuel and the potential damage to flora and fauna caused by floating tanks. Additionally, conversion to natural gas and solar heating systems will reduce the Community's emission of greenhouse gases. The Community will benefit through improved local air quality and reduce its contribution to climate change through reduced air pollution.

#### Health and Social Benefits

Community residents and businesses will experience public health benefits from breathing cleaner air, both in homes and in the Community.

### Cost-Benefit Analysis

By developing design guidelines and a phasing policy that includes incentives for local homeowners, this program can, over time, introduce natural gas and phase out home heating oil. This would allow areas to evolve and convert to a fuel supply that carries fewer risks for polluting homes, businesses, and the environment.

### **Risk Reduction Analysis**

This project will reduce the environmental risk and the risk of damage to properties from fuel oil spills or floating oil tanks that have become unearthed or dislodged. Less floating debris will contribute to an overall reduction in roadway blockages and can improve accessibility during and immediately after a major storm event. Additionally, conversion to alternative heating sources will reduce the risk of homes being without heat during and after major winter storms, as fuel delivery may be stalled if roads are sufficiently incapacitated.

### **General Timeframe for Implementation**

Three months

### **Regulatory Requirements Related to Project**

This project will require coordination with National Grid, which has provision over the local public natural gas system. Regulatory changes will need to be made to the Town of Hempstead's building and zoning code.

### **Jurisdiction**

The Town of Hempstead has jurisdiction over building and zoning codes.

## Featured Project: Cedar Creek Hazard Mitigation Strategy

The Cedar Creek Water Pollution Control Plant (WPCP) is one of the two major wastewater treatment plants in Nassau County and, according to the Nassau County Department of Public Works (DPW), each plant processes approximately 58 million gallons of sewage per day. Combined, the two plants treat 85% of the sewage collected within Nassau County. During Superstorm Sandy the other major treatment plant, the Bay Park Wastewater Plant, was damaged and released 200,000 million gallons of raw sewage into the Bay.

The Cedar Creek WPCP remained in operation throughout the storm but the system was overwhelmed, causing damage to internal and external equipment and materials, as well as clogging up systems with debris, which required extensive cleaning. The WPCP is a critical community asset that must be kept operational at all times, including during major storm events, to prevent untreated sewage from overflowing into the streets and affecting community facilities, businesses, and homes.

The Nassau County DPW Sandy Damage Assessment Report of the Cedar Creek WPCP recommended the development of a hazard mitigation strategy to provide a level of protection against future storm events. This project is included in the County's capital plan for Cedar Creek WPCP. Strategic planning and redesigning for flood protection will safeguard the assets and will allow the plant to continue servicing the Community.

### Estimated Project Cost

The cost of this project is included in the Nassau County Capital Budget.

### Project Benefits

This project addresses the Infrastructure Health and Social Services Recovery Support Functions (RSF).

### Risk Reduction and Resiliency Benefits

This project would identify what hazardous events could seriously compromise the plant and what mitigation strategies are necessary. This would reduce the risk of catastrophic loss of key sewage treatment assets due to any type of hazardous event. The loss of the plant's treatment capacity during an event

could cause major environmental damage to the surrounding area and potentially lead to back up of sewage, which could expose residents to health risks. Any damage caused could require substantial capital investment and time to replace. The reduction of sewage overflow risk to roadways in the Community would improve the reliance of access to and from key assets.

### Environmental Benefits

In addition, neighboring residents would be better protected from localized effluent leaks and local bays, marshes, wetlands, and wildlife would be better protected from contamination hazards.

### Cost-Benefit Analysis

The strategy represents a small investment with multiple returns in ensuring that this critical infrastructure asset is prepared for future hazardous events.

### Risk Reduction Analysis

The project would reduce flood and damage risk to a key asset in the community, and potentially to assets located nearby, depending on the extent of proposed mitigations.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

There are no regulatory requirements related to the project.

### Jurisdiction

The Cedar Creek WPCP falls under Nassau County Department for Public Works jurisdiction.

## Featured Project: Wastewater Facilities Hardening Study

The Cedar Creek Water Pollution Control Plant (WPCP) is one of the two major wastewater treatment plants in Nassau County and, according to the Nassau County Department of Public Works, each plant processes approximately 58 million gallons of sewage per day. Combined, the two plants treat 85% of the sewage collected within Nassau County. During Superstorm Sandy the other major treatment plant, the Bay Park Wastewater Plant, was damaged and released 200,000 million gallons of raw sewage into the Bay.

The Cedar Creek WPCP remained in operation throughout the storm, but the system was overwhelmed, causing damage to internal and external equipment and materials, as well as clogging up systems with debris, which required extensive cleaning. The WPCP is a critical community asset that must be kept operational at all times, including during major storm events, to prevent untreated sewage from overflowing into the streets and affecting community facilities, businesses and homes.

This project would fund a study to identify ways to harden wastewater treatment facilities to prevent further damage from inundation. This project is included in the Nassau County Capital Budget.

### Estimated Project Cost

The cost of this project is included in the Nassau County Capital Budget.

### Project Benefits

This project addresses the Infrastructure Recovery Support Function (RSF).

### Risk Reduction and Resiliency Benefits

This project would identify what hazardous events could seriously compromise the plant and what mitigation strategies are necessary. This would reduce the risk of catastrophic loss of key sewage treatment assets due to any type of hazardous event. The loss of the plant's treatment capacity during an event could cause major environmental damage to the surrounding area and potentially lead to back up of sewage, which could expose residents to health risks. Any damage caused could require substantial capital investment and time to replace. The reduction of

sewage overflow risk to roadways in the Community would improve the reliance of access to and from key assets.

In addition, neighboring residents would be better protected from localized effluent leaks and local bays, marshes, wetlands, and wildlife would be better protected from contamination hazards.

### Cost-Benefit Analysis

The strategy represents a small investment with multiple returns in ensuring that this critical infrastructure asset is protected against future damage from inundation.

### Risk Reduction Analysis

This project would reduce the risk of physical damage from flooding and prevent loss of function of the Cedar Creek WPCP, which would not only affect the immediate surrounding area, but the wider region that relies on the treatment plant to treat sewage.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

There are no regulatory requirements related to this project.

### Jurisdiction

The Cedar Creek WPCP falls under Nassau County Department for Public Works jurisdiction.

## Featured Project: Wastewater Facilities Odor Control Improvements

The Cedar Creek Water Pollution Control Plant (WPCP) is one of the two major wastewater treatment plants in Nassau County and, according to the Nassau County Department of Public Works, each plant processes approximately 58 million gallons of sewage per day. Combined, the two plants treat 85% of the sewage collected within Nassau County. The Cedar Creek WPCP is located in Wantagh at the southern end of the Cedar Creek Park. The park and plant are surrounded by several residential neighborhoods and schools, including Seaford Harbor and the Seaford Harbor School. Local residents have made complaints over the years about the odors emanating from the treatment facility.

Nassau County currently has a project underway to implement improvements to the odor control systems at the Cedar Creek WPCP. The new odor control system will use a biofilter with wood chips to consume the odors. These improvements will help mitigate nuisance to the Community.

### Estimated Project Cost

The Nassau County Legislature has authorized \$24,767,700 for odor control improvements at the Cedar Creek Water Treatment facility.

### Project Benefits

This project addresses the Infrastructure Recovery Support Function (RSF).

### Economic Benefits

The new technology will eliminate the need for chemicals, which will lower operating costs. In addition there will be an environmental benefit of not having to handle a waste stream of these chemicals.

### Health and Social Benefits

The odor control system improvements will reduce the odor nuisance to the surrounding neighborhood and in turn provide a health and social benefit to the Community.

### Cost-Benefit Analysis

This project would benefit Seaford and Wantagh neighborhoods adjacent to the WPCP by reducing odors from the plant. Economic benefit will be realized as property values increase due to the increased attractiveness of living in the area.

### Risk Reduction Analysis

This project will reduce the risk of odors emanating from Cedar Creek, which was identified as an important project for the local community. The project offers a community benefit by reducing the nuisance caused by having a regional treatment facility within the local community.

### General Timeframe for Implementation

12 months

### Regulatory Requirements Related to Project

Work is already underway on this project and appropriate approvals have been received.

### Jurisdiction

Cedar Creek WPCP falls under Nassau County Department for Public Works jurisdiction.

## Featured Project: Comprehensive Gas Station Backup Power

Under the new State law, most gas stations in the downstate region located within 0.5 miles of highway exits or hurricane evacuation routes are required to have a transfer switch installed by April 1, 2014, and to deploy and install a generator within 24 hours of losing power during a fuel supply or energy emergency. In addition, chains of gas stations must have a transfer switch installed at an additional 30% of their stations under the same criteria by August 1, 2015. The state will provide grants of up to \$13,000 per station to assist with these critical upgrades.

### Estimated Project Cost

The State has made more than \$25 million available to gas stations to meet the State requirement.

### Project Benefits

This project addresses the Infrastructure Recovery Support Function (RSF).

### Risk Reduction and Resiliency Benefits

This project will reduce risk to the population by helping to ensure that people have access to motor vehicle fuel for mobility needs or for powering home generators. This will benefit evacuation before a storm, ensure availability of supply during a storm, and enable faster recovery following a storm. Access to reliable and local vehicle fuel is also important to allow emergency responders, clean up crews, building inspectors, and the many other functions of recovery to move into and throughout a local area after a major storm.

### Cost-Benefit Analysis

This investment will bring resilience to the current fuel supply and offer a line of defense against power failures. These improvements would offer reliable performance of key critical facilities during storm events.

### Risk Reduction Analysis

This project will reduce the risk the population and combat the risk of decreased mobility or access to necessary places or supplies by ensuring that people have access to motor vehicle fuel.

### General Timeframe for Implementation

8 months

### Regulatory Requirements Related to Project

This project is a regulatory requirement from the State of New York.

### Jurisdiction

The Town of Hempstead has permitting authority for site improvements on private property. Individual gas station owners and owners of gas station chains will be responsible for implementing this project.

## Featured Project: Harden The Existing Electrical Grid

New York State will utilize federal funds to harden the State's existing electrical grid, including the relocation of approximately 500 miles of overhead primary wire underground, elevating vulnerable substations, expanding tree trimming, raising power lines above newly elevated homes, and creating a new outage response system. With the new PSEG Long Island in place in 2014, the State can take its ongoing fixes even further to protect Long Island against future storms. Some of the projects that will be funded through this program may directly affect NYRCR Seaford/Wantagh Community (Community). While it is currently unknown what those projects will be, it was clear from Community input that the existing electrical grid is in great need of updating and modernization to make the system more resilient to future storms. This Featured Project is not seeking funding from the NYRCR Program but is reported here as this project is important to the Community.

### Estimated Project Cost

The State has allocated over \$1 billion for this effort.

### Project Benefits

This project addresses the Infrastructure Recovery Support Function (RSF).

### Risk Reduction and Resiliency Benefits

The improvements to the electrical grid will provide energy security and resilience for the Community by removing obstacles and threats to the distribution system. 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 will have a better chance of retaining electricity and remaining habitable, reducing the need for immediate emergency response or shelter. Tree trimming and raising lines will reduce the risk of electrical fires.

### Cost-Benefit Analysis

This investment will bring resilience to the current energy infrastructure system and offer a line of defense against power failures. These improvements would help ensure more reliable service to the entire Community.

### Risk Reduction Analysis

The improvements to the electrical grid will provide energy security and resilience for the Community by removing obstacles and threats to the distribution system, as well as reducing risk to the population by maintaining access to evacuation routes and critical community facilities, and for emergency response vehicles.

### General timeframe for implementation

8 months

### Regulatory Requirements Related to Project

This project will require permits and/or coordination with Nassau County, the Town of Hempstead, and PSEG. This may also involve the U.S. Army Corps of Engineers and Coastal Zone Management (CZM) consistency concurrence (NYS Department of State).

### Jurisdiction

PSEG is the electrical utility that services Seaford and Wantagh.



## Section V: Additional Materials

The following section provides supporting information for the NYRCR Seaford/Wantagh Plan (NYRCR Plan):

**A. Additional Resilience Recommendations:** This section describes resiliency projects and actions for NYRCR Seaford/Wantagh (Community) that the NYRCR Planning Committee (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 Planning 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 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 11:** Additional resiliency recommendations

Strategy	Project Name	Short Description	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan	Implement a comprehensive green infrastructure plan, and create a shared ownership model for stormwater and wastewater infrastructure.	Y
Improve Transportation and Communication Connectivity	Seaford Harbor School Access Road	Expand road networks to alleviate traffic bottlenecks that may hinder evacuation and police/fire department efforts during emergencies. Construct additional access road for the Seaford Harbor School.	N
Invest in Resilience Enhancements for Critical Assets	Park Avenue Electrical Substation Resilience Enhancement	Substation within LIRR right of way was said to have flooded during Sandy. Assess condition of substation and evaluate critical elevations versus flood heights and determine source of flooding in order to install appropriate flood protection measure.	N
Invest in Resilience Enhancements for Critical Assets	Living Shoreline Demonstration Project	Rehabilitate any shoreline that was damaged by Sandy with demonstration project of living shoreline techniques which can be used to minimize coastal erosion and maintain coastal process. Potential locations include Wantagh Park and Seamans Neck Park.	N
Invest in Resilience Enhancements for Critical Assets	Smart Switches and Meters	Conduct analysis to identify critical areas of the grid. Install additional underground smart switches and automated overhead switches in areas with overhead lines to provide greater grid flexibility and the ability to isolate areas where a power failure has occurred.	N
Improve Stormwater Management and Drainage Systems	Stormwater Management Districts	A study of the feasibility of establishing stormwater management districts needs to be undertaken in an effort to address overlapping municipal authorities and the implementation of EPA Phase II Final Rule permit conditions.	Y
Establish Policies for Resilient Planning and Design	Commercial District Masterplan	Engage in a comprehensive masterplanning process for the community's commercial districts (Sunrise Hwy, Wantagh Ave, and Merrick Rd) to encourage economic development and incorporate resilient design strategies such as green infrastructure. Work with business owners to establish business improvement districts in the Community and invest in public space and pedestrian improvements.	N
Improve Transportation and Communication Connectivity	Bikeway Access	Parkland in Wantagh and Seaford is typically accessed by car. The Long Island REDC awarded a project in 2013 where Nassau County proposes to initiate planning and design and begin the first phase of construction for a cost-effective, connected set of pathways for residents and tourists to walk, bike and ride from the LI Sound to the Great South Bay and Jones Beach, providing more options for north-south transportation and transforming the network of existing bike paths into safe transit corridors.	Y

**Table 11 (cont'd):** Additional resiliency recommendations

Strategy	Project Name	Short Description	Regional
Invest in Resilience Enhancements for Critical Assets	Emergency Animal Shelters	Work with local businesses and organizations to establish a refuge center for animals or families with animals to go during a storm emergency or flood event. Establish a program to recruit volunteers, such as local veterinary professionals or students, to help manage the facility	N
Establish Policies for Resilient Planning and Design	Energy Retrofit Program	Establish a home retrofit program and create contractor incentives for energy efficient buildings. Equipping homes and buildings with better insulation, high performance windows, and energy-efficient mechanical systems can significantly reduce energy demand, saving money and reducing strain on the power grid.	N
Establish Policies for Resilient Planning and Design	Residential Generator Rebate Program	Provide rebates for residential installations of natural gas or propane generators. As part of a homeowner energy education program, provide residents with an overview of the permitting process and outline regulatory requirements for installation.	N
Improve Transportation and Communication Connectivity	Post-Storm Housing Database	Create a county-wide database of rental units and hotel rooms available to accommodate displaced residents. Use the database to identify areas with low vacancy and guide real estate development to bring more rental units online.	Y
Establish Policies for Resilient Planning and Design	Distributed Generation Incentives	Create incentives to support the installation of small-scale energy generation and energy storage technologies, such as solar photovoltaics and cogeneration plants. Appropriate technologies should be determined by building size and use type, and incentives should be structured accordingly.	N
Improve Transportation and Communication Connectivity	Emergency Parking	Designate areas outside of flood zones to be used for off-street parking during flood events.	N
Improve Transportation and Communication Connectivity	Emergency Cellphone Service	Work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power.	N

## B. Master Table of Projects

**Table 12:** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems	South of Merrick Road Outfall, Bulkhead and Drainage Survey, Inspection, and Check Valve Installation	Survey and inspect the location, condition, and elevation of the Community's drainage system south of Merrick Road, including outfalls, bulkheads, underground pipes, manholes and catch basins. Install check valves in key locations.	Proposed	\$2,100,000	N
Invest in Resilience Enhancements for Critical Assets	Bulkhead Replacement/ Upgrade	Inspect and identify bulkheads on public property at street ends and canal ends that require replacement and raising. Replace bulkheads at an appropriate height and with materials that are more resilient to erosion and wind.	Proposed	\$1,000,000	N
Improve Stormwater Management and Drainage Systems	Sunrise Highway, Merrick Road, Park Ave Drainage Improvement Study and Design	Study and design improvements for stormwater management and drainage systems located along Sunrise Highway, Merrick Road, and Park Avenue. This study should consider the potential for green infrastructure solutions to meet the assessed needs. Once the likely improvements have been identified, the project will proceed into the design of the drainage improvements.	Proposed	\$1,200,000	N
Improve Transportation and Communication Connectivity	Merrick Road Streetlight Retrofits Project	Install LED streetlights with solar PV and battery backup on existing utility poles. Merrick Road will serve as the pilot for the streetlight retrofit project.	Proposed	\$1,100,000	N
Establish Programs and Policies for Resilient Planning and Design	Community Assistance Centers and Protecting Critical Community Infrastructure	Create network of Community Assistance Centers and complimentary public education program. Community Assistance Centers are places for residents to find emergency preparedness information. During and after a storm, these centers would become a place to collect and distribute resources, charge cell phones, and access the internet.	Proposed	\$2,100,000	N

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Wantagh High School County Shelter Resilience Enhancement	Wantagh High School is a designated emergency shelter for Nassau County. Ensure that Wantagh High School is accessible and able to accommodate the needs of community members by assessing the facility's utilization during Sandy and implementing resiliency upgrades, including backup generation capacity.	Proposed	\$1,900,000	N
Invest in Resilience Enhancements for Critical Assets	Cedar Creek Microgrid Design	The New York State Energy Research and Development Authority (NYSERDA) is currently conducting a feasibility study for a microgrid at the Cedar Creek WPCP and surrounding facilities. Based on the results of this study, this project would fund the design of the microgrid system.	Proposed	\$500,000	N
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. Establish a communication network that more effectively links government services with non-profit and other emergency recovery organizations. Create a physical	Proposed	\$20,000	Y
Establish Programs and Policies for Resilient Planning and Design	Business continuity program	Create a business continuity program that provides small businesses with a roadmap for continuing operations under adverse conditions.	Proposed	\$40,000	Y
Improve Stormwater Management and Drainage Systems	Seaford Creek Stormwater System Modeling, Analysis, and Pilot	Conduct Hydrologic and Hydraulic study of Seaford Creek watershed to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	Proposed	\$950,000	N

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems	South Shore Stormwater System Modeling and Analysis	Conduct Hydrologic and Hydraulic study of six South Shore watersheds to determine sources of flooding and excess outfalls. Survey and inspect portions of stormwater drainage system. Identify priority locations for green infrastructure and appropriate installations.	Proposed	\$725,000	Y
Improve Transportation and Communication Connectivity	Lifeline Corridor Study and Guidelines	Study and design for infrastructure improvements along critical roads to maintain access during storm events.	Proposed	\$120,000	Y
Improve Stormwater Management and Drainage Systems	Sunrise Highway, Merrick Road, Park Ave Drainage Improvements	Improve stormwater management and drainage systems located along Sunrise Highway at Wantagh State Parkway, Merrick Road by Mill Pond Park, Wantagh State Parkway, Seaford Oyster Bay Expressway, and Park Avenue. Green infrastructure solutions should be incorporated where possible.	Featured	TBD	N
Improve Transportation and Communication Connectivity	Seaford Road Raising	Rebuild local streets in Seaford at higher elevation to alleviate monthly spring tide flooding.	Featured	\$2,500,000	N
Improve Transportation and Communication Connectivity	Wantagh Road Raising	Rebuild local streets in Wantagh at higher elevation to alleviate monthly spring tide flooding.	Featured	\$3,250,000	N
Invest in Resilience Enhancements for Critical Assets	Wantagh High School and Seaford High School Solar Power and Battery Storage	Seek funding through New York State "K-Solar" Initiative to expand current array of solar panels at both schools and add battery backup for storage.	Featured	\$8,700,000	N
Invest in Resilience Enhancements for Critical Assets	Wantagh Library and Seaford Library Solar Power and Battery Storage	Seek funding through New York State "Community Solar NY" Initiative to install solar PV panels and battery backup for storage.	Featured	\$1,000,000	N

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	Create new residential design guidelines for improving architectural quality and functionality in newly raised homes. Recommend changes to TOH building, planning, and zoning to encourage resilient design.	Featured	\$100,000	N
Establish Programs and Policies for Resilient Planning and Design	Marina and Dock Resilience Guidelines	Develop and adopt new guidelines on the siting and design of new marinas, as well as the reconstruction of existing marinas. Develop emergency preparedness and evacuation procedures for marinas, including uniform procedures for securing vessels.	Featured	\$100,000	N
Establish Programs and Policies for Resilient Planning and Design	Home Heating Upgrades	Amend building and planning regulations to phase out the use of oil fuel tanks south of Merrick Road. This incorporates requirements and enforcement for correct tank anchoring procedures, and incentives for residents to convert to natural gas or other alternative fuel sources.	Featured	\$50,000	N
Invest in Resilience Enhancements for Critical Assets	Cedar Creek Hazard Mitigation Strategy	Develop a hazard mitigation strategy to mitigate damage to the Cedar Creek WPCP from future storm events. Strategic planning and redesign of the facility for flood protection help ensure that the plant will be able to continue operating under adverse conditions.	Featured	Included in Nassau County capital budget	N
Invest in Resilience Enhancements for Critical Assets	Wastewater Facilities Hardening Study	Wastewater facilities must be kept in continuous operation. Identify ways to harden wastewater treatment facilities to prevent further damage from inundation.	Featured	Included in Nassau County capital budget	Y

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Wastewater Facilities Odor Control Improvements	Implement improvements to the odor control systems at the Cedar Creek Water Pollution Control Plant to mitigate community nuisance.	Featured	\$24,767,700 authorized by Nassau County Legislature	Y
Invest in Resilience Enhancements for Critical Assets	Comprehensive Gas Station Backup Power	State mandate to install generators or other provision backup power for gas stations in critical areas to facilitate evacuations and disaster recovery.	Featured	\$25,000,000 made available by New York State	Y
Invest in Resilience Enhancements for Critical Assets	Harden the Electrical Grid	Specific resilience measures including undergrounding overhead primary wire, elevating substations, and creating outage response system.	Featured	Funded by New York State	Y
Improve Stormwater Management and Drainage Systems	Green Infrastructure Plan	Implement a comprehensive green infrastructure plan, and create a shared ownership model for stormwater and wastewater infrastructure.	Additional	N/A	N
Improve Transportation and Communication Connectivity	Seaford Harbor School Access Road	Expand road networks to alleviate traffic bottlenecks that may hinder evacuation and police/fire department efforts during emergencies. Construct additional access road for the Seaford Harbor School.	Additional	N/A	N
Invest in Resilience Enhancements for Critical Assets	Park Avenue Electrical Substation Resilience Enhancement	Substation within LIRR right of way was said to have flooded during Sandy. Assess condition of substation and evaluate critical elevations versus flood heights and determine source of flooding in order to install appropriate flood protection measure.	Additional	N/A	N
Invest in Resilience Enhancements for Critical Assets	Living Shoreline Demonstration Project	Rehabilitate any shoreline that was damaged by Sandy with demonstration project of living shoreline techniques which can be used to minimize coastal erosion and maintain coastal process. Potential locations include Wantagh Park and Seamans Neck Park.	Additional	N/A	N

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Smart Switches and Meters	Conduct analysis to identify critical areas of the grid. Install additional underground smart switches and automated overhead switches in areas with overhead lines to provide greater grid flexibility and the ability to isolate areas where a power failure has occurred.	Additional	N/A	N
Improve Stormwater Management and Drainage Systems	Stormwater Management Districts	A study of the feasibility of establishing stormwater management districts needs to be undertaken in an effort to address overlapping municipal authorities and the implementation of EPA Phase II Final Rule permit conditions.	Additional	N/A	Y
Establish Policies for Resilient Planning and Design	Commercial District Masterplan	Engage in a comprehensive masterplanning process for the community's commercial districts (Sunrise Hwy, Wantagh Ave, and Merrick Rd) to encourage economic development and incorporate resilient design strategies such as green infrastructure. Work with business owners to establish business improvement districts in the Community and invest in public space and pedestrian improvements.	Additional	N/A	N
Improve Transportation and Communication Connectivity	Bikeway Access	Parkland in Wantagh and Seaford is typically accessed by car. The Long Island REDC awarded a project in 2013 where Nassau County proposes to initiate planning and design and begin the first phase of construction for a cost-effective, connected set of pathways for residents and tourists to walk, bike and ride from the LI Sound to the Great South Bay and Jones Beach, providing more options for north-south transportation and transforming the network of existing bike paths into safe transit corridors.	Additional	N/A	Y

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Invest in Resilience Enhancements for Critical Assets	Emergency Animal Shelters	Work with local businesses and organizations to establish a refuge center for animals or families with animals to go during a storm emergency or flood event. Establish a program to recruit volunteers, such as local veterinary professionals or students, to help manage the facility	Additional	N/A	N
Establish Policies for Resilient Planning and Design	Energy Retrofit Program	Establish a home retrofit program and create contractor incentives for energy efficient buildings. Equipping homes and buildings with better insulation, high performance windows, and energy-efficient mechanical systems can significantly reduce energy demand, saving money and reducing strain on the power grid.	Additional	N/A	N
Establish Policies for Resilient Planning and Design	Residential Generator Rebate Program	Provide rebates for residential installations of natural gas or propane generators. As part of a homeowner energy education program, provide residents with an overview of the permitting process and outline regulatory requirements for installation.	Additional	N/A	N
Improve Transportation and Communication Connectivity	Post-Storm Housing Database	Create a county-wide database of rental units and hotel rooms available to accommodate displaced residents. Use the database to identify areas with low vacancy and guide real estate development to bring more rental units online.	Additional	N/A	Y

**Table 12 (cont'd):** Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Policies for Resilient Planning and Design	Distributed Generation Incentives	Create incentives to support the installation of small-scale energy generation and energy storage technologies, such as solar photovoltaics and cogeneration plants. Appropriate technologies should be determined by building size and use type, and incentives should be structured accordingly.	Additional	N/A	N
Improve Transportation and Communication Connectivity	Emergency Parking	Designate areas outside of flood zones to be used for off-street parking during flood events.	Additional	N/A	N
Improve Transportation and Communication Connectivity	Emergency Cellphone Service	Work with local cellular service providers and regulatory agencies to expand service areas and equip cell towers with emergency backup power.	Additional	N/A	N

## C. Public Engagement Process

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

### NYRCR Planning Committee

The Committee dedicated their time and expertise to work closely with the technical Consultant Team and local and State officials to propose projects, plans, and programs that fit Community needs. 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 and were critical to the development of strategies and projects for future implementation.

Generating participation at the Public Engagement Events was a key responsibility of the Planning Committee since they have strong ties to the Community and access to networks of residents and stakeholders. The Planning Committee, with the assistance of the Consultant Team, identified community organizations and individuals that could provide important perspectives and invited their participation. Committee members also invited the general public to participate. Committee members issued email blasts, distributed flyers, and conducted personal outreach. All Public Engagement Events were posted on the NY Rising website ([stormrecovery.ny.gov](http://stormrecovery.ny.gov)).

The Committee held eight (8) official meetings over the course of the project. For two of these meetings, the Committee participated in Joint Committee Meetings with the neighboring NYRCR Communities of Baldwin, Bellmore/Merrick, Massapequas, and the Village of Freeport to learn about the coastal

environment, natural habitat, housing and economic issues, and resilience measures, and to explore shared issues and opportunities for collaboration and cooperation.

- **Committee Meeting 1:** The first Committee Meeting was held on September 17, 2013, and was the initial meeting between members from New York State, Planning Committee, and Consultant Team to discuss the purpose of the NYRCR Program and initial goals and objectives.

- **Committee Meeting 2:** The second Committee Meeting was held on October 8, 2013. It included a discussion of existing planning efforts, Community assets, Community needs and opportunities, and the outreach strategy and scheduling of Public Engagement Events.

An interim Committee Meeting was held on October 16 to introduce a new Committee Member and further prepare for the first Public Engagement Event.

- **Committee Meeting 3:** The third Committee Meeting was held on October 24, 2013. It continued the previous meetings discussion of existing planning efforts, Community assets, Community needs and opportunities, and Public Engagement Events.

- **Committee Meeting 4:** The fourth Committee meeting was held on November 6, 2013. In this meeting Committee Members reviewed the NYRCR Conceptual Plan and began to discuss opportunities for sustainable reconstruction, recovery, and resilience, and prepared for Public Engagement Event 2.

- **Committee Meeting 5 (Joint Committee Meeting):** The fifth Committee Meeting was held on December 10, 2013, and was attended by Committee Members from neighboring NYRCR Communities. The meeting provided an overview of flood risk scenarios and flood mitigation strategies.

- **Committee Meeting 6:** The sixth Committee Meeting was held on January 16, 2014. In this meeting Committee Members reviewed the

Community asset inventory and risk analysis, discussed proposed projects, and reviewed the findings of the business surveys.

- **Committee Meeting 7 (Joint Committee Meeting):** The seventh Committee Meeting was held on February 19, 2014, and was attended by Committee Members from neighboring NYRCR Communities. The meeting addressed housing and economic development opportunities within the five Communities that were represented.
- **Committee Meeting 8 (Joint Committee Meeting):** The eighth Committee Meeting was held on March 11, 2014. In this meeting Committee Members voted on the proposed and featured projects to be included in the NYRCR Plan.

## 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 planning process. Outlined below is a brief summary of the proceedings and the outcomes.

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

The first public engagement event was held on October 17, 2013. The meeting, which included an open house, presentation, and small group discussions, introduced the NY Rising Community Reconstruction (NYRCR) Program to the Community and provided numerous opportunities for public input. Participants viewed project materials at three different Open House-style stations. One provided an overview of the NYRCR Program. The second station presented six Community Asset Maps. The third station presented the draft vision as prepared by the Committee. Participants were encouraged to provide their feedback to the asset maps and vision statement. Comments received on the vision statement were used to revise it prior to incorporation in the NYRCR Conceptual Plan.

The next portion of the meeting was dedicated to small group discussions so participants could cooperatively and creatively consider the future of their community. Participants identified the community's most important needs and generated project ideas for recovery and resiliency. They discussed the following two questions:

- Superstorm Sandy and Hurricane Irene had profound impacts on our Community. Thinking about our Community as a whole, what do you believe are the three top issues that need to be addressed to recover and emerge more resilient in the future?
- The NYRCR Plan will include the major projects and programs that need to be undertaken for our Community to recover and be more resilient. The plans are an investment – done thoughtfully, they can help make communities safer and stronger, increase prosperity, improve the quality of life, and drive innovation and competition. You are encouraged to think big, and identify the transformative and innovative actions needed to become resilient and grow the economy. What do you believe should be done to create a better future for our Community?

### Key Outcomes

Participants at the meeting had clear and specific ideas about what they believed could effectively help the Community to recover and become more resilient. The small groups generated 40 different ideas. The input was reviewed to identify emerging themes that represented issues of concern and ideas for the future that would inform the development of strategies and projects. Listed below are the emerging themes organized by Recovery Support Function.

- **Community Planning & Capacity Building:** Improve emergency preparedness and response.
- **Economic Development:** Revitalize business district.
- **Housing:** Raise homes.

- Infrastructure: Seaford Harbor School access road; Cedar Creek Sewage Treatment Plant Improvements (capacity and odor); alleviate flooding (e.g. back flow devices); dredge canals; and raise streets.

There was no input received on issues related to Health & Social Services or Natural and Cultural Resources. Ideas relating to preparing for and mitigating the effects of major storm events were very obviously the key concerns of the participants.

The ideas expressed at this first Public Engagement Event have been captured and addressed in vision, goals, strategies, and projects of this NYRCR Plan.

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

The second Public Engagement Event was held on November 18, 2013. The event had three main components. The meeting was designed to present the emerging NYRCR Conceptual Plan, solicit community feedback on issues related to the six elements of the plan, and generate strategy and implementation ideas.

After the opening presentation, participants joined small groups to weigh in on important community issues and to expand upon the strategies and projects included in the NYRCR Conceptual Plan. Participants were to review material related to two of the six Recovery Support Functions: Community Planning and Cultural Resources; Economic Development; Health, Social Services, and Socially Vulnerable Populations; Housing; Infrastructure; or Natural Resources.

For the topics that were reviewed at the meeting, participants completed an independent questionnaire. The group members then worked cooperatively to provide reactions and observations on a map of the community. Finally, they reviewed the list of strategies and projects included in the NYRCR Conceptual Plan and discussed what others should be included. The group documented its most important ideas on summary sheets.

After the event, all materials were encoded and used by the Consultant Team and the Planning Committee to better understand community conditions and needs as well as to revise and enhance the list of reconstruction and resiliency projects. Although the number of questionnaire responses generated was small and not statistically significant, they do provide an indicator of community sentiment.

### **Key Outcomes**

The participants identified the pros and cons of their community. Pros included togetherness, neighbors helping neighbors, suburban lifestyle, and sense of community. The cons were feelings of helplessness and anxiety as well as concern for children and elderly as a result of Superstorm Sandy. Cons also included smell from the sewage treatment plant, only having one emergency access road out of the Seaford Harbor neighborhood, and the cost of living. These pros and cons identify some of the issues that must be addressed moving forward and the community spirit that can support implementation.

Community members had great insights into their needs and potential solutions, which was further borne out by the research, analysis, and deliberation of the Committee and the Consultant Team. It is clear that the input received from the Public Engagement Events informed the development of projects since all of these issues are included in this NYRCR Plan.

There were also some relatively unique comments collected at the meeting that were more focused on resiliency. There was the desire to rethink the commercial corridor so that the commercial tax base is not lost. Some participants see the Community's future comprised of senior housing and single family residential, but expressed that they were not opposed to Transit Oriented Development (TOD) only that they could not envision where it could be developed.

Generally, the feedback collected at the event confirmed that the project ideas being developed by the Committee and Consultant Team were in synch with the participants' needs. Feedback provided at this meeting was incorporated into the evolving project lists.

### **Public Engagement Event 3: Vision, Community Assets, Needs and Opportunities and Project Ideas**

This event, held on February 25, 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 Seaford/Wantagh Plan (Plan), and begin to generate public support for implementation. The Community Development Block Grant Program Disaster Recovery Program (CDBG-DR), a 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.

Participants viewed a presentation, the main focus of which was the projects to be considered for inclusion in the NYRCR Seaford/Wantagh Plan. The Consultant Team presented the approach and community issues that informed the preparation of these draft projects as well as the definition of the three types of projects included in the NYRCR Plan.

Participants then learned more details about the projects during the Open House portion of the event. Large boards were posted throughout the meeting space. Each board included information on projects including description, proposed location, cost estimates, benefits, and more. Committee members and Consultant Team representatives staffed the stations and were available to field participants' questions. Participants were encouraged to complete Project Comment Cards to provide reactions to and additional information for each of the projects. Each participant was also given a questionnaire to rate their levels of support for each Proposed and Featured Project on a three point scale (high, medium, and low). Finally, participants were asked to select the five projects they felt were most important to their community by writing them on their questionnaire and then posting stickers on large boards.

After the meeting, projects were also posted on the NY Rising website and an online survey was released to solicit feedback from people not able to attend the community meeting. No feedback was received to the online survey.

#### **Key Outcomes**

The Project Comment Cards were reviewed to make final enhancements to the project descriptions for review by the Committee and potential inclusion in the NYRCR Plan.

The vast majority of the projects presented enjoyed support from participants. Tidal Check Valves, Drainage Improvements, and Lifeline Transportation Network received the most support.

This feedback was used to refine the project lists and helped inform the selection of the final sets of project proposals.

### **Public Engagement Event 4: The Bellmore/Merrick NY Rising Community Reconstruction Plan**

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

#### **Online Presence and Platforms**

The website [www.stormrecovery.ny.gov/nyrcr](http://www.stormrecovery.ny.gov/nyrcr) provides information about the NYRCR Program, and regularly posted material relating to the NYRCR Plan. This included 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, but no comments were received through this platform.

#### **Business Surveys**

A survey was deployed by the Consultant Team 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 business/legal/financial, retail, healthcare, fitness, restaurant, and technology/life sciences, and had varying degrees of damage from Superstorm Sandy. The respondents identified the impediments to recovery as including access to communications and gasoline, and also that the criteria for loans/grants hurt entrepreneurs who don't work out of traditional office space. They noted that access to working capital or payroll subsidies would have helped. None of these businesses included flood mitigations in their rebuilding.

The Consultant Team developed a series of general recommendations based on the input received from respondents to this survey and on the Team's understanding of economic recovery and development in the wake of Superstorm Sandy.

There are needed improvements to the recovery process including:

- Quicker return of power;
- Faster access to grant/insurance money;
- Emergency lines of credit for payroll and inventory; and
- Fewer regulatory hurdles: Permits, variances, etc.

To increase resiliency going forward, the Consultant Team developed the following suggestions:

- Central location for business recovery assistance with representatives from all government, utilities, etc.;
- Facilitate temporary business relocations in vacant commercial spaces;
- Area wide flood mitigations/canal repairs;
- Emergency power generation/gas supplies; and
- Plantings/bioswales to absorb and mitigate the effects of flooding.

In terms of overall economic development, there could be more thought and planning put into economic and commercial development. Suggestions include infill of vacant properties, commercial area beautification, landscaping, street, and sidewalk repair; better/more

parking; and, tax incentives for existing businesses. All of these suggestions have been integrated into the NYRCR Plan to the extent possible.

## Housing Survey

The Community is primarily a residential community. Research was, therefore, undertaken to explore the impact of Superstorm Sandy on housing. Conducted by a specialist firm, data was gathered from a variety of sources, including a limited number of broker interviews. The research looked at the Community's housing characteristics, property values, household characteristics, the impacts of Superstorm Sandy (both physically and economically) and from this, considered the future demand and risks on community housing assets. Key findings from this research informed the preparation of the NYRCR Plan.

## Health and Social Services Interview

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, particularly because participants at Public Engagement Events were generally not focused on these concerns. The Committee, along with those of the neighboring communities of Baldwin, Bellmore/Merrick, the Village of Freeport, and the Massapequas, commissioned an assessment of health and social service recovery needs and opportunities to plan for social resilience. The Executive Summary of Assessing Health and Social Service Recovery Needs and Opportunities to Plan for Social Resiliency in 5 Long Island Communities (the Assessment) is included in the appendix.

In addition to independent 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 are confidential, there are not individual results specifically for the Community presented in the Assessment.

The Assessment was very thorough and identified an extensive list of needs generally for the five communities that participated in the Assessment. Many of

these are long standing needs that have been exacerbated by Superstorm Sandy or that may affect the future resiliency of the Community.

Due to the significant direct physical impacts of Superstorm Sandy, reconstruction, hazard mitigation, and resiliency measures are emphasized in this NYRCR Plan. Wherever possible, these projects and programs seek to incorporate and address issues identified through the health and social services component of the planning effort. These include:

- Designating existing sites or planning and developing for sites that can be repurposed for emergencies;
- Power sources that can ensure access to essential medicines;
- Community centers and gathering places;
- Transportation barriers;
- Lighting and maintenance; and
- Stewardship and safety.

## 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 13.

### Asset Information

The asset information columns in Table 13 include the following information:

- **Asset Name:** The name of the facility or a descriptive name that serves as a unique identifier.
- **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, Health and Social Services, Housing, Infrastructure Systems, or Natural and Cultural Resources.
- **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.
- **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 13 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 13 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 13:** Community asset inventory

Asset Information																
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Landscape Attributes						Risk Assessment					
					Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	
American Legion Post 1132	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
American Legion Post 1273	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Astoria Federal Savings Bank	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Bank Of America	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Bethpage Federal Credit Union	Moderate	Economic	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
BP Gas Station	Extreme	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Capital One Bank	Moderate	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cedar Cove Community Center	High	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Cedar Creek Park	Moderate	Natural and Cultural	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cedar Creek Sewage Treatment Plant	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	3	3	3	27
Wantagh Public Library	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	3	30
Wantagh Middle School	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	3	30
Wantagh Park	High	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	4	3	3	36
Cell Tower - Sunrise Hwy & Old Mill Rd	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cell Tower - Sunrise Hwy & Rt 135	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Cell Tower - Sunrise Hwy & Wantagh State Pkwy	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
CFS Bank	High	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Chase Bank	High	Health & Social	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	4	3	4	48
Nassau County Police Department Precinct 7	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Tackapausha Preserve	Moderate	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Wantagh Pump Station	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	4	3	5	60
Temple Ave WTP	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
TD Bank	High	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	4	3	5	60
Chase Bank	High	Economic	No	Low	No	Yes	Yes	Yes	Yes	Yes	No	2	3	3	2	18

**Table 13 (cont'd):** Community asset inventory

Asset Information					Landscape Attributes							Risk Assessment			
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Citibank	Moderate	Health & Social	No	Low	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Excel Urgent Care (Wantagh)	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Fire Department Headquarters	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Fire Station 1 Headquarters	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Fire Station 3	Extreme	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	4	2	24
Fire Station 5	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Fire Station 7 Dispatch Office	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Forest Lake School	Moderate	Natural and Cultural	Yes	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Four Corners Marina	Extreme	Health & Social	Yes	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Getty Gas Station	High	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Getty Gas Station	High	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Gulf Gas Station	Moderate	Economic	No	Medium	No	Yes	Yes	Yes	Yes	No	2	4	2.5	3	30
Gulf Gas Station	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Hess Gas Station	Moderate	Housing	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Knights Of Columbus	Moderate	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Mandalay Elementary School	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	3	27
Manor Elementary School	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Maplewood School	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Meenan Oil Company (1MG storage)	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Mill Pond Park	High	Economic	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Nassau Center For Disabled	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Nassau County Wantagh Park Marina	Moderate	Economic	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Park Avenue Substation	Moderate	Health & Social	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Pathmark (Seaford)	Extreme	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	4	2	24
Precision Marine	Extreme	Natural and Cultural	No	Low	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	3	40.5

**Table 13 (cont'd):** Community asset inventory

Asset Information					Landscape Attributes						Risk Assessment				
Asset Name	Risk Area	Asset Class	Critical Facility	Community Value	Erosion Rate	Beach Width	Shore Defenses	Vegetation	Dunes or Bluffs	Soils	Landscape Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
RMS Marine Services	Extreme	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	Yes	2.5	4	4.5	5	90
Roslyn Savings Bank	High	Economic	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Seaford Harbor Marine	Extreme	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Seaford Harbor School	Moderate	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	2	18
Seaford High School	Moderate	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Seaford Jewish Center	Moderate	Natural and Cultural	No	High	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3	3	27
Seaford LIRR	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Seaford Marine	Extreme	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
Seaford Middle School	Moderate	Health & Social	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Seaford Public Library	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Seaford Senior Community Service Center	Moderate	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Seamans Neck Park	Extreme	Economic	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
First Federal Savings Bank	High	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	3	3	27
South Bay Boat Haulers	Extreme	Economic	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	2	27
South Shore Animal Hospital	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
South Shore Medical Care (Wantagh)	Moderate	Economic	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Sunoco Gas Station	High	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	2	18
Treasure Island Marina	Extreme	Health & Social	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	5	67.5
Twin Lakes Preserve	Moderate	Infrastructure	No	Low	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Verizon Datacenter	Moderate	Health & Social	No	Low	0	0.5	0.5	0.5	0.5	0	2	3	2.5	3	22.5
Wantagh Elementary School	Moderate	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Wantagh High School	Moderate	Natural and Cultural	Yes	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Wantagh LIRR	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Water Supply Plant	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50



## E. End Notes

1. Five of the 102 localities in the program – Niagara, Herkimer, Oneida, Madison, and Montgomery Counties – are not funding through the CDBG-DR program.
2. The following localities' allocations comprise the NYRCR Community's total allocation: Seaford - \$7.9 million; Wantagh - \$3.3 million.
3. ESRI estimates. Demographic and Income Profile. Seaford/Wantagh (CDP 3646668). 03January 2014.
4. Long Island Index. Places to Grow. January 2010.
5. United States Census Bureau. American Community Survey. "Table S0802 – Means of Transportation to Work by Selected Characteristics." 2008-2012 American Community Survey 5-Year Estimates. 2012.
6. Nassau County Department of Public Works. Cedar Creek Water Pollution Control Plant Damage Assessment, Emergency Work and Interim Stabilization Narrative. 26 July 2013.
7. "Tropical Cyclone Report Hurricane Irene." National Hurricane Center. <www.nhc.noaa.gov>
8. "Hurricane Irene Aftermath, Wantagh NY." Chris Corradino photography. <www.christography.com>
9. Patch Staff. "Irene Aftermath in Wantagh and Seaford." 28 August 2011. Wantagh Patch. <wantagh.patch.com>
10. State of New York Department of Public Service. Case 12-E-0283 In the Matter of the Review of Long Island Power Authority's Preparedness and Response to Hurricane Irene. June 2012.
11. Village of Freeport All Hazard Mitigation Plan. 2014
12. "Hurricane Sandy." NWS Forecast. <www.weather.gov>
13. "\$332 Million in Federal Funding Supports Nassau County's Sandy Recovery." 18 December 2013. Federal Emergency Management Agency. <www.fema.gov>
14. "FEMA to give \$80M more for Bay Park Sewage Plant." 17 January 2014. Long Island Newsday. <www.newsday.com>
15. Jonas, Sharon. "Glad she's gone, Citizens speak about Sandy." Seaford Wantagh Citizen. 8 November 2012.
16. "Irene information, shelters and tools for LI and NYC." Long Island Newsday. 28 August 2011.
17. Interview with Nassau County OEM. 5 March 2014.
18. "Mangano Orders Mandatory Evacuation of Flood and Storm Surge Zones." Nassau County New York. 28 October 2012.
19. Interview with Nassau County OEM. 5 March 2014.
20. "Mangano Orders Mandatory Evacuation of Flood and Storm Surge Zones." Nassau County New York. 28 October 2012.
21. "Mangano Announces Food & Drink Distributions." Nassau County New York. <www.nassaucountyny.gov>
22. "Mangano Opens Additional Warming Centers In Nassau." Nassau County New York. <www.nassaucountyny.gov>
23. "Sandy recovery process is slow, uncertain." Seaford Wantagh Citizen. 28 February 2013.
24. "Logistical nightmare – riding shotgun with LIPA." Seaford Wantagh Citizen. 8 November 2012.
25. Richardson, Todd, and Ben Winter. "Analysis of Communities Impacted by Hurricane Sandy." HUD Office of Policy and Research. Draft, January 29, 2013.
26. <http://www.fema.gov/media-library/assets/documents/30714?id=65> (Sandy Housing Assistance Data for New York and New Jersey Updated, August 28, 2013).
27. <http://www.fema.gov/media-library/assets/documents/30714?id=65> (Sandy Housing Assistance Data for New York and New Jersey Updated, August 28, 2013).
28. Richner, Zachary. SBA DCMS Application Information. Nassau and Suffolk Counties Business Applicant Information. 13 December 2013.
29. Governor's Office of Storm Recovery
30. US Bureau of the Census On The Map LED Dataset
31. Richner, Zachary. SBA DCMS Application Information. Nassau and Suffolk Counties Business Applicant Information. 13 December 2013.
32. Schofer, Laura. "Wantagh and Seaford – Building for Resilient Communities." LI Herald News form Nassau County Communities. <liherald.com>
33. "Logistical nightmare – riding shotgun with LIPA." Seaford Wantagh Citizen. 8 November 2012.
34. "Superintendent Conboy reports of Seaford Schools." Seaford Wantagh Citizen. 8 November 2012.
35. "Hindsight is 20/20." Seaford Wantagh Citizen. 15 November 2012.
36. Nassau County Department of Public Works. Cedar Creek Water Pollution Control Plant Damage Assessment, Emergency Work and Interim Stabilization Narrative. 26 July 2013.
37. <http://new.mta.info/press-releases>
38. <http://wantagh.patch.com/groups/politics-and-elections/p/thousands-remain-without-power-in-wantagh-seaford-area>
39. "Long Island Power Authority Investor Update Conference Call." 16 January 2013. Long Island Power Authority. <www.lipower.org>
40. Long Island 2035 Study Team. LI 2035 Visioning Initiative. December 2009.
41. South Shore Estuary Reserve Council. South Shore Estuary Reserve Comprehensive Management Plan. 2001.
42. Regional Plan Association. Places to Grow – An Analysis of the Potential for Transit-Accessible Housing and Jobs in Long Island's Downtowns and Station Areas. January 2010.
43. South Shore Estuary Reserve Council. South Shore Estuary Reserve Comprehensive Management Plan. 2001.
44. New York State Department of State. NYS Coastal Management Plan. 2006.

45. Nassau County. Draft Nassau County Master Plan. October 2010.
46. Nassau County. Draft Nassau County Master Plan. October 2010.
47. Regional Plan Association. Cleaner Greener LI Regional Sustainability Plan. April 2013.
48. Nassau County. Draft Nassau County Master Plan. October 2010.
49. Nassau County. Nassau County Consolidated Plan. 2010.
50. Long Island Regional Planning Council. Sustainable Strategies for LI 2035. December 2010.
51. Long Island Regional Economic Development Council. New Vision for the LI Economy. November 2011.
52. Long Island 2035 Study Team. LI 2035 Visioning Initiative. December 2009.
53. Regional Plan Association. Cleaner Greener LI Regional Sustainability Plan. April 2013.
54. Long Island Regional Economic Development Council. Strong Island – Recovery & Resurgence – Strategic Economic Development Plan for Nassau and Suffolk Counties (Update). September 2013.
55. Regional Plan Association. Nassau County Infill Redevelopment Feasibility Report. September 2013.
56. Nassau County. Draft Nassau County Master Plan. October 2010.
57. “Nassau Hazard Mitigation Plan.” Nassau County New York. <[www.nassaucountyny.gov](http://www.nassaucountyny.gov)>
58. Nassau County. Multi-Jurisdictional Nassau County Debris Management Plan.
59. Long Island 2035 Study Team. LI 2035 Visioning Initiative. December 2009.
60. Quantified using New York State and Nassau County GIS databases.
61. United States Census Bureau. 2007-2011 American Community Survey DP04. 2011.
62. United States Census Bureau. 2007-2011 American Community Survey DP04. 2011.
63. United States Census Bureau. 2007-2011 American Community Survey DP04. 2011.
64. Code of Federal Regulations (CFR) Title 44, Chapter 1, Part 201 – Mitigation Planning
65. Guidance for New York Rising Community Reconstruction Plans: A Planning Toolkit for CR Planning Committees (2013).
66. Urbanomics. “Results from Business Survey.”
67. U.S. Census Bureau, Center for Economic StudiesOnTheMap <http://onthemap.ces.census.gov/> Accessed 30 December 2013
68. U.S. Census Bureau, Center for Economic StudiesOnTheMap <http://onthemap.ces.census.gov/> Accessed 30 December 2013
69. Urbanomics. “Seaford-Wantagh Economic Profile.” 2014.
70. U.S. Census Bureau, 2010 Census of Population
71. “State of New York Action Plan for Community Development Block Grant Program Disaster Recovery.” New York State Homes and Community Renewal. April 2103. 17.
72. Low Income Occupants Have Annual Incomes Below \$75,000 or Meet HUD’s Low Income Limit At 80% of The AMI (Area Median Income)
73. “NY Rising Housing Recovery Program Announces 6,388 Homeowners Have Been Issued Checks for Over \$280 Million for Home Rebuilding.” The NY Rising Housing Recovery Program. <[www.stormrecovery.ny.gov](http://www.stormrecovery.ny.gov)>
74. ESRI forecasts, Demographic and Income Profile, Seaford/Wantagh (CDP 3646668). 03 January 2014
75. ESRI forecasts, Demographic and Income Profile, Seaford/Wantagh (CDP 3646668). 03 January 2014
76. “NY Rising Buyout and Acquisition Programs.”New York Storm Recovery Resources Center. <[www.stormrecovery.ny.gov](http://www.stormrecovery.ny.gov)>
77. “HOME Investment Partnerships Program (HOME).”Nassau County New York.<[www.nassaucountyny.gov](http://www.nassaucountyny.gov)>
78. ESRI forecasts, Demographic and Income Profile, Seaford/Wantagh (CDP 3646668). 03 January 2014
79. “Nassau and Suffolk Counties Trends in Wetland Loss.” New York State Department of Environmental Conservation. <[www.dec.ny.gov](http://www.dec.ny.gov)>
80. U.S. Environmental Protection Agency, Functions and Values of Wetlands. 2001.
81. Barbier EB, Georgiou IY, Enchelmeyer B, Reed DJ (2013) The Value of Wetlands in Protecting Southeast Louisiana from Hurricane Storm Surges. PLoS ONE 8(3): e58715
82. U.S. Environmental Protection Agency, Wetlands: Protecting Life and Property from Flooding. 2006.
83. Galveston Bay Foundation. Living Shorelines: A Natural Approach to Erosion Control. 2011.
84. New York State Department of Environmental Conservation. Stormwater MS4 Permit and Forms.
85. Ibid.
86. Richner, Zachary. SBA DCMS Application Information. Nassau and Suffolk Counties Business Applicant Information. Report Date 12/13/2013.

## F. Glossary

BFE: Base Flood Elevation

CDBG-DR: Community Development Block Grant - Disaster Recovery

CHHA: Coastal High Hazard Area

DPW: Department of Public Works

ESRF: New York State Empire State Relief Fund

FEMA: Federal Emergency Management Agency

FD: Fire Department

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

LIRR: Long Island Rail Road

MW: Megawatt

NDRF: National Disaster Recovery Framework

NFIP: National Flood Insurance Program

NGVD: National Geodetic Vertical Datum of 1929

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 DOS: New York State Department of State

PD: Police Department

PSEG: Public Service Electric and Gas Company

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

TOH: Town of Hempstead

TSD: Transit-Supportive Development

UFSD: Union Free School District

