



Baldwin
**NY Rising Community
Reconstruction Plan**



March 2014
NY Rising Community
Reconstruction Program

NYRCR Baldwin Planning Committee

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Foreword

Introduction

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

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

Program Overview

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

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

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

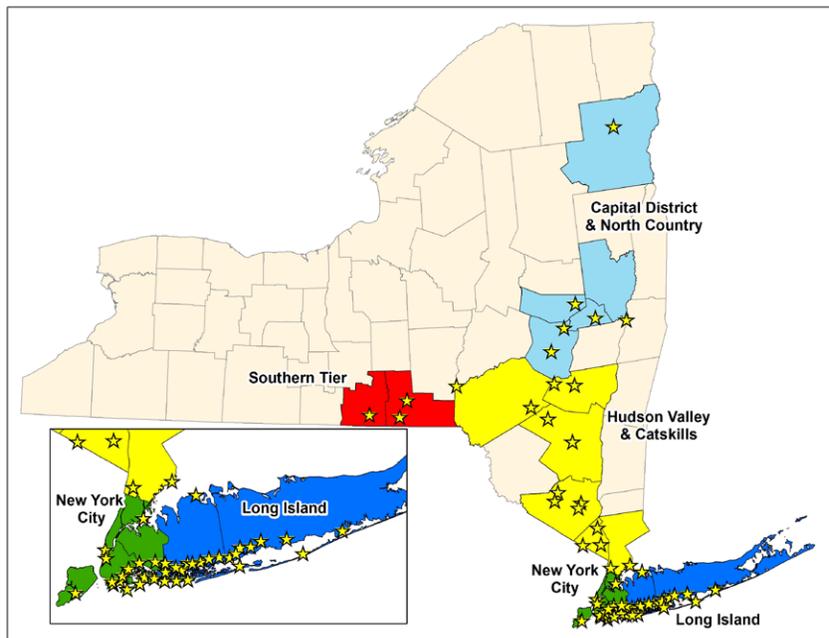
1. Five of the 102 localities in the program – Niagara, Herkimer, Oneida, Madison, and Montgomery Counties are not funded through the CDBG-DR program.

Throughout the planning process, Planning Committees were supported by staff from 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 more than 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 more than \$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 Baldwin is eligible for up to \$10.6 million in CDBG-DR implementation funds.²

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: Baldwin – \$3 million; Baldwin Harbor – \$7.58 million.

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Executive Summary

Overview

The hamlets of Baldwin and Baldwin Harbor – with a combined land area of approximately 4.7 square miles and a population of more than 32,000 – are close-knit, ethnically diverse communities located along the south shore of Long Island’s Middle Bay in Nassau County, New York. Baldwin and Baldwin Harbor extend from Middle Bay and Baldwin Bay north to the Southern State Parkway, crossing over the Merrick Road and Sunrise Highway corridors. These unincorporated hamlets within the Town of Hempstead (TOH) include a mix of upland and waterfront single-family home neighborhoods with different architectural styles and tree-lined streets. Ample retail stores and shops cluster around the train station and along Grand Avenue. In 2007, CNN Money ranked Baldwin #25 in a list of the best places to live in the United States.

On October 29, 2012, life changed dramatically for many community residents and business owners. New York and the entire Tri-State region were devastated by Superstorm Sandy, the largest storm of the 2012 Atlantic Ocean hurricane season. The south shore of Long Island, including Baldwin and Baldwin Harbor, suffered massive storm damage, power outages, sewer line overflows, and utility and transportation disruption. Superstorm Sandy’s destruction came on the heels of Hurricane Irene, which struck the community a year prior, on August 26, 2011, causing significant flooding, wind damage, and power outages. Directly or indirectly, the lives and well-being of virtually everyone in the region were, and continue to be, affected by the aftermath of both storms.

The NY Rising Community Reconstruction (NYRCR) Program was established by New York State (NYS) to provide rebuilding and revitalization assistance to communities severely damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Through the creation of a NYRCR Plan, the program empowers communities to identify resilient and innovative reconstruction projects that take into account current damage, future threats, and economic opportunities. For the purposes of this planning effort, Baldwin and Baldwin Harbor were combined to create the NYRCR Baldwin Community (Community).

The NYRCR Baldwin Community is eligible for up to \$10.6 million of U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funding (\$3.0 million for Baldwin and \$7.6 million for Baldwin Harbor).

Residents, business owners, first responders, and local employees from the Community actively participated in the NYRCR Program over a period of seven months, beginning in September 2013. These stakeholders considered their goals and aspirations for the future to develop a NYRCR Plan that honors the unique qualities and assets of the Community, that seeks to creatively reduce potential storm- and climate change-related impacts, and that leverages these investments to enhance existing assets and create new ones, improve quality of life, and support other needs and opportunities that can ultimately benefit the Community as a whole. The result of their efforts is this NYRCR Plan, which presents a series of strategies and projects that respond to the Community’s critical issues and contribute to building a more resilient, safe, and sustainable future for the NYRCR Baldwin Community.

The geographic scope of the NYRCR Plan includes both hamlets and extends north from Middle Bay in a narrow strip up to the Southern State Parkway. Its eastern edge is defined by Brookside Avenue until it intersects with Forest Avenue, and from there follows Milburn Creek south into Baldwin Bay. The Community’s western edge extends north from Parsonage Cove up to Silver Lake Park, where it cuts west along Foxhurst Road to Parkview Place, and continues north along the streets forming Baldwin’s existing boundary. The geographic scope of NYRCR Baldwin is shown in Figure ES-01.

Storm Impacts

Recent storm events brought significant damage to homes, businesses, infrastructure, and the natural environment. The two most powerful storms had different impacts on the Community in terms of both type and magnitude. 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 a 10-foot storm surge at high tide, which inundated waterfront neighborhoods that generally lie between 5- and 10-feet above sea level. The majority of the flooding was in homes and businesses south of Atlantic Avenue and via the two canal systems of Parsonage Cove to the west and Baldwin Bay to the east. The Community faced severe problems with power outages, heavy debris, and immobility due to damaged and flooded roads and compromised power lines.

More than 2,500 housing units were reported to be damaged, and although the degree of damage varied, many homes were inundated by an average of three-feet of water. Major roads and evacuation routes were blocked to residents and first responders. Many trees – which contribute to the Community’s character – were significantly damaged or felled by the strong winds. Power outages for most residents lasted 16 days and also caused disruption to cellular communications. A state of emergency was declared for portions of the community near Barnes Avenue to facilitate the cleaning out and decontamination of homes and other affected areas since the sewer main leading to the Bay Park Sewage Treatment Plant was breached and sewage backed up at manholes and basement drains into private residences.

While nearly all of the Community’s commercial corridors are located on high ground, a small number of businesses were flooded by Superstorm Sandy; other businesses suffered due to power outages and reduced commercial activity as a result of the storm. Gas stations could not pump fuel without backup power. Oakwood Beach Club’s beach eroded during Superstorm Sandy, although its pools and clubhouse remain.

Critical Issues

Recent storm events uncovered a variety of critical issues with the natural and built environment of the Community, along the south shore of Long Island, throughout vast utility service areas, and in

the broader region. These issues directly and indirectly impacted homes, businesses, sanitary sewers, stormwater drainage systems, 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 Plan:

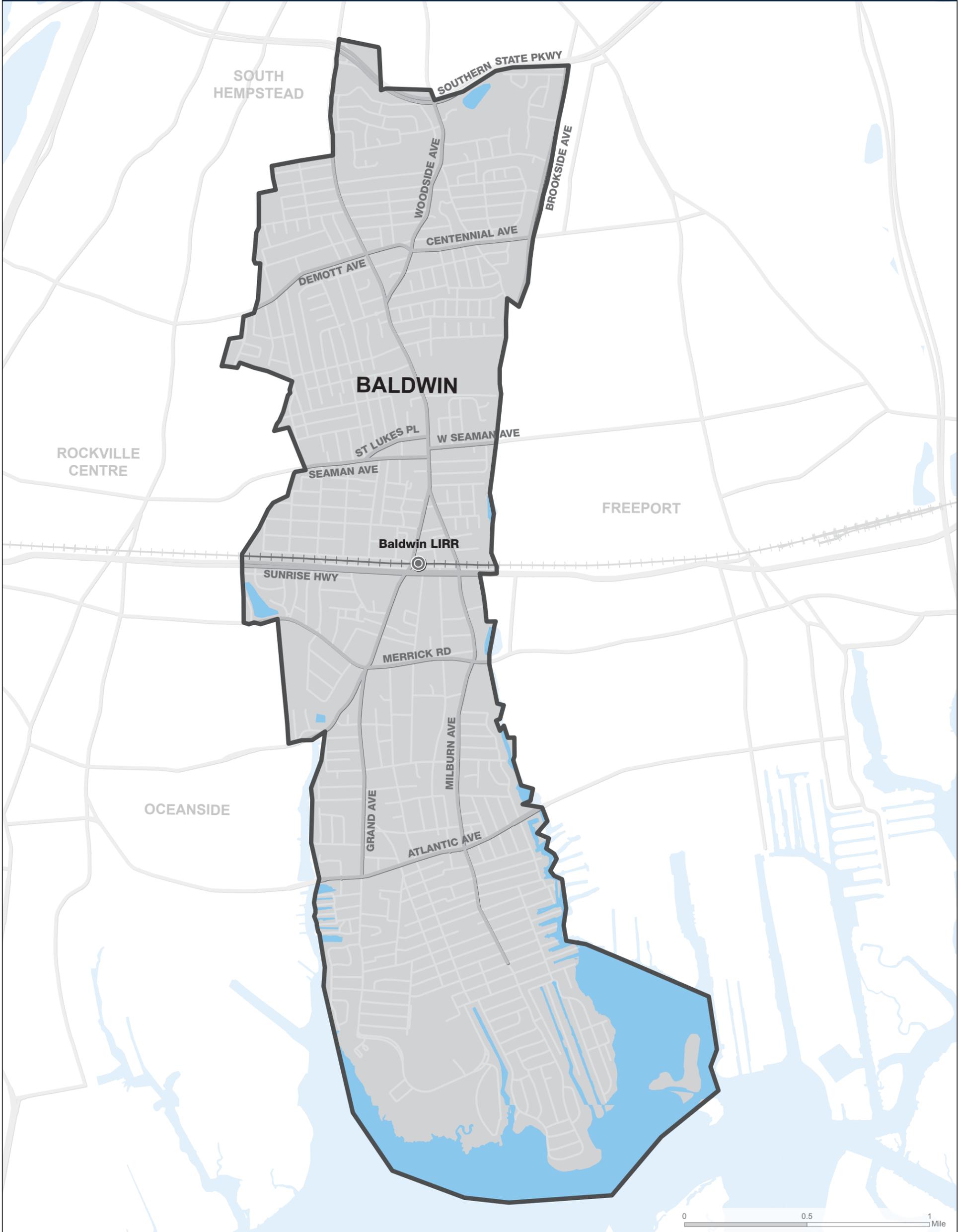
- Economic Challenges;
- Energy Infrastructure;
- Flooding and Drainage;
- Housing in High Risk Areas;
- Information, Communication, and Resources;
- Regional Connections;
- Resilient Planning, Design, and Construction; and,
- Shoreline Protection.

Although local issues are paramount, it is imperative to recognize the Community’s relationship to its neighboring communities 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. This dynamic demands a regional perspective of the challenges facing the Community so that local solutions can take into account and leverage regional considerations for reconstruction, recovery, and resiliency. Through a comprehensive review of regional plans and studies, meetings with neighboring communities, and sessions with the Town of Hempstead, a series of regional considerations was developed and used to expand upon local projects as well as to inform the development of shared projects with neighboring communities.

Community-Driven Process

The NYRCR Program provided the Community with a unique opportunity to participate in a community-driven planning effort. Nine Community representatives dedicated their time, passion, and expertise as members of the NYRCR Planning Committee (Committee), which guided the development of the NYRCR Plan. The Committee played an integral role every step of the way by: providing overall direction and guidance; generating material; reviewing,

Figure ES-01: Geographic Scope



Legend

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

Data Sources

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



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Vision for a Resilient Future

The Vision for the NYRCR Baldwin Community is to make balanced investments in community infrastructure and create a sustainable and resilient community that values diversity, quality of life, natural resources, and economic development while maintaining a positive relationship to the water.

Goals for the Future

The NYRCR Baldwin Plan strives to:

- Support local business resilience by encouraging business continuity, crisis management planning, and technology and financial resilience.
- Acknowledge the hazards and vulnerabilities associated with future storms to encourage thoughtful, sustainable redevelopment.
- Rebuild homes and commercial buildings that are resilient in design and location.
- Develop innovative and natural solutions to coastal storm surges and erosion management.
- Enhance public open space so it serves multiple purposes, such as recreation, resilience, and refuge.
- Protect fresh water resources and improve stormwater management.
- Leverage Baldwin's civic pride, diversity, and high quality of life to rebuild the residential, commercial, and services communities.
- Ensure that proper health and social services are accessible to all residents on a daily basis and in emergency scenarios.
- Provide emergency infrastructure to all first response facilities and improve communication network redundancy.
- Ensure public safety during and after major natural events.

revising, and responding to components of the plan; and, deliberating on the initiatives that will bring the greatest recovery and resiliency value to the Community.

The Committee held eight official meetings over the course of seven months, from September 2013 to March 2014, including participating in two joint Committee meetings with the neighboring NYRCR Communities of Bellmore/Merrick, Freeport, Seaford/Wantagh, and Massapequas to explore shared issues and opportunities for collaboration and cooperation. In addition to guidance from the Committee, more than 260 residents and stakeholders participated in three Public Engagement Events or shared their opinions and ideas through online surveys, business surveys, and key informant interviews.

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 of the NYRCR Plan and have been used to guide the development of the Community's strategies and projects, as well as to serve as an ongoing reminder of what the Community aims to achieve.

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 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.

Flooding is a significant risk for the Baldwin Harbor area of NYRCR Baldwin, with large tracts of housing being in the extreme or high flood risk areas or at risk of being cut off by street flooding. The latter particularly affects Baldwin Harbor Middle School and Meadow Elementary School. In addition, Parsonage Creek and Milburn Creek on the west and east edges of the Community carry flood water and storm surge deeper into the Community, as far north as Merrick Road to Silver Lake Park and Milburn Creek Park, causing more localized flood risk in those areas even during regular high tide and rainfall events. Pump stations which support these neighborhoods also lack protection.

Three of NYRCR Baldwin's Parks and the Oakwood Beach Club are subject to extreme or high flood risk. These assets, highlighted as being of importance to the community, suffered damage in both Superstorm Sandy and Hurricane Irene and are at risk of future storm damage. In total, there are more than 1,600 assets in the high and extreme flood risk areas. Through the Community Engagement process, approximately 35 key assets were identified, and the risk assessment process helped identify which of those assets had increased potential for storm damage.

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

- Improve disaster and resiliency preparedness among Community residents and businesses;
- Improve communication/notification systems and disaster response by government authorities and utility service providers;
- Provide access to disaster support services and supplies in the Community for residents and businesses;

- Designate and maintain critical evacuation routes that are clearly labeled;
- Improve access to support services for seniors and socially vulnerable populations;
- Rebuild or renovate damaged housing and housing in high risk areas to storm-resistant standards;
- Expand and diversify the tax base with commercial development, particularly around and near the Long Island Rail Road (LIRR) station;
- Prepare workforce to meet regional employment projected demand in both skilled and unskilled professions;
- Mitigate the impacts of stormwater and tidal flooding through enhanced natural systems and infrastructure;
- Improve mobility for cars, pedestrians, and first-responders in the Community during storm events and on a day-to-day basis; and,
- Protect, acquire, maintain, upgrade, and/or restore public and private parks, open spaces, and natural assets in the Community to better manage stormwater, to protect habitat and wildlife, and for possible recreational uses.

Strategies for Reconstruction and Resilience

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. Resiliency is about strengthening the ability of NYRCR Baldwin 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 on local issues, and iterative development by the Committee. The four Reconstruction and Resilience strategies for the Community are listed below:

- Improve Stormwater Management and Drainage Systems;
- Improve Transportation and Communication Connectivity;

- Establish Programs and Policies for Resilient Planning and Design; and,
- Enhance the Community’s Natural and Cultural Resources.

Proposed and Featured Projects

The projects that resulted from this extensive planning process support the Reconstruction and Resilience 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 on the following page lists the 21 Proposed and Featured Projects organized by strategy. The projects have not been ranked or prioritized.

Table 01: Proposed and featured projects

Strategy	Project Name	Short Description	Category	Regional
Establish Programs and Policies for Resilient Planning, Design, and Housing	Downtown and Commercial Corridor Resiliency Plan	This project is a resiliency study to plan for the long-term future of the commercial corridors in Baldwin and the area of Downtown Baldwin.	Proposed	No
Improve Stormwater Management and Drainage Systems	Silver Lake Park Drainage Improvements	A comprehensive drainage study will be undertaken to assess the flow controls at these basins to identify the cause of flooding in this area during regular rainfall events and guide the design of drainage improvements and improvements to the park for the Community.	Proposed	No
Enhance the Community's Natural and Cultural Resources				
Improve Transportation and Communication Connectivity	Baldwin Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. After a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort.	Proposed	No
Improve Stormwater Management and Drainage Systems	Green Infrastructure: NYRCR Baldwin Tree Planting Subsidy Program	Reintroduce a varied version of the TOH Tree Planting Program for Baldwin residents only to replace trees that have been brought down by storms and plant additional trees.	Proposed	No
Improve Stormwater Management, Drainage Systems	East Baldwin Road Raising	Road raising and associated drainage improvements along Washington Place, Hayes Place, Van Buren Place and Jackson Place.	Proposed	No
Improve Transportation and Communication Connectivity				
Enhance the Community's Natural and Cultural Resources	Baldwin Park Water Promenade	The project involves the strategic implementation of both natural and structural storm protection features along the shoreline to create a promenade and minimize further erosion and damage.	Proposed	No
Enhance the Community's Natural and Cultural Resources	Oakwood Beach Restoration	Assessment, design, and construction for the restoration of the privately-owned Oakwood Beach and Club and appurtenances for use by the entire Community.	Proposed	No

Table 01 (cont'd): Proposed and featured projects

Strategy	Project Name	Short Description	Category	Regional
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. It would establish a communication network that more effectively links the local government, emergency management agencies, residents, businesses and non-profit organizations.	Proposed	Yes
Establish Programs and Policies for Resilient Planning and Design	Business Continuity Program	Staff person to assist businesses in creating business continuity plans. Identify business assistance funding.	Proposed	Yes
Improve Stormwater Management and Drainage Systems	South Shore Stormwater System Modeling and Analysis	Hydrologic and hydraulic (H&H) model to determine the causes of localized flooding issues across the catchment and identify measures to prevent the flooding.	Proposed	Yes
Improve Transportation and Communication Connectivity	Lifeline Corridor Study and Guidelines	Study will be undertaken to identify best practices and develop design guidelines for resilient streetscapes. The guidelines will present design options for Merrick Road.	Proposed	Yes
Establish Programs and Policies for Resilient Planning and Design	Home Heating Upgrades	Incentivize the conversion of home heating systems from fuel oil to electric heat pumps, solar thermal, or natural gas in extreme and high risk areas. Amend building and planning regulations to phase out the use of fuel oil tanks south of Merrick Road, and incorporate temporary-intermediary regulations to require proper anchoring requirements based on anticipated inundation levels.	Featured	No
Improve Transportation Communication and Connectivity	Lifeline Network: Priority Local Road Streetlight Retrofit	Installation of solar photovoltaic (PV) powered LED streetlights with battery backup on utility poles along Merrick Road in Baldwin.	Featured	No
Establish Programs and Policies for Resilient Planning and Design				

Table 01 (cont'd): Proposed and featured projects

Strategy	Project Name	Short Description	Category	Regional
Improve Stormwater Management and Drainage Systems	Green Infrastructure: Pilot Project Implementation at Steele Elementary School	Project proposes the study, design, and construction of a 0.4 acre-foot infiltration basin in combination with bioswales at Steele School.	Featured	No
Improve Transportation Communication and Connectivity				
Improve Stormwater Management and Drainage Systems	Tidal Check Valve Installation and/or Replacement	Project includes the inspection of outfalls to determine the condition and appropriateness of tidal check valves. Also includes the installation of 25 tidal check valves, where they would be most effective in addressing flooding.	Featured	No
Establish Programs and Policies for Resilient Planning and Design	Improve Resilience of Community Marinas	Emergency preparedness guidelines, recommendations and education to increase resiliency of marinas and docks.	Featured	No
Establish Programs and Policies for Resilient Planning and Design	Strategic Adaptation for Coastal Development	Identify long-term retreat and resilience options for Baldwin to protect future residents and business from higher occurrence and more intense storms/surges. Work with flood insurance providers to study existing models and assumptions. Use a combination of climate change and sea level rise forecasts and actual events to develop triggers for changes to zoning, planning, and building regulations.	Featured	No
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	Creation of new residential design guidelines for improving architectural quality and functionality in newly raised homes.	Featured	Yes

Table 01 (cont'd): Proposed and featured projects

Strategy	Project Name	Short Description	Category	Regional
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis – Phase 2	This project is Phase 2 of the proposed project 'Public Communication and Education Gap Analysis' and includes the implementation of the gap analysis recommendation. Topics covered may include garage and parking design, stairway and entryway design, mechanical systems, home appliance placement, structural reinforcement, materials recommendations, and resilient landscapes.	Featured	Yes
Establish Programs and Policies for Resilient Planning and Design	Street-end Bulkhead Replacement/Upgrades	This project will inspect and identify the bulkheads at street ends and canal ends that fall under the Town of Hempstead ownership which require raising or replacement to improve resiliency as a result of recent storms. The project will identify, design, and construct up to 1,000 linear feet of bulkhead.	Featured	No
Improve Stormwater Management and Drainage Systems	West Baldwin Road Raising and Drainage Improvement Study	Study includes assessment and determination of works needs to alleviate the continual and severe flooding issues.	Featured	No
Improve Transportation and Communication Connectivity		Area includes Grand Boulevard, Hayes Street, Van Buren Street and Byrd Place.		



Section I: Community Overview

Baldwin and Baldwin Harbor are hamlets on the south shore of Long Island within the Town of Hempstead, Nassau County, New York. The hamlets of Baldwin and Baldwin Harbor are close-knit, ethnically diverse communities where residents share the same ZIP code, school district, commercial services, public parks, and library. Retail stores and shops are clustered around the Long Island Rail Road (LIRR) Baldwin Station and along Grand Avenue. The Community is a mix of residential neighborhoods with different architectural styles and tree-lined streets, while the waterfront contains original and renovated cottages. In 2007, CNN Money ranked Baldwin twenty-fifth in a list of the 100 best places to live in the United States.

As a part of the greater New York City metropolitan area, the communities are approximately 21 miles east of Manhattan and six miles east of the Nassau-Queens border. The area of both hamlets combined is 4.72 square miles, of which 0.6 square miles (approximately 13%) is bay water. Baldwin Harbor extends from Middle Bay and Baldwin Bay at the south to Sunrise Highway in the north, where Baldwin begins. From here, Baldwin continues north until Southern State Parkway. For the purposes of this NY Rising Community Reconstruction (NYRCR) Baldwin Plan, Baldwin and Baldwin Harbor are combined and are collectively known as the NYRCR Baldwin Community (Community).

In the 1800s, Baldwin developed south along Grand Avenue to an old stage coach road, now called Merrick Road. Baldwin was previously regarded as Hick's neck, and later Milburn, before being founded in 1855 as Baldwinsville. The name was given in honor of Thomas Baldwin (1795-1872), a sixth-generation member of the Baldwin family of Hempstead and a leading merchant in Milburn at the time. Mr. Baldwin owned a general store, T. Baldwin and Sons, and a hotel at what would now be considered the northwest corner of Merrick Road and Grand Avenue. Retail continues to be the dominant commercial use today. Like other south shore communities, more than half of the Community's commercial property value is in retail uses. Of the 452 commercial parcels in the Community, 50.2% of them are classified as retail, followed by 32.1% mixed use, 8.4% office, and 6.2% industrial uses.³

The Town of Hempstead is led by a Town Supervisor who leads meetings of the Town Council and directs legislative and administrative functions of the town. The Town Supervisor works with a six member body of the Town Council each of whom is elected from a council district within the Town. The Town of Hempstead is one of three Towns in the County of Nassau.

Housing comprises the predominant land use in the Community. Its housing stock is a mix of pre- and post-World War II (1945) construction. More than half of the Community's housing stock was built before 1950 and approximately one-third between 1950 and 1970. In Baldwin, fewer than 500 units were added since 1990 with relatively few units constructed since 2005. Because most modern building codes went into effect in the 1980s, a majority of the Community's housing is not built to modern code, although conforming alterations and renovations have occurred.

In 2013, the Community had an estimated population of 32,322 residents with 44.6% White, 29.3% Black or African American, and 18.8% Hispanic or Latino, 4.5% Asian, and 2.9% other. The population's median age was 40.9 years. The Community's residents comprise 10,436 households and are estimated to have a median household income of \$102,986. Over the next five years, the Community is expected to grow modestly, increasing in population by less than one percent to 32,612 residents.⁴

Residents and stakeholders actively participated in the NYRCR Program incorporating their goals and aspirations for their Community into the larger reconstruction and resiliency effort. They worked to ensure that reconstruction activities help advance the larger ambitions of the Community while building back better and more resilient. They helped develop a plan that honors the unique qualities and assets of the Community and seeks to directly and creatively reduce potential storm- and climate change-related impacts. The results of their efforts are included in the NYRCR Baldwin Plan (NYRCR Plan), which presents a series of strategies and projects that respond to critical issues and contribute to building a more resilient, safe, and sustainable future for the Community.

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

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

All of the material presented in the NYRCR Plan has been developed collaboratively by residents of the Community and with assistance from the NYS Department of State (NYS DOS), NYS Homes and Community Renewal (NYS HCR), and the private consultants of Ove Arup and Partners, P.C., Sasaki Associates, Urbanomics, HealthxDesign, and CAS Group (the Consultant Team). Nine community representatives dedicated their time, passion, and expertise to the NYRCR Planning Committee (Committee) to guide the development of the NYRCR Plan from its inception. Residents and business-people participated in three Public Engagement Events and shared their opinions and ideas through online platforms and business surveys. The Consultant Team provided technical expertise and support for the NYRCR Plan's content, at the direction of the Committee, to reflect best practice in the various subject matter areas, local conditions, and Community input through the public engagement process, which is described in Section V.

A. Geographic Scope of NYRCR Plan

As shown in Figure 01, the geographic scope of the NYRCR Baldwin Plan incorporates the hamlets of Baldwin and Baldwin Harbor. The geographic scope of the Community extends north from Middle Bay in a narrow strip to the Southern State Parkway. Its eastern edge follows Brookside Avenue until it intersects with Forest Avenue, and from there follows Millburn Creek south into Baldwin Bay. The Community's western edge extends north from Parsonage Cove up to Silver Lake Park, where it cuts west along Foxhurst Road to Parkview Place and continues north along the streets that form the Hamlet of Baldwin's existing boundary.

The Southern State Parkway and Sunrise Highway are two major east-west thoroughfares serving the Community. The Southern State Parkway, which traverses the northern edge, and Sunrise Highway, which intersects the middle of Baldwin, provides access east to Long Island and west to New York City. Grand Avenue, Merrick Avenue, and Atlantic Avenue are heavily traveled local routes.

Baldwin has its own station on the Long Island Rail Road (LIRR) Babylon Branch, which runs from Penn Station in Manhattan to the Village of Babylon in Suffolk County. Based on LIRR ridership statistics from 2006, 2,744 passengers traveled west on this line as part of their weekday morning commute. Three

Nassau Inter-County Express (NICE) bus routes also serve Baldwin, with the N35 line providing critical north-south transit access for residents.

Baldwin is located directly on Hempstead's Middle Bay. It is buffered from the Atlantic Ocean by the Long Beach barrier island and South Shore Estuary, which is home to a large number of wildlife and coastal habitats. The South Shore Estuary is defined by a series of interconnected bays, rivers, streams, wetlands, and small islands located along Long Island's south shore between the mainland and the barrier islands. Approximately 50% of Baldwin's shoreline land, all on the western portion of the Community, is preserved open spaces and parkland. The Community has a direct connection with the Estuary's bays through inlets which allow access for recreational boats and maritime activity via Parsonage Cove and Baldwin Bay.

The Community offers a waterfront lifestyle where residents live and work directly on and near the water. Although proximity to the waterfront is desirable, this has made the community increasingly vulnerable to flooding from storm events including tidal inundation, stormwater runoff, and rising sea levels.



The Baldwin LIRR station (source: Arup)



Homes along the Community's waterfront (source: Arup)

B. Description of Storm Damage

Both Hurricane Irene and Superstorm Sandy led to significant damage to homes, businesses, infrastructure, and natural systems in the Community. However, Superstorm Sandy was a stronger and more unique storm than Hurricane Irene, which is reflected in the extent of damage and impact described below. 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 downgraded to a Tropical Storm upon making landfall. The storm brought heavy rainfall to the Community and a storm surge of more than seven feet (based on the surge height of neighboring NYRCR Freeport).⁵ As was the case during Superstorm Sandy, the Community's Bay Colony neighborhood, due to its waterfront location, was disproportionately inundated with flood waters during Hurricane Irene.

Superstorm Sandy

On the night of October 29, 2012, New York and the tri-state region, which includes New Jersey and Connecticut, were devastated by Superstorm Sandy, the most destructive storm of the 2012 Atlantic Ocean hurricane season. At the time of landfall, Superstorm Sandy was classified as post-tropical, however, several characteristics led to the especially high level and breadth of flooding, including:

- Daily high tide cycles;
- A full moon, which added to the high tides;
- Strong winds; and,
- Moderate amounts of rainfall in upstream areas, which drained through the Community and converged with the incoming storm surge along drainage corridors.⁶

In addition to Superstorm Sandy's impacts, long-term sea level rise has added roughly one foot to local water levels since 1900.⁷

The south shore of Long Island, including the Community, suffered massive storm damage, power outages, sanitary sewer line and stormwater drainage system overflows, and utility and transportation

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.

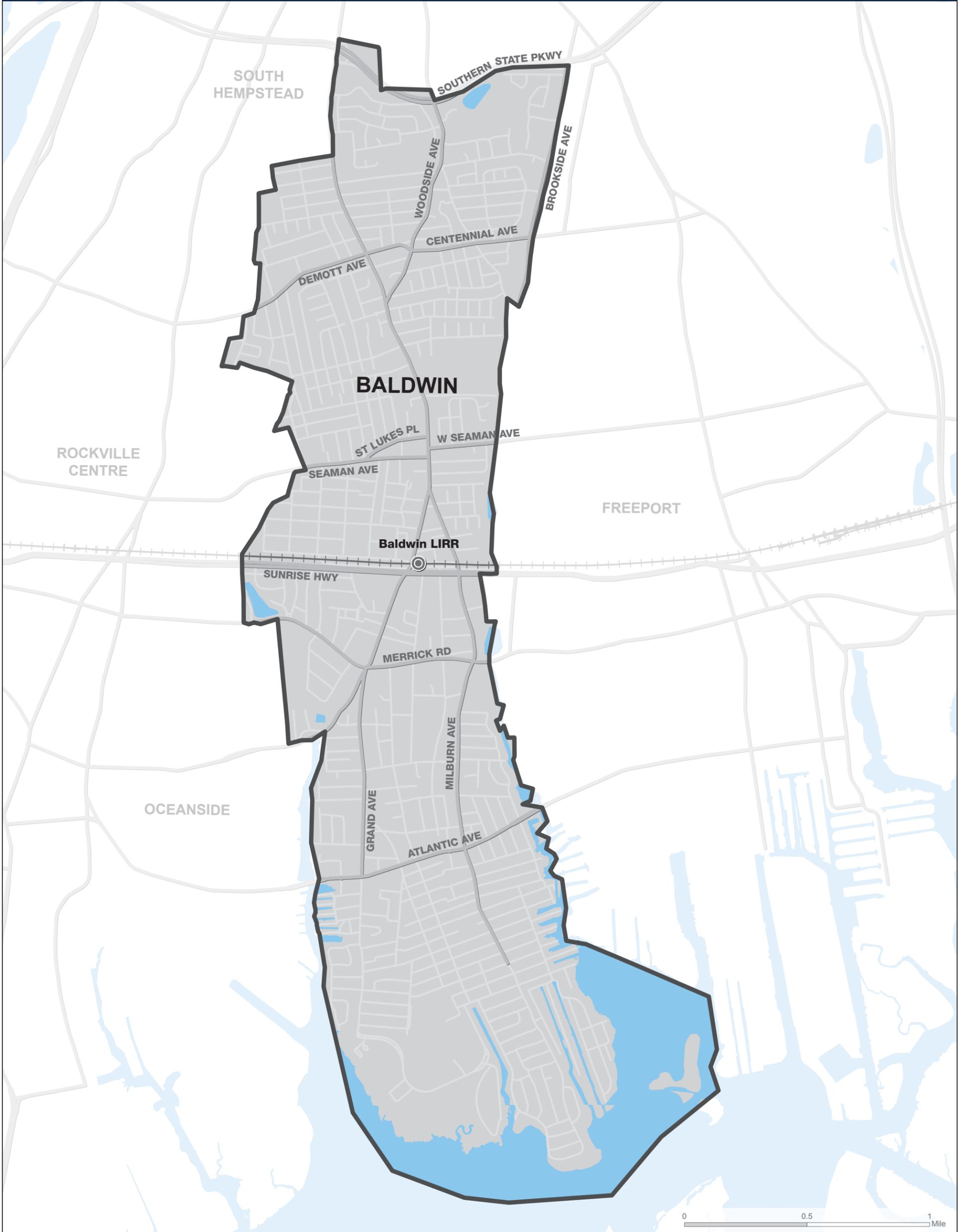
Inundation Flooding: Intense periods of rainfall over inland areas may overflow into creeks and combine with storm surge and high tides to increase the flood severity along the coast. Intense periods of rainfall can also cause flooding in inland areas where there is not sufficient capacity for the water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

disruptions. Few residents were prepared for the extent of the Superstorm Sandy's impacts. In addition, the damage caused by the storm to Nassau County's Bay Park Sewage Treatment Plant was extensive. The Community was directly affected by the damage at Bay Park, with raw sewage spilling into streets and homes. Directly or indirectly, the lives and well-being of virtually everyone in the Community were, and continue to be, affected by the storm.

Superstorm Sandy's storm surge caused major flooding in many areas of the Community. During the storm, the Community experienced a storm surge from the east resulting in more damage to the

Figure 01: Geographic Scope



Legend

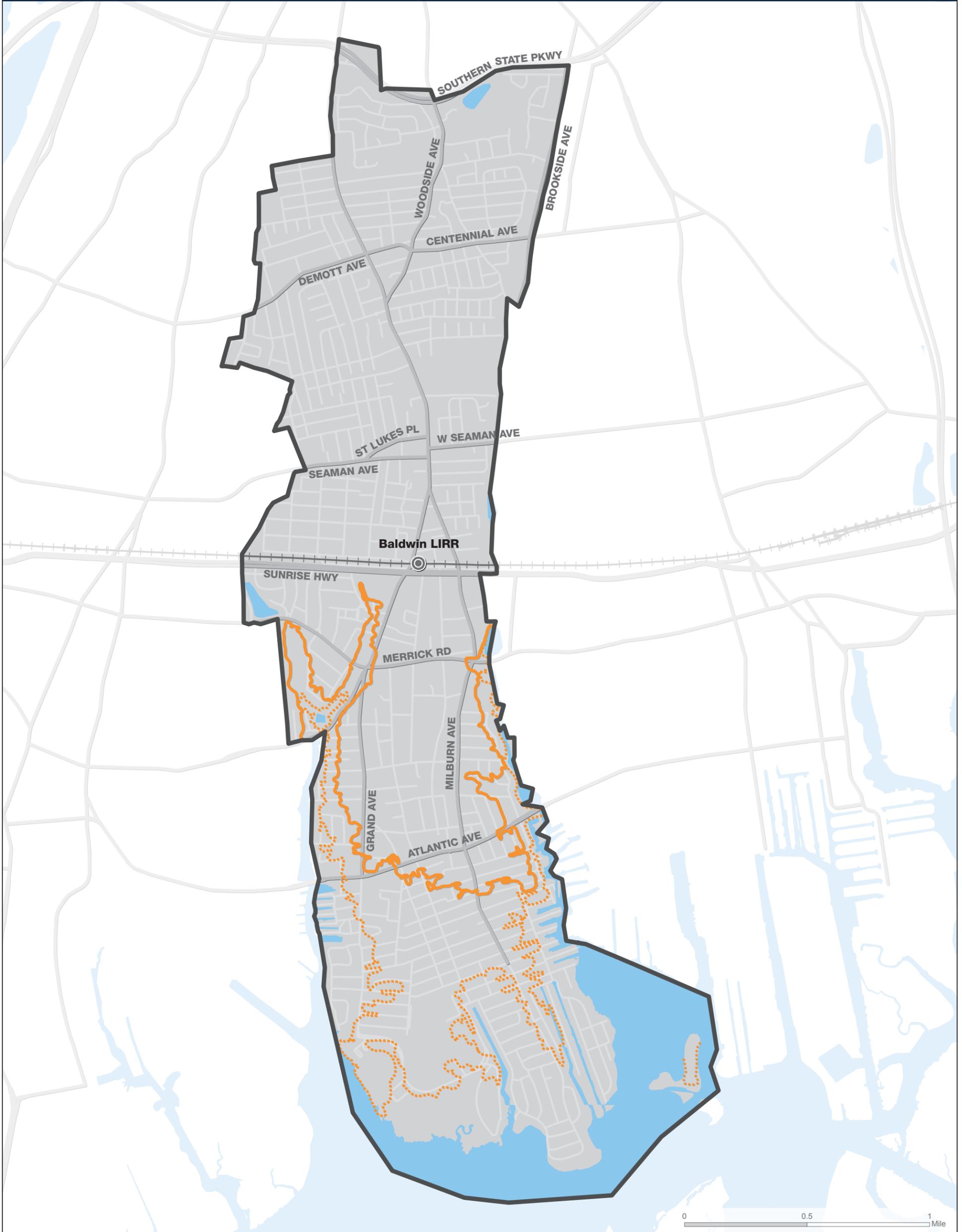
- NYRCR Boundary
- Water
- Long Island Rail Road
- Main Roads
- Local Roads
- LIRR Station

Data Sources

ESRI, NOAA,
US Census,
Nassau County,
NYS DO
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



exposed eastern shores than the more protected western shores. The damage was exacerbated in the Bay Colony neighborhood as high tides combined with the storm surge exceeded the height of bay marshland grasses, which would normally attenuate wave energy. Due to the height of the surge, this potential benefit was not provided. This area had also experienced flooding and downed trees from Hurricane Irene in 2011.

A majority of the storm's flood damage was concentrated in homes and businesses south of Atlantic Avenue. The two tributary systems of Parsonage Cove to the west and Baldwin Bay to the east overflowed and caused flooding that extended north beyond Atlantic Avenue as far as Merrick Road. Flooding from the storm exceeded many of the Federal Emergency Management Agency's (FEMA) 100-year flood zones.

The severity of approaching Superstorm Sandy caused the Nassau County Office of Emergency Management (OEM) and the State of New York to quickly mobilize emergency response efforts, working in partnership with local governments to inform residents of the approaching risks and issue an evacuation order for residents in low-lying areas and storm surge zones.

Community Response

Nassau County issued an Executive Order to evacuate by 2:00 p.m. on October 28, 2012, a day before Superstorm Sandy was expected to make landfall. The order required the mandatory evacuation of all residents living in a flood or storm surge zone, an area defined as south of Merrick Road from Rockville Centre to the Nassau-Suffolk border.⁸ The order instructed residents to utilize Nassau County's coastal evacuation routes, which include Peninsula Boulevard, Long Beach Road, Meadowbrook State Parkway, and Seaford Oyster-Bay Expressway.⁹ The order also instructed residents who required public transportation to evacuate by 7:00 p.m. when NICE Bus and the MTA, who owns the LIRR, would begin to shut down service in preparation for the storm.¹⁰

Nassau County residents were urged to leave the area and take advantage of public shelters or stay with friends and family outside of risk areas. Committee

What makes storm events so damaging?

Coastal communities are subject to a higher degree of risk from storms due to their proximity to water; development is often on filled tidal marshland environments where natural flooding has occurred, making them difficult to protect from the vicissitudes of nature. The Community has long lived with the challenges of a coastal environment and has learned to address risks from hurricanes, tropical storms, and other weather events. The direct impacts experienced by the Community during Hurricane Irene and Superstorm Sandy included:

- Coastal flooding of homes and businesses;
- Wind damage to trees, utility poles and other support structures;
- Localized flash flooding of streets;
- Boat and debris damage to homes, businesses parks, open spaces, and infrastructure; and,
- Backups and overflows of sanitary and stormwater drainage systems due to storm surge and excessive rainfall.

These weather systems continue to impact communities long after a storm has passed. Secondary, or indirect, impacts can be equally as damaging and further destabilize recovering communities. Secondary impacts experienced included:

- Fires from broken gas pipes and exposed electrical wires;
- Contamination of natural environments, homes, businesses and drinking water systems due to fuel and hazardous material spills;
- Corrosion of electrical wires and other utility infrastructure;
- Illnesses related to rotting and molding building components;
- Diminished health from food, water and power shortages;
- Communication and transportation loss due to extended power outages and fuel shortages; and,
- Job losses due to closed businesses.

Members and members of the public reported that many in the Community chose to follow these directives. The American Red Cross, in partnership with Nassau County, began opening public shelters on October 29, 2012, at 1:00 p.m. in the following locations: Nassau Community College, Levittown Memorial High School, Locust Valley High School, SUNY Old Westbury, and Manhasset High School. Additionally, a Pet Shelter was opened at Nassau County Mitchell Athletic Complex in Uniondale, a Special Needs Shelter was opened at Nassau Community College in Garden City East, and an Orthodox Shelter was opened at West Hempstead High School in West Hempstead.¹¹

On October 30, 2012, the day after Superstorm Sandy hit, a number of roads throughout Nassau County were closed due to tidal flooding, debris, and downed power lines, utility poles and trees. County road closures included Long Beach Road, near Southern State Parkway in Baldwin.¹² Local roads such as Barnes Avenue, Parsonage Street, and many others in the southern portion of the Community were also impacted and the lack of transportation access made it difficult for emergency response services to effectively identify areas in need and provide aid to impacted Community members.

On November 2, 2012 food and drink distribution centers and showers were opened, for residents affected by the storm and continued to operate through the following weeks.¹³ On November 5, as temperatures began to drop in advance of an oncoming nor'easter, a type of winter storm that forms in the upper North Atlantic Coast of the United States, warming centers were opened by Nassau County. Warming stations were open from 9:00 a.m. to 6:00 p.m. in public facilities throughout the Town of Hempstead.¹⁴

Despite efforts from the Nassau County Office of Emergency Management (OEM), which mails an emergency preparedness brochure to property owners and occupants once a year, members of the Community commented that many residents were not aware of emergency evacuation routes and shelter locations, or of how best to secure their properties prior to evacuation. Resident feedback collected at the Public Engagement Events indicated that most Community members turned to media outlets such as local radio stations for emergency response and

relief information. After the storm, downed phone lines made it difficult for Community members to receive information from Town and County emergency notification systems. Residents reported that the local Fire Department, the Baldwin Public Schools, and area churches, including St. Christopher's and the South Nassau Christian Church, best served residents after the storm.

In the days following Superstorm Sandy, the Town of Hempstead deployed a number of mobile offices to assist residents with the process of damage assessment, as required by FEMA for communities participating in the agency's flood insurance program. FEMA set up a Disaster Recovery Center at the Baldwin School District Office on November 9, 2012. Disaster Recovery Centers are one-stop shops for eligible storm survivors to get face-to-face help as quickly as possible.

Superstorm Sandy exposed significant vulnerabilities in the Community, which are addressed by the strategies and proposed projects in the NYRCR Plan. Recovery and reconstruction started in the immediate aftermath of Superstorm Sandy and continue to this day. The overall success of the Community's recovery efforts will depend not only on building back what was damaged, but using local opportunities and the support of the NYRCR Program to build back stronger, better and smarter than before.

Home and Business Impacts

The Community's housing stock is characterized by owner-occupied detached single-family homes. Relatively few multifamily units exist in the community, and those that do are located on Grand Avenue off Merrick Road and Atlantic Avenue. Of all assets within the Community, Superstorm Sandy had the greatest impact on housing assets. The storm resulted in heavy damage to 1,270 housing units, which were damaged in excess of 50% or more of their value. Another 620 units were damaged to between 20% and 50% of their value, and several hundred more had damages less than 20% of their value. Based on Damage was caused mostly by flooding, which exceeded four feet in 300 units, ranged between one and four feet in nearly 900 units, and was less than a foot in approximately 300 other units.

Homeowner Assistance

Although damage to privately-owned homes was extensive in some areas of the Community and was a concern raised at NYRCR Public Engagement Events, direct assistance is not part of the NYRCR Plan's articulated strategies and projects. The NY Rising Community Reconstruction Program was initiated to focus specifically on community-wide resiliency initiatives that seek to mitigate the effects of storm events on residents, neighborhoods, and community assets. Other Federal and State programs are assisting homeowners with reconstruction directly. For example, the NY Rising Housing Recovery Program (which, like the NYRCR Program, is a program of the Governor's Office of Storm Recovery) provides housing assistance to help property owners recover, rebuild, or relocate after the devastation of Superstorm Sandy, Hurricane Irene, or Tropical Storm Lee.



Home in the Community being raised (source: Arup)

Rising tides the morning of October 29, 2012, reached low-lying neighborhoods in the Community, flooding streets and yards. At least one fire, at a house on Stanton Avenue, occurred around 10:00 a.m., hours before Superstorm Sandy made landfall. High winds and heavy rain began around noon and many residents began to lose power around 1:00 p.m. as a result of downed power lines and scattered transformer fires.¹⁵

Superstorm Sandy's powerful storm surge tore through homes in the Community's southern neighborhoods, causing one to collapse completely and ripping the roof of another. Canals in the residential neighborhood of Bay Colony, off Northern Boulevard, were filled with trash and debris carried by the flood water. Boats moored along the Community's waterfront were ripped from their moorings and slammed into docks and neighboring properties by the force of the storm surge.

The engines for the Bay Park Sewage Treatment Plant's main pumping system were flooded by nine feet of water, which destroyed the plant's electrical system and compromised many other critical systems. The plant went offline at approximately 10:00 p.m. on October 29, 2012, for approximately 58 hours. After the implementation of an emergency

recovery effort, power was restored and influent/raw sewage pumping re-established at approximately 6:00 a.m. on November 1, 2012. No sewage remained around critical equipment after the sea water receded at the next low tide. A Conserve Water Order was issued to residents in the affected service area, which falls within the Community, to reduce the amount of additional wastewater entering the system.¹⁶ Damages to the Bay Park Sewage Treatment Plant are discussed in detail later in this Section.

To facilitate post-Superstorm Sandy rebuilding efforts, the Town of Hempstead eliminated the requirement for homeowners to obtain a zoning variance prior to increasing foundation and overall home height to meet FEMA National Flood Insurance Program (NFIP) minimum elevation requirements.¹⁷ The Town's Building Department waived building permit and plumbing permit fees for in-kind reconstruction and replacement of damaged homes through the end of March 2014. Additionally, the Department extended hours for Plan Examiners to meet with residents who were or still are repairing or rebuilding storm damaged homes, and modified approved construction hours have been modified to allow work on weekends.

While nearly all of the Community's commercial corridors are located outside of FEMA Special Flood Hazard Areas (SFHAs), a small number of businesses are located in a Zone AE (1% annual chance flood) SHFA and were flooded by Superstorm Sandy.¹⁸ Portions of Grand Avenue and Merrick Road that run along inlets and inland ponds suffered flood damage, including areas around Silver Lake. The entire section of Atlantic Avenue near Milburn Creek and up to Milburn Pond was inundated as well. Although there is some marina and beach development in Baldwin Harbor, it is largely limited to private boat clubs. Several Community businesses, such as Sonny's Canal House Restaurant which was flooded by six and a half feet of water, were severely damaged. While some businesses like Samuel Kolstein & Son Ltd. and Manhattan Refrigeration rebuilt their facilities and reopened a few months after the storm, many other businesses are still rebuilding or permanently closed.¹⁹

Many gas stations throughout Long Island suffered power outages for their pumps and shortages of fuel to sell, as 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 much faster.



Damage to the Bay Park Treatment Plant caused sewage to back up into streets and homes (source: LI Herald)

Environmental Impacts

A significant portion of the Community's shoreline has been preserved as open space and parkland. Public facilities include Silver Lake Park, Milburn Creek Park, Baldwin Park, and Mumby Pond. There are also private facilities including Oakwood Beach Club and private marinas.

A large part of the Community's defining characteristics, which residents report differentiate it from neighboring areas, are its verdant landscape and tree-lined streets. These are beloved and important assets. The local landscape, however, has been heavily impacted by last few natural disasters, which have caused widespread damage to trees in the Community from extreme winds and saturated soils that inflict widespread damage to trees in the Community.

Superstorm Sandy's storm surge washed out many parks and wetlands and carried trash and debris into local wetlands and waterways. Baldwin Park was flooded, but no major damage was sustained since the inundated areas were predominantly playing fields. This park was also flooded during Hurricane Irene, which damaged a building, which is now vacant, but was then occupied by the Board of Cooperative Educational Services (BOCES), which is now vacant. Oakwood Beach Club's beach eroded during Superstorm Sandy; but the pools and clubhouse remain. Silver Lake Park and Milburn Creek Park were also flooded but not significantly damaged by the storm.



The Oakwood Beach Club was damaged by Superstorm Sandy and Hurricane Irene (source: Arup)

Household chemicals, fuel from damaged boats, and gas and oil tanks were carried away by floodwaters and deposited in wetland areas, coating the water and wildlife in leaked fuel and other contaminants. The nonprofit organization Operation SPLASH (Stop Polluting Littering and Save Harbors) estimates that Superstorm Sandy deposited more than a million pounds of garbage into the South Shore Estuary, from car tires to boats and building components. Saltwater marshlands off the Community's waterfront remained covered with debris for months after.

Infrastructure Impacts

As shown previously in Figure 02, 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 were inundated and receding floodwaters left roadways littered with heavy debris. Heavy winds knocked down traffic signals, utility lines, and trees throughout the Community, including one on Grimm Place, which fell across and blocked the entire street. Many roads were impassable and unsafe. 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.²⁰

Based on Committee, Consultant Team, and resident feedback, it is believed that flooding may have been exacerbated by missing or malfunctioning tidal check valves on stormwater outfalls. It is estimated that there could be more than 200 tidal check valve locations in the Community but due to incomplete data it is unclear how many of these need maintenance, replacement, or repair.

Superstorm Sandy left LIRR tracks covered in debris from downed trees and utility poles. A segment of the Babylon Branch located east of the Community was blocked after three 90 ft. LIPA utility poles snapped at their bases and tilted over the tracks. More than 20 substations across the LIRR ultimately lost power because of the storm.²¹ Partial train service was restored to the Babylon Branch on Friday November 2, 2012, four days after the storm. By Monday, November 5, trains were operating on a modified weekday schedule and service was almost completely restored within the following week.²²

Cellular communication networks were down for days after the storm, as many cellphone 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. Because of these outages, emergency notification systems were rendered ineffective for many Community residents.

Although water supply infrastructure was not affected by Superstorm Sandy, the Bay Park Sewage Treatment Plant was critically damaged. Although workers at the Plant spent days installing emergency protection measures, they had not anticipated the force of the storm surge. In less than 30 minutes, the Plant's main pumping system was flooded by nine feet of water, destroying the plant's electrical system and compromising many other critical systems. The plant went offline at approximately 10:00 p.m. and sewage began to back up and overflow into low-lying homes in the Bay Park Sewage District. The Plant was offline for more than 50 hours, and approximately 69 million gallons of raw sewage was released into nearby channels and waterways.²³ The facility continued to release under-treated sewage from November 1, 2012, to December 14 before it was fully functional. Community residents were advised to limit wastewater entering the sewer system and avoid contact with sewage backup at manholes and basement drains.²⁴

Flooding from the storm caused a 48 in. force main and sub-ground sewage vault to burst under Barnes Avenue, west of 3rd Place, releasing sewage into the neighborhood. The sewage mixed with the rising flood waters and went into houses, creating a health hazard to residents.²⁵ A state of emergency was declared by Nassau County for portions of the Community near Barnes Avenue to facilitate the cleaning out and decontamination of homes and other affected areas.²⁶

At the peak of Superstorm Sandy's impact, more than 90% of Long Island Power Authority (LIPA)'s 1.1 million electricity customers lost power.

The utility's transmission and distribution system sustained damage at more than 40,000 locations, including 51 substations, 4,400 distribution poles, 2,500 transformers and 400 miles of power lines. Outages were expected to last no longer than ten days. However, on the November 7, 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 where electrical work and certification was required before the premises could be safely energized.²⁷

A number of other critical infrastructure systems were affected by power outages and storm surge waters. Storm surge filled the already over-capacity stormwater system causing localized flooding further inland. Some residents suffered natural gas outages and damaged equipment and lines created potentially dangerous situations. Seawater entering residential fuel tanks displaced the oil inside, forcing it out and into surrounding yards and homes. Aboveground tanks were ripped off their foundations and carried into nearby properties and in some instances flooding caused buried fuel tanks to float up out of the ground.²⁸

C. Critical Issues

Damage from Superstorm Sandy and Hurricane Irene uncovered critical issues with the Community's natural and built environment. The damage directly and indirectly impacted residents, homes, businesses, sanitary and stormwater sewers, energy infrastructure, public facilities, and natural resources.

It is crucial that these issues be understood and addressed in a manner that makes the Community more resilient, on a regular basis and in the wake of potential future disasters. The strategies and projects that are included in Sections III and IV of the NYRCR Plan are designed to tackle these issues. The following critical issues facing the Community are discussed:

- **Flooding and Drainage:** Drainage issues from Superstorm Sandy and Hurricane Irene are a consequence of tidal action, storm surge, and stormwater runoff. Flooding made it difficult for many Community residents and first responders to travel on main and local roadways. Even prior to these storms, there were areas within the Community that regularly flooded during high tide or moderate rainfall events. Drainage infrastructure improvements have not been made in concert with increases in population and detailed records are incomplete. Furthermore, asset ownership is complex and responsibilities for maintenance and renewal are unclear.
- **Housing in High Risk Areas:** Almost 2,000 homes in the Community – approximately 20% of all housing units – are located within NYS DOS identified extreme or high risk areas (defined in Section II), demonstrating a significant risk to life and property. Damage from Superstorm Sandy contributed to the destabilization and decrease of home values. The cost of home ownership has and will continue to increase for many due to repair and maintenance needs, and higher flood insurance premiums.
- **Shoreline Protection:** The Community has seen a steady decline in marshland areas as decades of development have replaced these ecological systems. Open space and parkland along the shoreline have been damaged by recent storms. Marshlands serve many critical functions related to the ecological health of the Estuary's bays, public health and well-being, and economic development. Channeling and bulkhead construction have created a hardened shoreline that resists regular tidal movement and erosion, but does little to soften the blow of major storms. This hardening has also reduced water quality by removing marshland, which naturally filters sediment and other pollutants from the water. Moreover, inconsistent bulkhead height and irregular maintenance have weakened the ability of these structures to mitigate erosion and flooding.
- **Energy Infrastructure:** While flooding caused the most obvious and extensive destruction in the Community, loss of power was also a significant issue for local residents and businesses and one that threatened lives and safety. Much of the power loss was due to fallen trees damaging above-ground power lines and utility poles. A lack of switches within the electrical grid meant that more homes and businesses were impacted when other parts of the grid were down. Many critical public and private facilities were not adequately equipped with emergency backup power supplies. The lack of power to streetlights left residents with dark, flooded roadways.
- **Economic Challenges:** Many local retailers were closed for extended periods due to damage from Superstorm Sandy and some never reopened. While most business owners were able to survive and rebuild, the loss of revenues combined with the financial investment required for repairs created a significant financial loss. Faced with another major storm, it is unlikely that many smaller businesses would be able to bear the costs of reopening. The loss of local retailers and businesses may also affect the character of the Community's neighborhoods, leaving storefronts and other commercial properties vacant and in disrepair.
- **Information, Communication, and Access to Resources:** Community members reported issues with the communication of emergency preparedness and response information before, during, and after Superstorm Sandy. Before,

some residents did not heed warnings to evacuate until it was too late, putting emergency responders at risk. During and after the storm, power loss, downed communication lines, and inoperable cellular towers left residents unable to access critical information such as the locations of distribution centers and public shelters. In the wake of Superstorm Sandy, many residents and businesses have struggled to understand the resources available for recovery and the requirements of reconstruction.

- **Rebuilding and Recovery:** The damage to public and private property in the Community from Superstorm Sandy is significant and remains an issue. Many homeowners are still struggling to restore or improve their residences. Many critical public infrastructure assets are operating sub-optimally as a result of the storm or are at risk should another major storm event occur. Although the NYRCR Plan strives to look forward and lay the groundwork for significant strides in community resiliency, economic development, and environmental protection, Community residents are committed to restoring what was lost.
- **Regional Connections:** Many coastal communities on Long Island feel similar impacts during storm events. They must rely on inland communities for shelter and services. Due to Long Island's development patterns and governmental structure, the infrastructure networks and service districts in many communities are closely interconnected and/or overlap. Most hamlet communities do not have the local 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. They also do not reflect current best practice with regards to green building. Many support centers designated to provide assistance to storm victims were ill-equipped, lacking reserve power or other necessary services to support displaced residents.



Bulkheads are primarily intended to help control erosion (source: Arup)



Many homeowners are still struggling to restore their residences after Sandy (source: Arup)

D. Community Vision

Through a combination of input received from the community during Public Engagement Events and the work of the 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 Plan and have been used to guide strategies and proposed projects. They should serve as an ongoing reminder of what the Community aims to achieve.

Community Vision

Vision for a Resilient Future

The Vision for the NYRCR Baldwin Community is to make balanced investments in Community infrastructure and create a sustainable and resilient Community that values diversity, quality of life, natural resources, and economic development while maintaining a positive relationship to the water.

Goals for the Future

The NYRCR Baldwin Plan strives to:

- Support local business resilience by encouraging business continuity, crisis management planning, and technology and financial resilience.
- Acknowledge the hazards and vulnerabilities associated with future storms to encourage thoughtful, sustainable redevelopment.
- Rebuild homes and commercial buildings that are resilient in design and location.
- Develop innovative and natural solutions to coastal storm surges and erosion management.
- Enhance public open space so it serves multiple purposes, such as recreation, resilience and refuge.
- Protect fresh water resources and improve stormwater management.
- Leverage Baldwin's civic pride, diversity, and high quality of life to rebuild the residential, commercial and services communities.
- Ensure proper health and social services are accessible to all residents on a daily basis and in emergency scenarios.
- Provide emergency infrastructure to all first response facilities and improve communication network redundancy.
- Ensure public safety during and after major natural events.

E. Relationship to Regional Plans

Many Long Island communities, particularly those on the south shore, share common issues and concerns related to reconstruction, recovery, and resiliency. These communities may share similar patterns of development, interconnected infrastructure systems, overlapping municipal service provision areas, and a common coastline. This dynamic demands a regional perspective on the challenges facing the Community so local solutions take into account and leverage regional considerations. Several groups have independently undertaken research and analysis of existing problems and concerns, and have developed recommendations based on their findings.

The NYRCR Plan is informed by these existing planning documents and efforts, several of which offer relevant strategies, projects, and actions. A list of the regional and sub-regional plans reviewed is shown in Table 02. 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 are applicable at a local level.

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

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

- **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. This includes Nassau County Office of Emergency Management's (OEM) *Nassau County Multi-jurisdictional Hazard Mitigation Plan (2009)*,²⁹ The County OEM also developed the *Nassau County Disaster Debris Management Plan (2009)*³⁰ to facilitate and coordinate the management of debris following an emergency

or disaster, specifically a hurricane or nor'easter event. The Community residents' experiences during Superstorm Sandy have heightened their desire for greater access to information and resources before, during, and after a similar emergency.

- **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. The *Draft Nassau County Master Plan (2010)*,³¹ *New Vision for the LI Economy (2010)*,³² *Sustainable Strategies for Long Island 2035 (2010)*,³³ and the *Cleaner Greener Long Island Regional Sustainability Plan (2013)*³⁴ all favor investment in energy efficiency and conservation, renewable energy sources, and distributed energy generation strategies to increase energy independence and reduce ratepayer costs.

- **Equitable and Supportive Communities:**

Providing equitable social, educational, housing, and workforce opportunities for all of Long Island's residents is essential to the long-term sustainability. Long Island's population is increasingly diverse; according to *Sustainable Strategies for Long Island 2035 (2010)*, 54% of the population will be non-white by 2035.³⁵ In Nassau County, 32.2% of the population is Black or African American, Hispanic or Latino, or Asian as of 2010.³⁶ At the same time, minority populations remain concentrated in certain areas, while the populations of many communities are more than 90% White. The population is also aging, and it is important that Long Islanders welcome newcomers and provide opportunities and a high quality of life to all racial, ethnic, and age groups. This includes meeting the health needs of an aging, diverse population.

- **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. The *LI 2035 Visioning Initiative (2009)*³⁷ and *New Vision for the LI Economy (2011)*³⁸ incorporate recommendations for consolidating overlapping or

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 2011 with 2012 and 2013 update	Long Island Regional Planning Council, Long Island Comprehensive Economic Development Strategy Committee
LI 2035 Visioning Initiative	December 2009	Long Island 2035 Study Team
Long Island's Rental Housing Crisis	September 2013	Regional Plan Association
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

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

Document Name	Date Published	Author
Progress and Promise – Building a Foundation for Long Island’s Future (Update)	September 2012	Long Island Regional Economic Development Council
Significant Coastal Fish and Wildlife Habitat Assessments Narratives	2008	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

duplicated services, streamlining permitting processes, and establishing more comprehensive land use regulations.

- **Housing:** Nassau County is dominated by single family housing, with a majority of units more than 50 years old. Escalating home prices and property tax levels prior to Superstorm Sandy have limited the stock of housing available for the County's young and aging population, low-income residents, and those displaced by previous storms. Plans such as the *LI 2035 Visioning Initiative* (2009),³⁹ *Sustainable Strategies for LI 2035* (2010),⁴⁰ and the *Nassau County Infill Redevelopment Feasibility Report* (2013)⁴¹ recommend an increase in smaller, affordable housing and rental developments. Following the impacts of Superstorm Sandy it is uncertain if home prices will continue to decline or rebound to pre-storm values.

- **Infrastructure investment:** The *LI 2035 Visioning Initiative* (2009)⁴² and *Sustainable Strategies for LI 2035* (2010)⁴³ identify the challenges facing Long Island's aging infrastructure as it struggles to accommodate population growth while adapting to the increasing threat of storm events and sea level rise. Roads, bulkheads, and power and gas lines have been particularly affected by flooding and storm damage.

Additionally, the transportation network no longer best serves Long Island's present-day commuting patterns and should be re-evaluated to better accommodate both regional and local mobility. Infrastructure investment has consistently been identified as critical to the region's growth and economic viability.

- **Transit-oriented development:** *Places to Grow* (2010)⁴⁴ and *Sustainable Strategies for LI 2035* (2010)⁴⁵ suggest Transit-oriented development (TOD) and transit-supportive development (TSD) as an opportunity to preserve the quality of life of communities while allowing for future growth. Combining this with the need for affordable and resilient housing provides an opportunity to combine housing needs with TOD resulting in a more resilient community.

The Community has engaged in a number of local planning efforts to improve quality of life for its residents and to provide resilience against future storm impacts. The *Nassau County Infill Redevelopment Feasibility Study* (2013)⁴⁶ is one of sixteen "place-based" projects advanced by the New York-Connecticut Sustainable Communities Initiative (Sustainable NYCT). These projects reduce reliance on automobiles and establish new land use and economic development mechanisms/structures that embrace multi-modal transportation opportunities and promote growth that is economically, socially and environmentally sustainable. The Community was selected as one of three pilot station areas for the study, which will include a detailed assessment of how TOD will increase access to jobs, incentivize and facilitate use of public transit, and encourage mixed-income housing options, all of which also support resiliency.

- **Water resources:** Flood management, water conservation, and environmental protection have been recurring themes in many of the documents studied, specifically the *South Shore Estuary Reserve Comprehensive Management Plan* (2001),⁴⁷ the *Nassau County Stormwater Management Program Plan* (2009),⁴⁸ and the *South Shore Estuary Reserve Workplan Implementation* (2010),⁴⁹ and are evident in the strategies and projects included in the NYRCR Plan.

As part of the *Nassau County Storm Water Management Program Plan* (2009),⁵⁰ Silver Lake Park, Lofts Pond, Milburn Pond and Storm Water Basin 500, and Brookside Preserve were included in a control measure for post-construction stormwater management projects that were part of a County-wide capital plan to improve various streams, ponds, and waterways.



Section II: Assessment of Risk and Needs

As part of developing the New York Rising Community Reconstruction (NYRCR) Baldwin 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 risk analysis of community assets to supplement the qualitative information collected at NYRCR Planning Committee (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 the NYRCR Baldwin Community (Community). Many of the Needs and Opportunities addressed in the NYRCR Baldwin Plan (NYRCR Plan) are a result of recent storm damage to the Community, and take into account the ongoing risk faced by Community assets. This includes lost economic opportunities attributed to damages as well as opportunities for rebuilding or expanding the local economy and making new and existing assets more resilient.

A. Description of Community Assets and Assessment of Risk

Community assets are places or things where economic, environmental, and social functions of the Community take place. Assets may be part of the built or the natural environment. Community assets were initially identified through data collected from New York State and Nassau County Geographic Information System (GIS) databases. Using GIS software, this data was filtered to include only assets within the geographic scope of the Community. Attribute information contained within different datasets was used to parse individual assets into the following asset class categories: Economic, Health and Social Services, Housing, Infrastructure Systems, and Natural and Cultural Resources.

Asset information was combined with NYS DOS hazard maps to identify individual assets in each risk zone. Hazard maps incorporate a full range of coastal risks and consider both the frequency and impact

of flooding. These maps, prepared for the NYRCR Program by NYS DOS with assistance from the National Oceanic and Atmospheric Administration Coastal Services Center (NOAA-CSC) and FEMA, identify three levels of risk based on aggregated information for multiple hazards. These risk areas are qualified as subject to extreme, high, and moderate risk from inundation and erosion from future storm events and sea level rise. Community risk areas 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.

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.

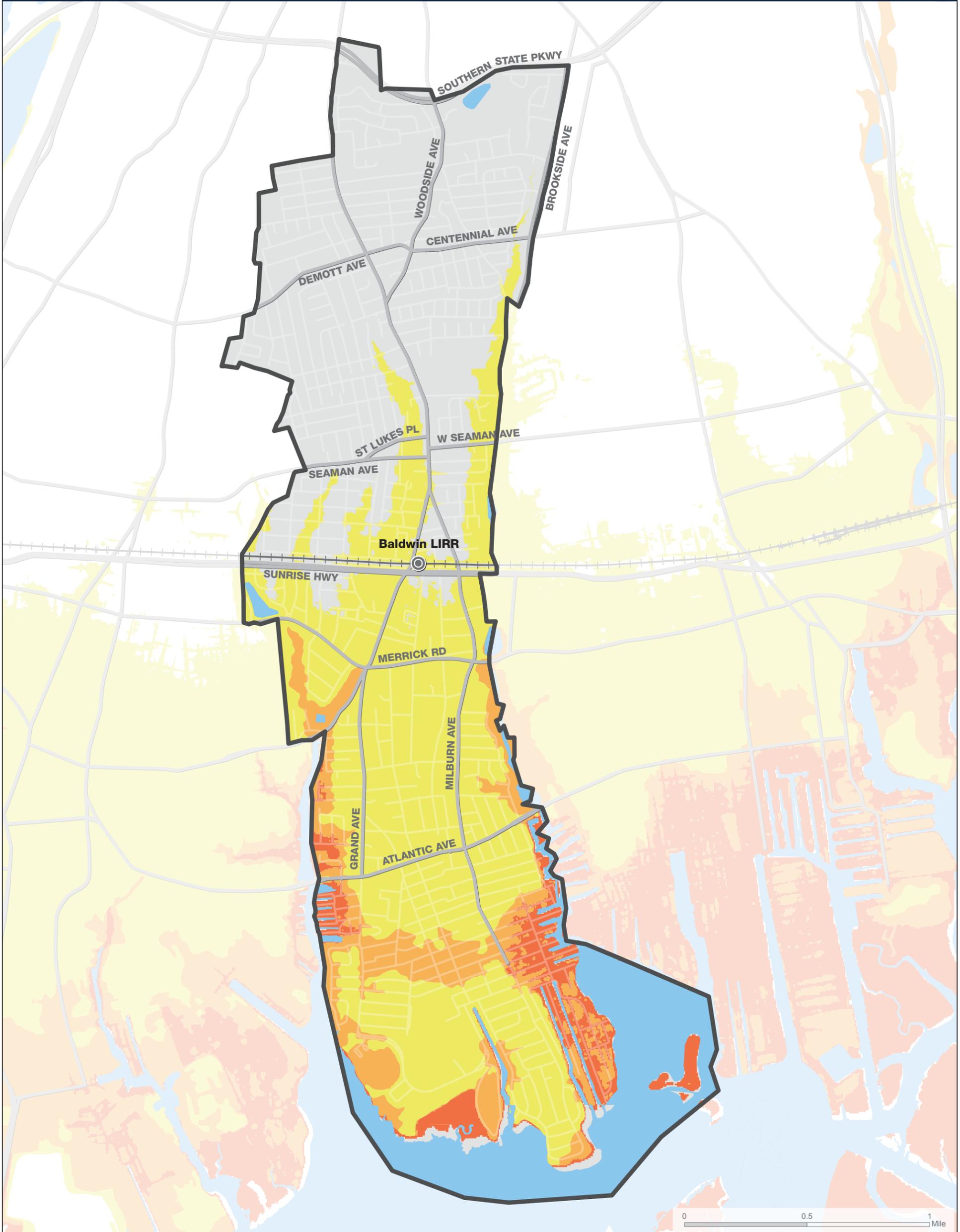
Health and Social Services: These assets include schools, health care, day care, elder care, emergency operations, government and administrative services, media and communications, police, and fire and rescue.

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.

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

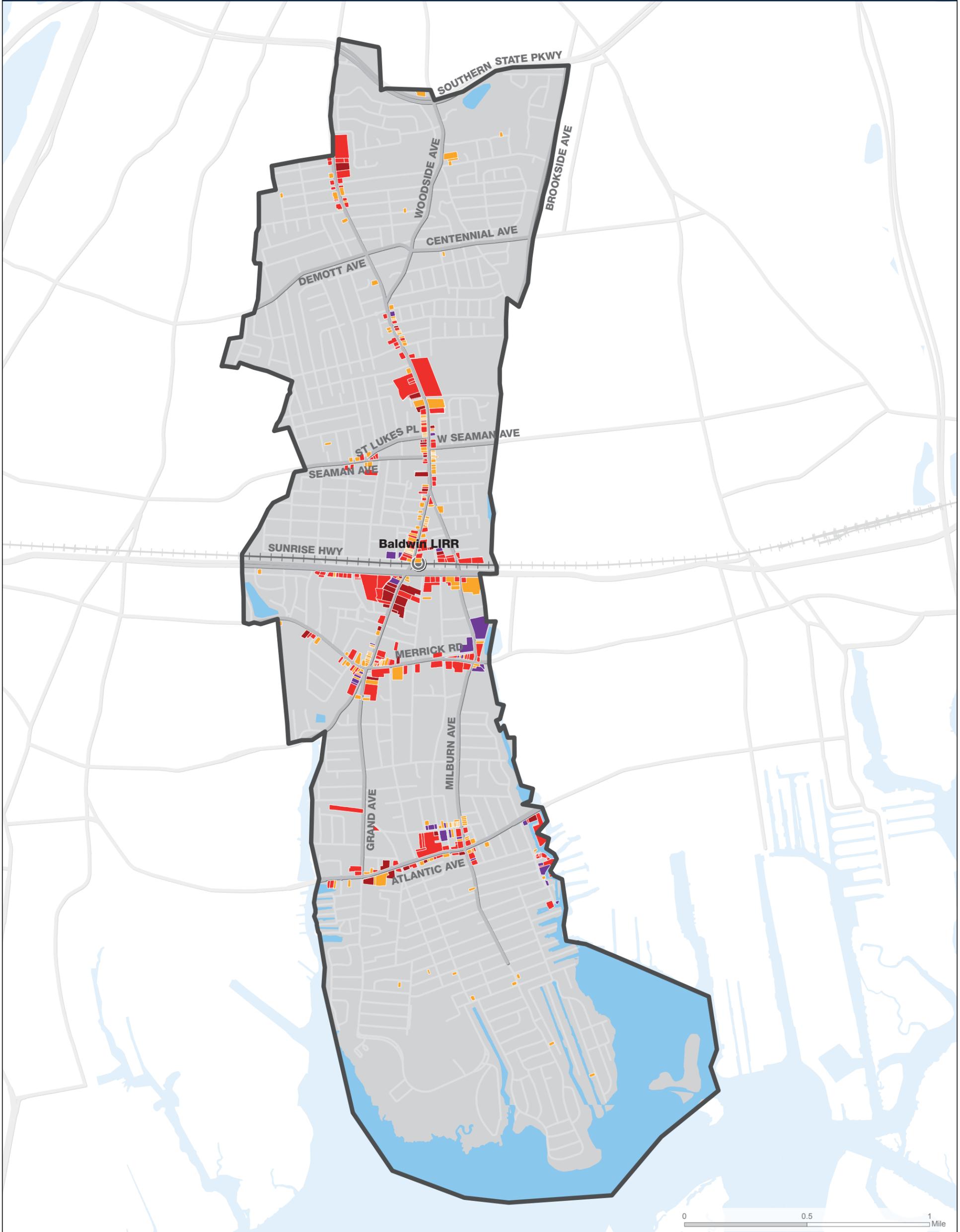
- Extreme
- High
- Moderate

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



i. Description of Community Assets

The following presents a summary of Community assets that have been affected by previous storms or are at risk to future impacts, organized by asset class. Assets were identified through a combination of research and data analysis, meetings with local officials and community figures, and Community member feedback.

Asset information was periodically reviewed at Committee Meetings, and residents were asked to annotate or amend asset maps presented during the first two Public Engagement Events. Table 03 and Table 04 at the end of this section identify the total number of assets located in extreme, high, and moderate risk zones in each asset class.

Economic

The majority of commercial property tax value in the Community (68.8%) is located in moderate risk zones, with 0.6% in extreme risk zones, 1.1% in high risk zones, and 29.5% located outside of hazard areas. Compared to other commercial uses, only vacant commercial property has a greater share of value (6.4%) in extreme risk zones. Office and retail uses are the most likely to be flooded, with a respective 1.5% and 1.2% of property value in high risk zones. The Community's industrial land uses, which are typically located in higher risk areas, are overwhelmingly located in moderate risk areas or outside of risk zones.⁵¹

Nearly all of the Community's commercial corridors, shown in Figure 04, are located on high ground. Although there is some marina and beach development in Baldwin Harbor, it is largely limited to private clubs. Storm-related damage has had little effect on public waterfront activity.

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, and administrative assets such as schools, government facilities, libraries, and community centers.

The Community has very few Health and Social Services assets located in the extreme and high risk zones. Of these assets, two schools – Baldwin Middle School and Meadow Elementary – sit in a moderate risk area on the southern peninsula that can become cut off during extreme flooding events.

Housing

Over the five-year period from 2007 to 2011 for which data is available, the Community's housing stock consisted of 10,863 units of which 10,288 were occupied by households and 635 or 5.8% of total units were vacant. The housing stock was dominated by detached single-family homes, much like other communities in southeastern Nassau County, but more so than in Nassau County as a whole. The homeownership rate is 83.5% and there are 1,686 rental housing units, more than three-quarters of which are north of Sunrise Highway and largely clustered around the Baldwin LIRR station.⁵² The number and location of rental households in the Community is shown in Figure 05 on the following page.

Infrastructure Systems

Most of the Community's critical infrastructure assets lie outside of the extreme and high flood risk zones. Key infrastructure assets within these zones include sanitary sewer pump stations, local roadways, power lines, and bulkheads. The LIRR skirts the northern edge of the moderate risk zone and is elevated throughout the Community, making this system quite resilient to flooding.

Natural and Cultural Resources

The Community's bays and marshlands are important natural and recreational assets. Over the last 80 years, significant areas of coastal wetlands have been filled to create land for residential development and have directly resulted in the degradation and loss of wetland areas. Subsequently, this 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. The material used to dredge these canals was used to fill in the wetlands, laying the ground for waterfront development. Silts and sedimentation

from stormwater runoff, however, has reduced the navigability of these canals, and regular maintenance dredging must be performed to keep silt and sedimentation to manageable levels.

The Community also has a number of Town of Hempstead and Nassau County parks. Nassau County's Silver Lake Park and Hempstead's Baldwin Park are located in both extreme and high risk zones. Silver Lake Park is part of a series of connected basins and ponds that collect and hold a portion of the Community's stormwater runoff. This capacity has been highlighted as a focal point for flood reduction measures and is included in one of the proposed projects in the NYRCR Plan.

Asset Inventory

As the Community has more than five thousand at-risk assets, it was considered impractical to run a quantitative risk assessment for each of these entries. For this reason, the inventory used for the risk assessment was refined to consider only key assets, which were identified using the critical asset criteria established by the FEMA, or were highlighted through Committee and public feedback.

Assets defined by the Committee include schools, pharmacies, medical centers, 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.⁵³ Key asset locations identified through this methodology are shown in Figure 06.

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

function provided during emergencies (e.g., a library or 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.

Additionally, each key asset was also screened based on its importance to the Community's socially vulnerable populations. The finalized key asset inventory is located in Section V.

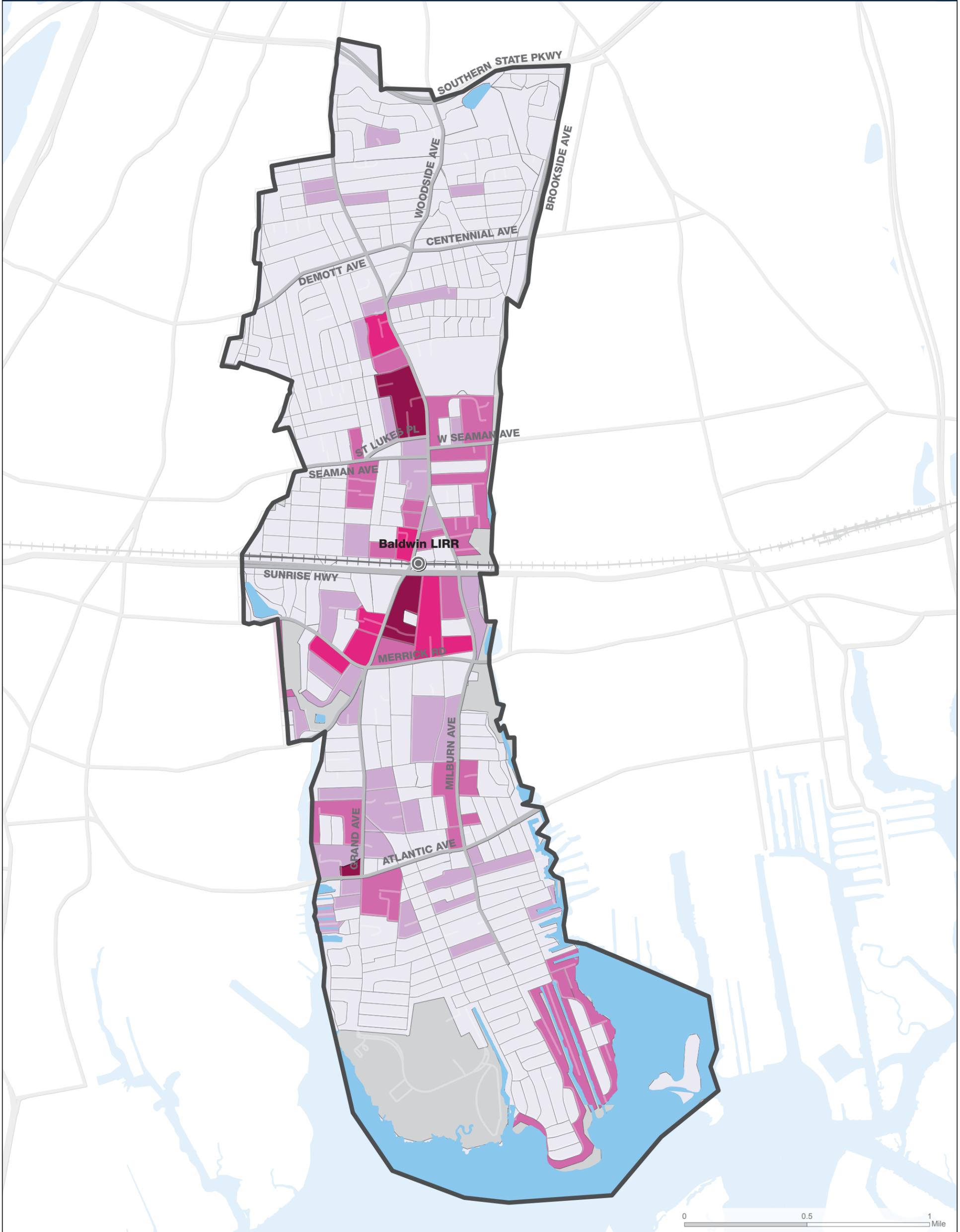
ii. Assessment of Risk to Assets and System

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

$$\text{Risk} = \text{Hazards} \times \text{Exposures} \times \text{Vulnerability}$$

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

Figure 05: Rental Housing



Legend

- NYRCR Boundary
- Long Island Rail Road
- LIRR Station

US Census Blocks, 2010

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

Data Sources

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



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Table 03: Community assets located in risk areas

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Health and Social	Assisted Living Facilities	1	0	0
	Community Centera	1	0	0
	Day Care Facilities	13	1	3
	Emergency Services	7	0	0
	Government	6	2	0
	Hospital	1	0	0
	Library	1	0	0
	Other Medical	2	1	0
	Pharmacy	6	0	0
	School	11	0	0
	Veterinary	1	0	0
Natural and Cultural	Beach	0	1	1
	Cultural	0	0	0
	House of Worship	19	0	1
	Parks	2	3	0
	Recreation	3	3	0
	Wetlands (acres)	16	11	0
Infrastructure Systems	Power Facility	0	0	0
	Rail Bridges	2	0	0
	Rail Stations	1	0	0
	Roads (miles)	38	9	5
	Road Bridges	0	2	0
	Sewer Pump/Treatment	1	3	0
	Water Treatment Plants	1	0	0
	Water Wells	0	0	0

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

Asset Class	Asset Sub-Class	Moderate	High	Extreme
Housing	Low Density Residential Units	3,186	726	814
	Medium Density Residential	230	35	35
	High Density Residential	115	0	1
	Assisted Living Facilities	1	0	0
Economic	Commercial Parcels	65	0	16
	Industrial Parcels	13	4	3
	Mixed Use Parcels	67	7	2
	Retail Parcels	74	3	1
	Bank/ATM	14	0	0
	Industrial Facility	1	2	0
	Lodging	1	0	0
	Marina/Boat/Pier	0	0	0
	Office	1	0	0
	Post Office	1	0	0
	Restaurant/Food/Caterer	27	1	0
	Retail	42	2	1

Table 04: Summary of community assets located in risk areas

Asset Class	Moderate	High	Extreme	Total
Health and Social	50	4	3	57
Natural and Cultural*	24 (16)	7 (11)	2 (0)	33 (27)
Infrastructure**	5 (38)	5 (9)	0 (5)	10 (52)
Housing	3,532	761	850	5,143
Economic	306	19	23	348

- **Exposure:** Local topographic and shoreline conditions can increase or decrease the effect of hazards on assets. Exposure is the measure of this influence on potential storm impacts. The tool assesses landscape attributes such as erosion rate, beach width, and the presence and condition of natural or engineered protective features will be considered when determining asset exposure.
- **Vulnerability:** Vulnerability reflects the level of impairment or consequences that assets may experience during and after a storm event. It is the measure of an asset's ability to resist damage. In the context of vulnerable populations, it reflects the difficulty of evacuation or relocation relative to population size. Vulnerability will be determined by studying previous storm impacts and using local knowledge to develop an estimate of future effects.

The hazard and vulnerability scores for each asset were assessed based on guidance from the risk assessment tool, and augmented with input from the NYRCR Baldwin Planning Committee. The risk assessment tool was also modified slightly to reflect the fact that the Community does not have significant beach-type coastal defenses, and the tool's designated landscape attributes could not be applied to individual assets. For more information on the NY State Risk Assessment Tool, please see *Guidance for New York Rising Community Reconstruction Plans: A Planning Toolkit for Committees* (2013).⁵⁴

Findings

Flooding is a significant risk for the Baldwin Harbor area of NYRCR Baldwin, with large tracts of housing in the extreme or high flood risk areas, or at risk of being cut off by street flooding. The latter condition particularly affects Baldwin Middle School and Meadow Elementary School.

In addition, Parsonage Creek and Milburn Creek on the west and east edges of the Community carry flood water and storm surge deeper into the community, as far north as Merrick Road to Silver Lake Park and Milburn Creek Park, causing more localized flood risk in those areas even during regular

high tide and rainfall events. Key mitigation measures are protecting residential roads around these areas, especially in the eastern section of Baldwin Harbor, and providing assistance centers for residents who will frequently be displaced by flooding. Pump stations which support these neighborhoods also need additional protection.

Three of NYRCR Baldwin's Parks and the Oakwood Beach Club are subject to extreme or high flood risk. These assets, highlighted as being of importance to the community, suffered damage in both Superstorm Sandy and Hurricane Irene and need enhanced protection against future storm damage.

In total, there are more than 1,500 assets in the high and extreme flood risk areas. Through the Community Engagement process, approximately 35 key assets were identified, and the risk assessment process helped identify which of those assets had increased potential for storm damage. These 19 assets are identified in Table 05 and categorized by asset class

Risk scores help to identify community assets with increased potential for storm damage and were used to help develop projects for the NYRCR Plan. Risk scores were evaluated for all of the key assets. It should be noted that Risk Scores include some subjective analysis and rely on previous experience to determine future risk. The Risk Score calculated for each key asset represents risk relative to other assets in the Community, and can range from 1.5 (negligible) to 75 (severe). The location of at-risk assets and their respective risk scores can be seen in Figure 07.

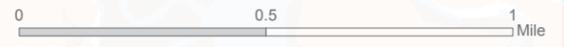
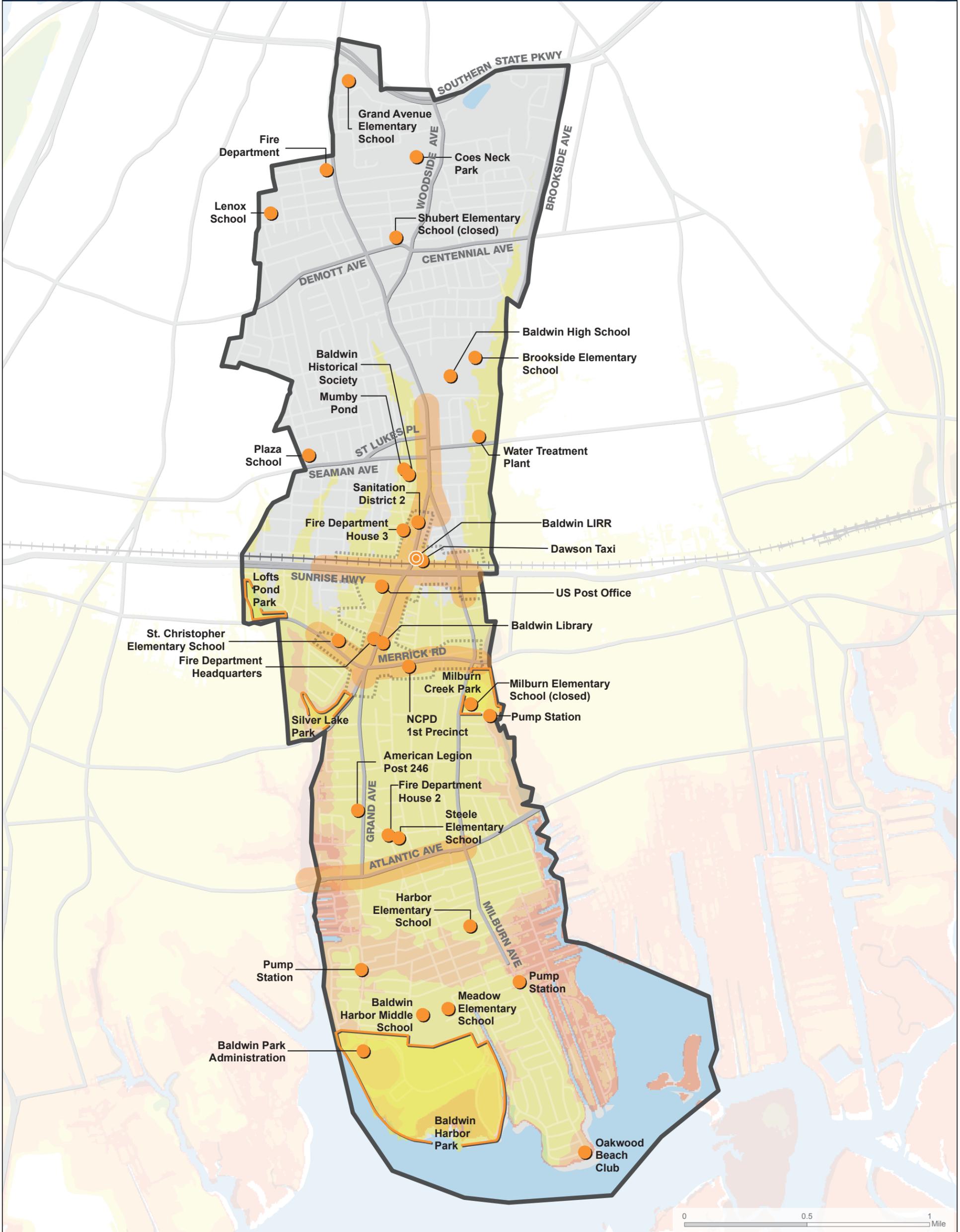


Milburn Pond in Baldwin (source: Arup)

Table 05: Key asset risk assessment

Asset Name	Risk Zone	Asset Class	Critical Facility	Community Value
Dawson Taxi	Moderate	Economic	No	High
Baldwin Middle School	Moderate	Health and Social	No	Medium
Pump Station - Garden & Fox Rd	High	Infrastructure	Yes	High
Pump Station - Grand & Washington St	High	Infrastructure	Yes	High
Pump Station - Northern & Milburn	High	Infrastructure	Yes	High
Baldwin Fd District House	Moderate	Infrastructure	Yes	High
Baldwin Fd Headquarters	Moderate	Infrastructure	Yes	High
Baldwin Fd Headquarters	Moderate	Infrastructure	Yes	High
Baldwin Fd Hose 2	Moderate	Infrastructure	Yes	High
Baldwin Fd Hose 3	Moderate	Infrastructure	Yes	High
Baldwin Fd Training House	Moderate	Infrastructure	Yes	High
LIRR - Baldwin	Moderate	Infrastructure	Yes	High
TOH Sanitation District 2	Moderate	Infrastructure	Yes	High
Water Treatment Plant - Seaman Ave	Moderate	Infrastructure	Yes	High
Baldwin Park Administration	High	Natural and Cultural	No	Medium
Lofts Pond Park	Moderate	Natural and Cultural	No	Medium
U S Post Office Baldwin	Moderate	Natural and Cultural	No	Medium
Silver Lake Park	High	Natural and Cultural	No	Medium
Baldwin Library	Moderate	Natural and Cultural	No	High

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

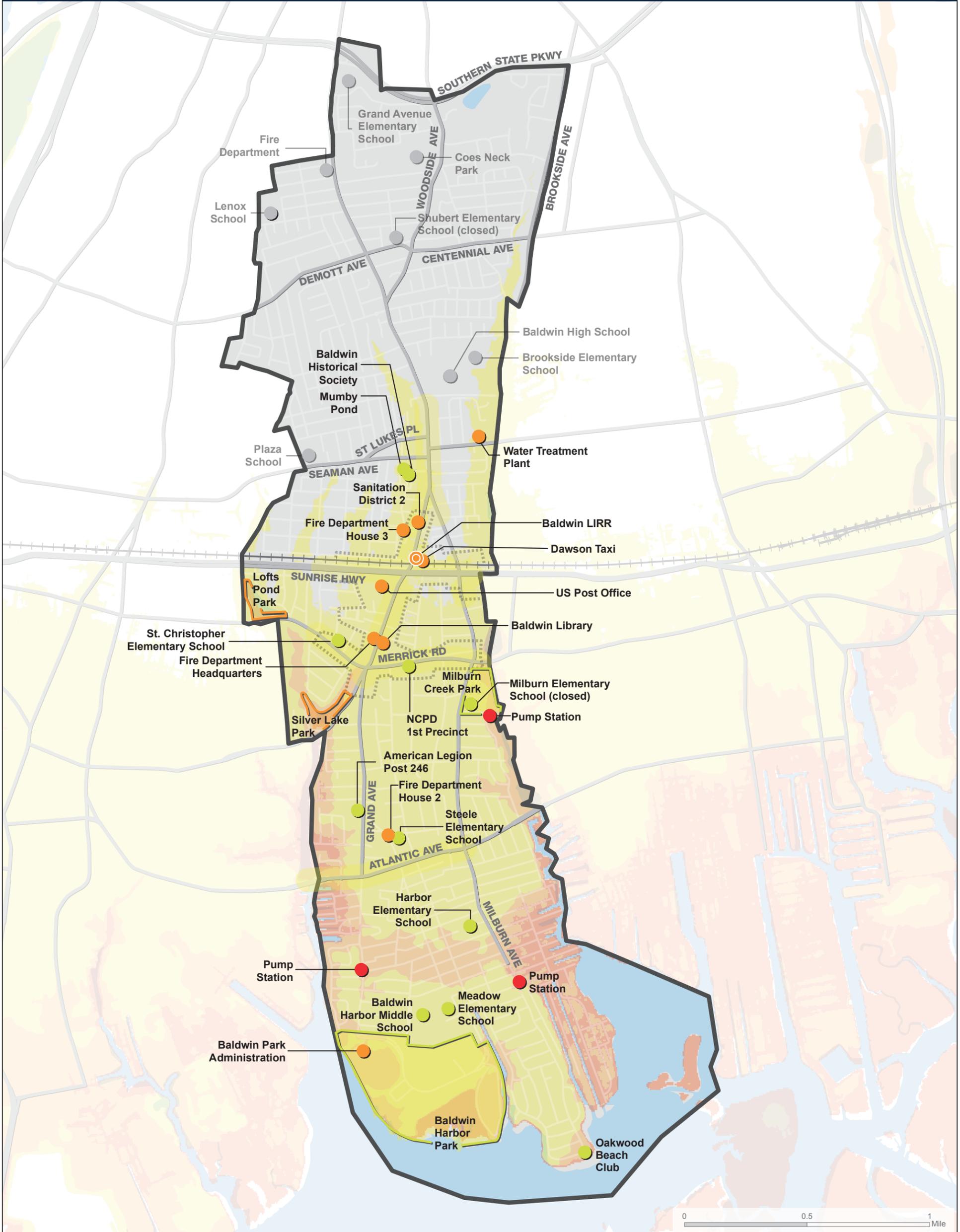
- Extreme
- High
- Moderate

Data Sources

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



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



B. Assessment of Needs and Opportunities

Well before Superstorm Sandy made landfall, the Community faced pre-existing or emerging issues with resilience, stormwater and flood management, and economic viability. Areas of the Community flooded during high tide and minor storms. Barnes Avenue had an ongoing problem with sewage destined for the Bay Park Sewage Treatment Plant spilling into streets. The number of seniors in the Community is growing and despite the stated desires in surveys and at public meetings to reduce reliance on automobiles, there are limited smaller, more accessible, mixed-use, multi-family housing options in the Community.⁵⁵

Recent storms exacerbated these needs and exposed many new ones. This section of the NYRCR Plan seeks to translate the impacts of damages that took place into physical, economic, and social needs so that appropriate solutions – the Reconstruction and Resiliency Strategies in Section III – can be implemented. The Community needs exposed by recent disasters can at times seem insurmountable. It is critical, however, to recognize that opportunities are also uncovered, and they can be leveraged to help the Community build back better.

The needs and opportunities identified in this section provide a basis for the strategies and proposed projects for the Community. Needs and opportunities were identified through a combination of research, analysis, NYRCR Planning Committee (Committee) feedback, and community member feedback from Public Engagement Events. These issues have been organized into FEMA’s National Disaster Recovery Framework’s 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.

Community Building and Capacity Building

Community planning and capacity building addresses 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.

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 business 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 Planning and Capacity Building Needs

As discussed in Critical Issues, many residents did not adhere to mandatory evacuation orders, and emergency communication and response issues were frequently brought up in the Community Public Engagement Events. Both the Town of Hempstead and Nassau County rely primarily on media outlets to disseminate evacuation zone information and shelter locations. Each has also established an emergency notification system 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.

Nassau County maintains four designated evacuation routes for south shore residents, two of which, the Meadowbrook State Parkway and Seaford-Oyster Bay Expressway are located in neighboring communities. At the time of the storm, however, local access to these routes was compromised, and those residents leaving their homes who had not heeded the evacuation order struggled to navigate darkened and flooded streets.

It was communicated by Community residents that some municipal services and utility companies were slow to respond in the immediate wake of Superstorm Sandy. Local sanitation, fire, and school districts were quick to resume operations. As reported by residents and Committee Members, a greater presence of police officers in damaged and evacuated areas was needed to create a more secure post-storm environment. Electric and gas utilities were slow to address potentially dangerous leaks and outages. Debris removal also became a problem without geographically targeted efforts to clear debris or the provision of adequate dumping space.

Flooded roadways, downed trees and electrical lines, and communication issues made it difficult for emergency response services to effectively identify areas of need and provide aid to Community members.

Community Needs

Community Planning and Capacity Building

- Improved emergency notification services are needed to provide Community residents with information for storm preparation and evacuation procedures.
- Increased awareness is needed among Community members who are unaware of the degree to which they are at risk from future storms.
- Local emergency resource centers and safe access to County evacuation routes are needed in the Community.
- More effective communication is needed between emergency response services, utility companies, and Community members.

Community Planning and Capacity Building Opportunities

Recovery efforts become hampered when information is not shared between local residents, public services, and private entities such as utility companies. Area residents are often the best resource for coordinating emergency response resources because they have local knowledge of the community, yet they are rarely utilized. A program to facilitate communication between these groups would supplement existing outreach and coordination measures and facilitate faster recovery.

Local roads can be identified as “lifeline” roads for use after storms, allowing for debris removal and providing access to community resources, medical facilities, emergency parking, and short-term housing for displaced residents. There is also an opportunity to utilize existing community assets, like the Baldwin Public Library and schools, as Community Assistance Centers (CAC) to provide education and awareness year-round and comfort, resources and information after future disasters. The intention of CACs is to provide comfort and assistance after a storm has passed and to act as emergency evacuation or shelter locations. Unused educational assets, such as the Milburn Elementary School, could also

Community Opportunities

Community Planning and Capacity Building

- Create a coordinated communication plan to allocate resources and share information between local residents, public services, and private entities during emergency events.
- Develop a comprehensive public education program to teach residents and business owners about resilience, recovery, and emergency preparedness.
- Identify lifeline network roads to provide local access to evacuation routes and Community emergency resources.
- Utilize existing community assets for Community Assistance Centers.

be used as CACs, or as a business incubator to help citizens wanting to jump start their own companies and support local economic growth.

After Superstorm Sandy, residents have become more interested in protecting themselves and their Community against future storms and other disasters. A comprehensive public education program would help educate Community members about the risks they face during a storm event and the benefits of appropriate mitigation measures and action plans. This includes safety measures for property owners during and after major storm events and the circulation of maps identifying potential evacuation routes. Neighborhood programs should help residents help one another during storms and provide a point of contact between residents, first responders, and government officials.

The Town of Hempstead Department of Public Safety is responsible for the operation and administration of the local Office of Emergency Management, which coordinates local response efforts with other State, County, and municipal government offices during disaster events, and the development of Hempstead's Emergency Disaster Preparedness Plan. In addition, the Department offers hurricane preparedness seminars for local residents and provides informational brochures for hurricane safety. The Community can

leverage and promote these existing programs and events to increase local capacity for disaster education, preparedness, and response.

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 and resiliency.

Economic Development Needs

A majority of the economic impacts from Superstorm Sandy were in the retail sector, due to the predominance of retail uses in the Community. According to data from the U.S. Small Business Administration (SBA), 59 NYRCR Baldwin Community businesses, representing 441 employees, applied for disaster management assistance after Superstorm Sandy. These applications represent claims totaling \$2.0 million in real property damage, \$496,030 of machinery damage, an inventory loss of \$88,132 and a leaseholder improvement loss of \$164,807. Of these 59 applications, only 11 (18.6%) were approved, totaling \$337,500 or roughly one-eighth of the \$2.8 million in verified damage assistance for which applications were submitted. As reported by community members at Public Engagement Events and business owners in the Community, business owners affected by Superstorm Sandy have been using their own resources to reopen while waiting for government grants and insurance proceeds.

Non-residential parcels in the Community number 606 (5.9%), and account for 53.8% of the area's total assessed value. Many of these properties are either institutional properties, such as schools and government buildings, or open space use types that are likely exempt from property taxes. Subsequently, some \$7 million in non-residential assessed value does not contribute to municipal tax rolls, but does provide a host of social, cultural, and economic values to the Community. Retail, industrial, mixed-use, vacant commercial and vacant industrial uses constitute 452 of the Community's non-residential parcels. While these properties represent 4.4% of all

parcels within the community, they provide 11.9% of assessed land value and 11.8% of total assessed value.⁵⁶

In 2006, Community businesses employed 6,968 workers. Following the recession of 2007-2008, there was a decline in employment, with the number of workers falling by 811 (11.6%). However, over the period from 2002 to 2011 the Community added 1,275 workers, a 26.1% gain. The majority of the local workforce commutes into the Community from elsewhere in the region. Only one in every seven local jobs is held by a Community resident (14.0%), with the single largest share of workers (17.4%) coming from New York City. The communities of Oceanside and Freeport contribute an additional 4.1% and 3.9% to the workforce, respectively.

Most residents work outside the Community in high-paying service industry sectors. Despite the recession, the number of employed local residents continued to expand through 2020, increasing by 1,782 workers (12.6%). A majority of community residents are employed in service industry sectors including healthcare and social services (21.2%), retail trade (9.7%), public administration (6.6%), professional and technical services (6.5%), and finance and insurance (6.0%). Projections from the New York State Department of Labor for occupations through the year 2020 show very favorable employment prospects for service occupations including retail, cashiers, restaurant servers, and fast food workers. Among professional occupations, healthcare practitioners are expected to be in greatest demand, specifically nurses, doctors, physical therapists and pharmacists. Growth in business occupations is also expected, with high demand for financial, marketing, and management services. Education occupations also show strong growth, notably pre-secondary and special education teachers. Workforce development programs, specifically for skilled professions, will be necessary to ensure continued employment growth and provide economic resilience for the Community.⁵⁷

Economic Development Opportunities

In 2012, the Community reported \$347.3 million in retail sales, around \$100 million above what would be expected given its population and disposable income.⁵⁸ While the Community's electronics, health

Community Needs

Economic Development

- Local businesses need to incorporate resilience measures into the rebuilding process to reduce vulnerability to future storms.
- Local business owners who experienced storm damage to their businesses and homes need access to recovery resources, as they may lack sufficient resources to rebuild and repair both properties.
- New commercial development is needed to increase local tax revenue and offset the prevalence of tax-exempt properties.
- Workforce preparation is needed to meet regional employment projections, which indicate a growing demand for workers in both unskilled service occupations and skilled professions.

and personal care stores, gas stations, bars, and special food services already draw customers from neighboring communities, there are opportunities for retail development in most sectors. Based on an analysis of local industries and Community needs, there is unmet demand exceeding \$67 million for motor vehicle and parts dealers, and \$48 million in demand for general merchandise retail, including department stores. Additional demand for restaurants, building material supplies, furniture, sporting goods, hobby, and book and music stores would be best served as infill to existing commercial areas.⁵⁹ Given the relatively low number of retail properties in flood risk zones, there are opportunities to relocate these businesses to fill vacant parcels in upland commercial corridors.

The Baldwin LIRR station is located in close proximity to two commercial corridors, and presents an opportunity for redevelopment to include a mix of uses, including housing. Compact commercial and mixed-use development around the station could diversify the commercial tax base without intruding into existing residential areas while also providing walk- and transit-friendly developments. These types of developments are ideal for seniors who wish to

Community Opportunities

Economic Development

- Redevelop parcels around the Baldwin LIRR station 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.
- Expand existing workforce development initiatives.
- Leverage local knowledge and form partnerships with higher education institutions to offer disaster planning and recovery advice for business owners.

downsize from larger single-family homes, but want to stay in the Community, as well as for households that value transit access. Market potential for general merchandise or department stores could be used to attract anchor tenants, and would support additional retail and dining services. Local demand for restaurants is particularly promising, as full service restaurants located at train stations have been successful in other parts of the region. The feasibility of Transit Oriented Development (TOD) at the Baldwin LIRR station has been examined and deemed promising in the *Nassau County Infill Redevelopment Feasibility Report* (2013) report, which provides a number of relevant recommendations for future development.⁶⁰

There is an opportunity to work with surrounding communities and Nassau County higher education institutions to further prepare local business owners for future disasters by better preparing and informing businesses on the risks of future storms, strategies to minimize disruptions, and resources for recovery. There is also an opportunity to develop long-range plans that include incentives for flood protection measures in new and existing properties, and development policies that promote growth outside of risk areas. These preparedness efforts can reduce future strain on the local economy by reducing overall damage to property and helping businesses quickly reopen, sustaining the local economy through the recovery process.

Grant funding could be directed to local workforce investment boards to continue support for skills training for under-employed and unemployed residents. There is also an opportunity to integrate workforce readiness programs with local schools and job training facilities and to work with local businesses to facilitate job placement. Workforce development initiatives should be expanded to continue support for skills training for under- and unemployed residents.

Health and Social Services

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 needs of all community members. This section discusses the immediate and long-term needs of socially vulnerable populations and individuals affected by previous disasters, as well as opportunities to promote health and well being for all members of the community. Socially vulnerable populations include residents who are especially susceptible to impacts of disasters or sudden changes in their community. These vulnerabilities can include primarily communicating in a language other than English, age, economic disadvantage, physical and mental disability, and/or lack of access to a car.

Health and Social Services Needs

Damage from Superstorm Sandy has created potentially unsafe living conditions for Community members who chose to remain in heavily damaged houses. Residents along Barnes Avenue had houses and properties inundated with a mix of floodwater and raw sewage when a sewer vault burst during flooding caused by the storm, and face unknown health risks as they begin moving back into their homes.⁶¹ Construction and maintenance workers are also susceptible to health issues caused by exposure to sewage, mold growth and spilled contaminants, such as gasoline and oil. Community members need to be informed of the potential health risks that accompany storm damage so they can take appropriate measures to protect themselves.

Older adults have encountered many challenges accessing health and social services, homecare, food and social support in the aftermath of Superstorm

Sandy. Within the Community, more than 12% of the current population is 65 years and over.⁶² By 2018, this number is expected to increase to 16.5%.⁶³ The effect of Superstorm Sandy on home care services may have disadvantaged senior residents and created health issues, especially for those who are homebound or require minor assistance to perform daily living activities. As of 2013, an estimated 45% households with a household head of 65 years and over were located in either extreme or high risk zones.⁶⁴ This represents a significant portion of Community residents who need additional protection from storm-related risks. Existing programs for senior residents need to be expanded and new programs established to account for this population.

Prior to Superstorm Sandy, 93% of all Long Island seniors reported their car as a primary mode of transportation.⁶⁵ Given the high concentration of older adults living in extreme, high and moderate risk areas, the loss of cars for this population represents a major barrier to both health care and social interaction. Physical and mental in-home health services are needed for elderly populations who are unable to travel.

Economic status affects the ability of individuals and families to recover from a disaster. Low-income residents may lack resources to evacuate and are more likely to be underinsured. Some 10.8% of Community members have no health insurance and a significant number of residents (46.6%) spend more than 35% of their household income on rent.⁶⁶ Geographic isolation can also contribute to these barriers, as residents without access to a car and/or public transportation are less able to obtain the services they need.

Better communication is necessary to ensure that the healthcare needs of the Community are met. Many residents are not aware of the health and social service resources available to them, despite the efforts of healthcare organizations to ensure effective outreach across all population groups. Sources of accurate information can be difficult to identify and may not be updated regularly. A significant number of households in the Community (31.4%) do not speak English at home – 11.5% of Community residents speak English less than “very well” – and communication difficulties can potentially affect the quality of care they receive.⁶⁷ Although public health

Community Needs

Health and Social Services

- Community members need to be aware of the potential health risks they face occupying storm-damaged homes.
- More support is needed to help protect senior residents in the Community, especially those in extreme in high risk areas.
- Transportation services are needed for senior residents in the Community who are unable to travel and have limited access to health care and social interaction.
- More transportation options are needed for senior and low-income residents in the Community who may not be able to easily access basic services.
- An expanded outreach program, available in multiple languages, is needed to increase awareness in the Community of available health and social service resources.

information is distributed in multiple languages, the current lack of participation signifies that this information is not reaching its intended audience. Stronger connections with underserved groups are needed to provide all of the Community residents with the right information.

Health and Social Services Opportunities

As the senior population in the Community expands, programs to foster social connection and physical activity become more important. It is important to maintain budgets to existing State and County programs in order to limit deterioration facing older adults. Additionally, local resources could be developed to bolster support and assistance to elderly residents. Nutritional and meal preparation programs will need to be expanded, especially for homebound seniors. In-home services such as shopping, laundry assistance, light housekeeping and grooming will become more important as the current population ages and family support declines. Social support programs to improve live and/or telephone contacts

Community Opportunities

Health and Social Services

- Increase coordination and partnerships among hospitals and community based organization to ensure that all community members have access to recovery resources.
- Investigate and address post-storm health issues and provide support for households and community members that are vulnerable to post-storm health impacts.
- Utilize public spaces such as community centers and places of worship for community outreach and education campaigns, and as Community Assistance Centers.
- Provide support and assistance to elderly, health-afflicted, low income, and minority residents.

and safety checks to residents who live alone will be necessary to maintain the emotional and physical well being of older community members.

The Baldwin Senior Center provides an opportunity to expand emergency preparedness education to seniors, and could function as a Community Assistance Center for local residents. Social interaction and support after traumatic events like Superstorm Sandy help Community members, especially seniors, recover more quickly.

Housing

This section considers the impact of recent storm damage to residential properties and the trend of events, which may affect the availability of housing stock in the future. The type and location of housing needs considers 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 of future housing opportunities.

Housing Needs

Of claims registered by 2,500 homeowners as of July 2013, FEMA assessed total damages to owner-occupied housing at \$33.6 million and approved assistance to nearly 1,600 property owners. Five hundred renters also filed claims and FEMA assessed an undisclosed amount of rental housing damage and provided assistance to only half of those renters registered.

As of July 2013, the total amount of approved funds dispersed by FEMA under the Individuals and Households Program (IHP) was \$16.4 million to homeowners and \$1.7 million to renters. An additional \$25 million was lent to homeowners by the federal Small Business Association (SBA) disaster loan program, as of September 2013. At the time the NYRCR Plan was published it was uncertain what funds have been or will be received by the Community property owners. Furthermore, it is unknown what funds have been disbursed from the NYS Homeownership Repair and Rebuilding Fund (HRRF), the Empire State Relief Fund (ESRF), or the New York Acquisition program to supplement FEMA aid and fund housing acquisitions.

Despite the number of Federal and State sources of recovery funding, it is not yet known if these programs have provided sufficient aid to meet the needs of recovering property owners in the Community. It is likely that the bulk of repair costs were borne by homeowners, as there are many affected residents who are not fully covered by public disaster assistance or private insurance. Furthermore, damage estimates and subsequent payouts may not accurately capture the extent of repair work necessary.

As FEMA aid is directed primarily to owner-occupied properties its estimates underrepresent damage to rental housing stock. Although there is no public housing in the Community, there are approximately 1,700 units (16.5%) of rental housing. Of these units, 68.6% are low income occupants.⁶⁸ Nearly 100 rental units are located in extreme and high risk zones, where inundation during Superstorm Sandy was highest. The 258 rental units that received FEMA aid for Superstorm Sandy recovery represented only 14% of the Community's FEMA assisted housing stock. It is not known how many affected

households relocated temporarily to rental stock in the Community, or left the community to stay elsewhere, during reconstruction.

In the 12-month period following Superstorm Sandy the Community housing market has seen a decline in asking prices, a rise in vacancies, an increase in housing foreclosures, and the demolition of many residential properties. Although some houses in 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 reported that they have lost equity in housing assets which, coupled with repair costs, has severely constrained their budgets. It is clear that following another major storm, 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 less than 1% to 32,612 residents.⁶⁹ An additional 104 households are anticipated, consisting mostly of families, with a decline in the number of children between 5 and 19 years of age and an increase in the number of elderly residents. As a consequence, the median age of Community residents will rise to 41.6 years. With a growing elderly population, the Community's per capita income is expected to increase in current dollars from \$39,339 in 2013 to \$45,706 by 2018. 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 development is guided by strategies for Community resilience.

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.⁷⁰ 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.⁷¹ However, the program could be amended to offer acquisition of housing

Community Needs

Housing

- Sufficient funding is needed from public disaster relief programs and private insurance proceeds to adequately repair and restore damaged properties to pre-storm conditions.
- Resiliency measures are needed to ensure that rental units located in extreme or high risk zones have been properly repaired and/or are adequately protected in case of future storms.
- The Community's housing market needs assistance to prevent the local tax base from shrinking and relieve the financial strain on individual homeowners already burdened with repair costs.
- Housing options are needed that increase Community resilience by providing a variety of housing types in low-risk areas that can meet the demands of middle-aged and elderly residents.

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 touristic opportunities. In high risk zones, property acquisitions could be offered at pre-storm value for redevelopment as resilient green housing.

Housing Opportunities

For homeowners with unmet repair or rehabilitation needs, public disaster funding and insurance proceeds may not be sufficient to complete repairs and mitigation efforts. Need-based local funding could cover the cost of repair for damaged property, including environmental hazard mitigation costs. Funding could be made available through incentive programs for homeowners and owners of rental properties to implement green building measures such as the U.S.

Department of Housing and Urban Development's (HUD) 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.⁷² 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.⁷³ The program could be amended, however, 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.

Multi-family housing development should be encouraged in upland areas outside of risk zones as opportunities for relocation, especially for the elderly, and attracting growth. Over the next decade, a majority of new households in the Community will be headed by elderly residents. Younger residents, however, can be attracted, especially if growth is linked to TOD near the Community's LIRR center. Additionally, new development can provide housing for residents displaced by Superstorm Sandy, as low-income renters may need to be relocated from storm damaged apartments.

The Community has a number of rental units that are predominantly occupied by low-income residents, an unknown share of which were likely impacted by Superstorm Sandy. Similar to the way the HOME program requires beneficiaries to be low- or moderate-income, priority could be given to acquiring or repairing buildings, relocating households, and assisting the owners of buildings where a disproportionate share of units are occupied by low income and minority residents.⁷⁴ If Low-Income Housing

Community Opportunities

Housing

- Identify alternative funding sources for repair and reconstruction costs not covered by public disaster funding or private insurance proceeds.
- Identify additional funding for mitigation costs not covered by public disaster funding or private insurance proceeds to raise homes in extreme and high risk zones.
- Incentivize property owners in extreme and high risk zones to rebuild in accordance with green building standards.
- Leverage housing acquisition program to acquire extreme and high risk properties for coastal buffer areas or redevelopment as resilient green housing.
- Pursue Transit oriented development (TOD) around the Baldwin LIRR station to provide multifamily housing for low-income residents and the young commuter workforce.
- Pursue continuing care residential development for elderly residents, located outside of risk zones, and combine development with a housing acquisition program.

Tax Credits (LIHTC) are used in the construction of multifamily buildings, a fixed percentage of units will be inclusionary or off-site in resilient housing for low income occupants.

Plans for new housing could target land within a quarter mile of the Baldwin LIRR station. 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 west to Manhattan, as well as access to a variety of commercial and Community services. Offered at market competitive rates, these units could attract and retain younger households in the commuter workforce. TOD that includes mixed-use housing will help bring diversity and density to

the Community and will guide new development into areas of the Community that are outside hazard risk zones.

As existing Community residents approach retirement age, demand for single-family homes will decrease as older residents look for alternative housing options. Prior to Superstorm Sandy, at least 250 households in extreme and high risk zones were headed by older Community members. The impact of Superstorm Sandy on these areas and the subsequent cost of recovery and repair not only weakened financial resources, but the physical challenge of remaining and pursuing reconstruction also poses additional stresses on aging residents. Increasingly, elderly households are moving to “continuing care” environments that combine healthcare-intensive amenities with community facilities in a clustered development. A housing acquisition and relocation program could be coupled with incentives to develop such a facility in an upland low risk area.

Infrastructure

Infrastructure issues address the rebuilding and recovery of essential infrastructure services, such as potable water, wastewater, drainage, energy, and transportation, that were damaged or destroyed by Superstorm Sandy. This includes both the need to both strengthen and protect critical infrastructure assets in risk areas, and to meet the community’s current and projected demand in a way that encourages resilience and economic growth.

Infrastructure needs

Flooding in the Community is not limited to major storm events. It is a regular occurrence during high tide events and/or heavy rainfall in many areas south of Merrick Road. Regular flooding has been reported in the Milburn Creek area, north of Sunrise Highway, and an enclosed culvert pipe opening located at the east end of Emerson Avenue. The large area of impervious surfaces in the Community prevents stormwater from infiltrating the ground naturally and creates the need for stormwater drainage to manage flooding. The limited provision of outflow check valves on storm drain outfalls does little to mitigate bay water backflow into the storm drainage system,

and the devices must be regularly checked to ensure they are properly working. During heavy rainfall events the storm drainage system is often overwhelmed, causing stormwater to accumulate and ultimately flooding areas. Accumulation of trash and debris in the storm drainage system can diminish its ability to effectively collect and convey stormwater, reducing the system’s overall capacity and further exacerbating flooding issues.

In low-lying areas streets can become impassable during regular storm events, impeding the transportation of people and goods, and limiting local parking capacity. In major events like Superstorm Sandy, flooded roadways prevent emergency responders from helping residents in need and leave evacuating residents stranded. The Community is predominantly auto-oriented and residents rely primarily on their cars for transportation. Regular maintenance to the Community’s stormwater management systems and new strategies for increasing surface permeability will help mitigate stormwater flooding on roadways. Effective evacuation routes and safe, adequate parking areas are needed to prevent damage and ensure the safety of Community members.

Aging and non-functional bulkheads present another concern in the Community. Many bulkheads have exceeded their useful life and some older bulkheads are too low, allowing water to pass over them and cause damage to adjacent properties. Many of these older bulkheads have not been raised to current code requirements – 6.5-7.5 ft. above National Geodetic Vertical Datum (NGVD) – causing significant erosion and property damage. Height regulations are typically enforced when bulkheads are newly constructed or replaced, but uniform enforcement is necessary to make bulkhead structures effective at mitigating flood and erosion effects.

Unmanaged vegetation 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. The Community’s tree-line streets are a defining characteristic of the area and were significantly damaged during Superstorm Sandy. This damage, however, can also impact energy infrastructure, as felled trees prevented utility workers from servicing downed

power lines. 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. Likewise, streets can become blocked and impassable until municipal and/or private repair crews can clear the way. Road and utility rights-of-way in the Community are owned and managed by a number of private and public entities across multiple jurisdictions. Identifying and contacting the party responsible for maintenance in a specific location is unnecessarily challenging and can substantially impede repair work.

Storm mitigation initiatives have been proposed by PSEG Long Island to protect assets from future damage. Emergency flood barriers will temporarily protect substations at risk of flooding and mobile generators and switchgear will be used to carry customer load as substations are individually rebuilt and elevated. PSEG Long Island plans to increase vegetation management efforts, shortening time between trimmings and expanding clearance zones around power lines to prevent damage from surrounding trees. Upgrades to strengthen utility poles and wires are also planned for high risk areas. Enhanced technology will be used to allow rerouting around damaged equipment, and to expedite the damage assessment and restoration process by providing outage detection and location capabilities.⁷⁵

Between 2001 and the end of 2013, LIPA contracted for the addition of more than 2,000 Mega Watts (MW) of supply capability to meet projected electricity demand throughout Long Island and meet the reliability requirements established by the New York State Contract Reporter (NYSCR) and New York Independent System Operator (NYISO). This includes the addition of thirteen new generating stations on the Island and two submarine transmission cables that connect the local grid to surrounding power markets, through which additional capacity can be purchased. PSEG Long Island plans to have sufficient capacity to meet demand through 2020, primarily through energy efficiency measures currently being implemented.⁷⁶

Without energy efficiency investments, PSEG Long Island expects peak load to increase an average of 144 MW (2.2%) annually. Energy efficiency and demand response measures would reduce growth

Community Needs

Infrastructure

- Clearly defined responsibilities and communication protocol is needed for jurisdictions responsible for critical infrastructure maintenance and/or repair work.
- Mitigation measures are needed to improve flooding and stormwater management on low-lying streets that suffer from routine flooding during high tides and/or heavy rainfall, and can become impassable during major storm events.
- Improved stormwater management is needed, especially for large areas of paved and impermeable surfaces in the Community which prevent stormwater from infiltrating the ground naturally, and storm sewers that do not have the capacity to manage runoff.
- New regulations are needed to prevent aging and non-functional bulkheads from exacerbating coastal flooding and erosion issues.
- Additional electricity generation and increased measures for energy efficiency are needed to ensure that future energy demand can be met.

to 1.4% on average per year. However, it is likely that the utility will eventually need to add additional generation resources on the Island. The utility has historically relied on short-term purchases from the state-wide capacity market to meet demand within the required reserve margin. Given the current surplus of energy and cost-effective capacity on the market, it is likely that LIPA will continue to pursue this strategy as necessary. Distributed generation resources such as solar power, wind power, and combined heat and power (CHP) are needed locally to ensure that the energy needs of the Community will continue to be met. These local sources of electricity can be networked and connected with PSEG Long Island's central grid using microgrid technology.

Other critical assets and systems require enhanced protection from flooding or power loss. Four of the Community's sewer pump stations are located in

high risk areas and are vulnerable to outages caused by flood-damaged equipment, as well as the water treatment plant on Seaman Avenue. The Second Precinct Police Department and a number of Fire Department assets such as the district house and headquarters are also vulnerable to storm damage, although these assets are only located in moderate risk zones. Public infrastructure systems such as street and traffic lights are also vulnerable and protective measures are needed to ensure their continued function in the face of another disaster.

Infrastructure Opportunities

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 priorities to best use shared resources in emergencies. Private entities such as utility companies could be incentivized to participate by offering an expedited permitting process. Information sharing protocols could reduce overlap and efficiency during regular operations by facilitating communication and reducing redundant work, potentially lowering tax and ratepayer costs.

To ensure the Community's southern neighborhoods 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 targeted for debris removal following emergency weather events, as well as being well publicized to residents. Routes should be clearly marked and provide directions to higher ground, as well as connected to community resources such as safe parking areas and emergency shelters. Traffic 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 do not have sidewalks, and downtown areas including those around the Baldwin LIRR station, are not well designed for pedestrian use. Increasing sidewalk connections

Community Opportunities

Infrastructure

- Use FEMA funding combined with local resources to develop a roadway management plan to coordinate maintenance and recovery work across transportation jurisdictions and utility zones.
- Leverage ongoing reconstruction efforts to elevate critical roadways in risk areas to maintain transportation access during flood events.
- Leverage ongoing reconstruction efforts to designate emergency parking areas so evacuating residents can safely store their vehicles.
- Leverage ongoing reconstruction efforts to implement street improvements in conjunction with repair and recovery work to increase pedestrian access, specifically in downtown commercial areas.

and introducing traffic-calming measures such as medians and curb extensions can improve driver and pedestrian safety and make walking a 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 marshlands, 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.⁷⁷ Development patterns, filling of marshlands, hardening of shorelines, and alteration of littoral processes are the causes of marshland loss along with ongoing (natural) land subsidence and increased rate of sea level rise. The popularity of waterfront homes peaked after World War II, when hundreds of acres of marshland were filled and developed. 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 marshlands left the Community without an important natural barrier against coastal flooding.

These development patterns have also resulted in an increase of overland flooding, as the stormwater drainage 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 recharging groundwater reserves. As stormwater runs over these surfaces, it collects pollutants such as gasoline and motor oil, and excess nutrients from fertilizers before being channeled into the drainage system and eventually into the bay. Lack of maintenance causes many storm drains to clog with trash and debris, causing storm water to back up and ultimately flood.

Cultural assets, such as nature preserves and parkland, serve an important role in the Community. Undeveloped land provides a buffer around marshlands and inland streams and open space recreation and leisure. Baldwin Harbor Park, Silver Lake Park, and the Baldwin Park administrative building are Community assets in high risk zones and are vulnerable to inundation in future storm events. Additionally, Milburn Creek, Coes Neck and Loft Pond Park as well as Mumby Pond are all in moderate risk zones. The Community's Oakwood Beach Club is also vulnerable to damage from storm surge and erosion. While Oakwood is a private beach club, there is a need in the Community for more public open space along the waterfront.

Community Needs

Natural and Cultural Resources

- Marshland restoration is needed to slow marshland loss and reduce the impacts of pollution, erosion, and frequent storm damage.
- Permeable surfaces such as planting beds, turf, and permeable pavers are needed throughout the Community's developed areas to allow stormwater to naturally infiltrate the ground and reduce instances of localized flooding.
- Mitigation measures are needed to protect Baldwin Harbor Park and Silver Lake Park, both in high risk zones, from heavy inundation during future storm events.
- Protection measures and maintenance are needed for Community parks and public open spaces that are susceptible to regular flooding.
- More public open space and parkland is needed in the Community's waterfront areas.

Natural and Cultural Resources Opportunities

Natural systems can provide a soft solution to storm management and can include restoration and expansion of tidal marshes. It is estimated that an acre of marshland can store approximately one million gallons of water, equal to about three-quarters of a football field covered in three feet of water.⁷⁸ Marsh vegetation helps to slow the speed of flood water, resulting in lower flood heights and ultimately less flood damage. While a natural systems approach to resilience can cost 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. Monetary costs are not the only consideration: there are many other values and benefits to be gained from successful projects such as aesthetic and touristic value, ecosystem improvement, and air and water quality improvement. These

benefits could not otherwise be obtained through traditional, hard structural treatments of the shoreline or filling marshland environments for development.

Marshes in coastal areas are especially important, as the flat coastal terrain leaves land and property exposed to hurricanes and other storms. Coastal marshes protect these assets from storm surge and provide a sustainable buffer against storm-generated wave action.⁷⁹ The EPA has stated that wetland preservation, along with other natural flood control measures provides more effective and less costly flood protection than engineered defenses.⁸⁰ Traditionally, bulkheads, rip-rap, or other engineered structures have been used to control coastal erosion and protect property from storm damage. These measures, however, can potentially increase erosion in adjacent areas. Wave energy from boat wakes, wind, and storm events create scouring in front of these structures, resulting in the loss of vegetated shallow areas to open water. Tidal marshland 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.⁸¹

Restoration and protection measures should be pursued to further preserve and enhance the function of the Community's natural and cultural resources. Seagrass, or submerged aquatic vegetation, restoration is a relatively 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. Mollusk bed 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.

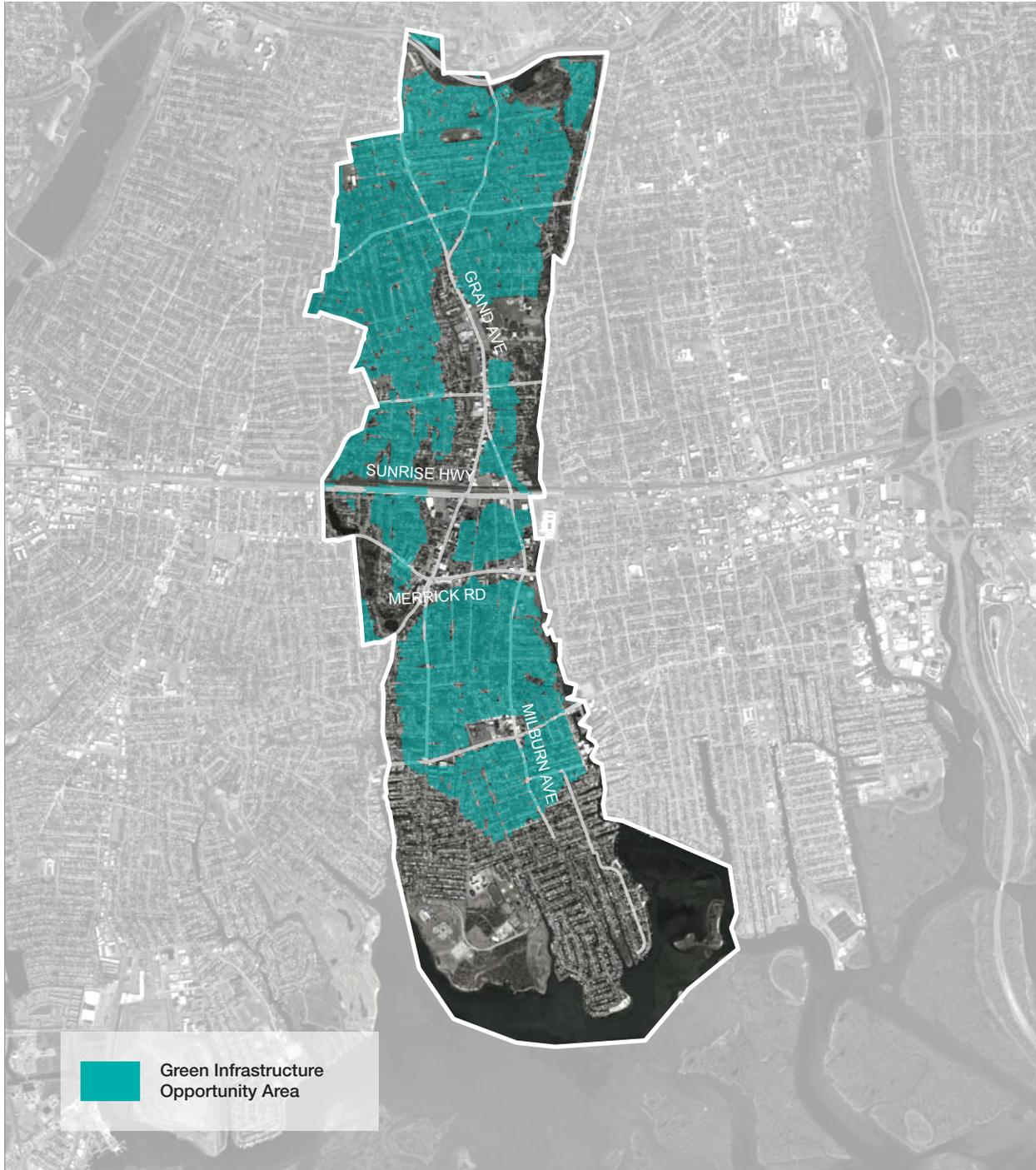
In addition to these measures, the use of green infrastructure presents an opportunity for the Community to increase resilience while enhancing the community's cultural resources. Green infrastructure approaches use engineered systems that mimic natural processes to infiltrate, evaporate, retain and reuse stormwater runoff. This includes the use of stormwater detention ponds and constructed

Community Opportunities

Natural and Cultural Resources

- Plan and implement a long-term protection plan for parkland and nature preserves in extreme and high risk areas.
- Utilize undeveloped public lands to manage stormwater and provide a habitat for local wildlife.
- Provide incentives for property owners and developers to implement green infrastructure strategies to manage stormwater runoff.
- Use existing home acquisition opportunities to acquire severely damaged properties for use as public open space, wetland buffers, stormwater retention, and wildlife habitat.
- Collaborate with other south shore communities to restore and protect marshlands.
- Educate Community members on the value and benefits of natural systems to increase protection and restoration efforts, and the co-benefits of ecological preservation.

wetlands to contain and naturally treat runoff on a large scale, as well as localized installations such as bioswales to naturally filter sediment and pollutants from stormwater as it enters the ground. Materials such as permeable paving can be used to capture pollutants in stormwater runoff and improve water quality. These approaches can mitigate flood issues by diverting stormwater from the Community's already overloaded storm drainage system. Green Infrastructure can be implemented in areas that are subject to routine flooding including public, private, or vacant lands. Based on a preliminary assessment of these factors, potential locations for the installation of green infrastructure in the Community were identified, as illustrated on the following page.



Preliminary green infrastructure assessment for the NYRCR Baldwin Community (source: Arup)



Section III: Reconstruction and Resiliency Strategies

The first two sections of the NY Rising Community Reconstruction (NYRCR) Baldwin Plan provide an overview of NYRCR Baldwin Community (Community) and identify its risks and needs. This section presents the strategies for reconstruction and resilience, which were developed based on the information and insights collected during the planning process. The strategies and potential projects provided below are oriented around activities that can be implemented in the near-term to address the identified needs and opportunities in the most expedient manner possible. Longer term actions and projects are identified and described under additional resiliency measures.

A strategy is a plan of action designed to achieve a major goal. Each strategy outlines the key considerations for implementation including project names and descriptions, cost, start and completion dates, and target areas. There are three key reasons it is critical that the Community have a strong plan of action with a rapid implementation schedule at this time. First, there are areas in the Community still significantly degraded by Superstorm Sandy. Second, there is the potential for another significant storm event which could exacerbate damages to the Community as many areas remain degraded and new preparedness, protection, and mitigation measures have not yet been fully instituted. Finally, the Community has the opportunity to jumpstart the implementation of this NYRCR Baldwin Plan (NYRCR Plan) through Community Development Block Grant Disaster Recovery (CDBG-DR) funding.

As the title of this section suggests, the 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. Resiliency is strengthening the ability of the Community to rebound quickly when confronted with challenges of all kinds in the future.

A. Reconstruction and Resiliency Strategies

There are four Reconstruction and Resilience Strategies for the Community which encompass a total of 31 projects and additional resiliency recommendations. The four strategies are as follows:

- Improve Stormwater Management and Drainage Systems;
- Improve Transportation and Communication Connectivity;
- Establish Programs and Policies for Resilient Planning and Design; and,
- Enhance the Community's Natural and Cultural Resources.

Each strategy and its related projects fulfill one or more of the Recovery Support Functions (RSFs) while addressing risks, meeting needs, making the best use of community assets, resolving critical issues, and (to the extent possible) addressing the Community's socially vulnerable populations. The strategies' projects deal with the needs and opportunities described in the previous section and also resolve the Community's critical issues articulated through the NYRCR planning process, including energy infrastructure; flooding and drainage; housing in high risk areas; information, communication, and resources; rebuilding and recovery; regional connections; resilient planning, design, and construction; and, shoreline protection. The projects also support, to the extent possible, vulnerable populations in the Community.

For the Community, there is an emphasis on stormwater management concerns and drainage improvements such as a Silver Lake Park drainage study, a tree planting program, and stormwater modeling and analysis. There is also a focus on projects that prepare the Community for future storm impacts. This includes a public communication and education gap analysis, the "lifeline" transportation network study, Community Assistance Centers, public bulkhead upgrades or replacement, and solar-powered streetlights. Some of the projects that address flooding also provide additional benefits such as replacing trees and plantings that give the Community so much of its character but were lost during Superstorm Sandy and Hurricane Irene.

While the strategies address impacts of storm events, there are other challenges that the NYRCR Plan seeks to address. As acknowledged in Section I: Community Overview, there are challenges impacting the Community's economic, cultural, infrastructure, and natural assets that require attention in order to make the Community a safer, stronger, and a more desirable place to live, work, and play.

A Downtown and Commercial Corridor Plan will not only help to focus residential development toward areas less prone to hazards, but also help to foster investment, provide housing options, reduce automobile dependence, and enhance public spaces. A Business Continuity Program will arm small business owners with tools and ideas to reduce the financial impact of future disruptions. Developing neighborhood preservation guidelines will ensure that existing neighborhoods that experience flood damage regularly are not negatively impacted by house raising and other residential mitigation measures.

The Reconstruction and resilience strategies address a balance of regional concerns, analysis, Community feedback, and iterative development by the NYRCR Planning Committee (Committee) and Consultant Team. A description is provided for each strategy, followed by tables presenting Proposed Projects and Featured Projects that would contribute to its implementation. A full description of each project is provided in Section IV: Implementation – Project Profiles.

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 a project where other identified funding opportunities exists, 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.

Improve Stormwater Management and Drainage Systems

Improvements to the Community’s stormwater management and drainage systems are critical to reduce regular flooding cause by tidal and precipitation events. This strategy addresses both the Infrastructure and Natural and Cultural Resources Recovery Support Functions with projects to improve stormwater drainage capacity and enhance natural assets by incorporating green infrastructure initiatives and storm sewer upgrades.

A number of drainage basins around and including Silver Lake Park have historically experienced localized flooding. Due to the debris build up following recent storms, flooding conditions have worsened. The Silver Lake Park Drainage Improvement project would study and assess drainage issues and identify potential solutions for flood mitigation. At a regional scale, the modeling and analysis of the South Shore’s stormwater drainage systems would provide a basis for the development of large-scale stormwater management projects.

Local green infrastructure projects would improve stormwater management and provide multiple co-benefits such as erosion control, increased air quality and reduced water pollution. Green infrastructure pilot projects were intentionally located near educational assets – Steele Elementary School and Mumby Pond (next to the Baldwin Historical Society) – to demonstrate and build awareness of the capability of these systems to manage stormwater.

Table 06: Strategy: Improve Stormwater Management and Drainage Systems

Project Name	Project Description	Cost Estimate	Category	Regional
Silver Lake Park Drainage Improvements	A comprehensive drainage study will be undertaken to assess the flow controls at these basins to identify the cause of flooding in this area during regular rainfall events and guide the design of drainage improvements and improvements to the park for the Community.	\$600,000	Proposed	No
Green Infrastructure: NYRCR Baldwin Tree Planting Subsidy Program	Reintroduce a varied version of the TOH Tree Planting Program for Baldwin residents only to replace trees that have been brought down by storms and plant additional trees.	\$800,000	Proposed	No
East Baldwin Road Raising	Road raising and associated drainage improvements along Washington Place, Hayes Place, Van Buren Place and Jackson Place.	\$2,000,000	Proposed	No
South Shore Stormwater System Modeling and Analysis	Hydrologic and hydraulic (H&H) model to determine the causes of localized flooding issues across the catchment and identify measures to prevent the flooding.	\$725,000	Proposed	Yes
Green Infrastructure: Pilot Project Implementation at Steele Elementary School	Project proposes the study, design, and construction of a 0.4 acre-foot infiltration basin in combination with bioswales at Steele School.	\$240,000	Featured	No

Table 06 (cont'd): Strategy: Improve Stormwater Management and Drainage Systems

Project Name	Project Description	Cost Estimate	Category	Regional
Tidal Check Valve Installation and/or Replacement	Project includes the inspection of outfalls to determine the condition and appropriateness of tidal check valves. Also includes the installation of 25 tidal check valves, where they would be most effective in addressing flooding.	\$750,000	Featured	No
West Baldwin Road Raising and Drainage Improvement Study	Study includes assessment and determination of works needs to alleviate the continual and severe flooding issues. Area includes Grand Boulevard, Hayes Street, Van Buren Street and Byrd Place.	\$250,000	Featured	No

Improve Transportation and Communication Connectivity

Improved communication and access to resources is critical for building the Community's resilience. Superstorm Sandy left some residents without power for more than two weeks, making it difficult to access recovery information and resources. Additionally, storm damage and residual flooding made many roads impassable for a number of days. This strategy addresses the Recovery Support Functions of Community Planning and Capacity Building and Infrastructure with projects that tackle emergency communication and mobility needs.

To ensure that all residents have access to information and emergency assistance, an integrated communications network should be established to consolidate and coordinate emergency recovery and response efforts. The Community Assistance Centers (CAC) project proposed in this strategy would establish a network of public buildings for residents to access emergency preparedness information and education throughout the year using dynamic information signage and materials to be generated by the proposed Local Disaster Recovery Manager. They will also serve as places to find resources and aid after major storm events, but are not intended to serve as or replace shelters during storms. Baldwin High School and the Baldwin Public Library have been identified as potential locations for this initiative.

Communication initiatives should be combined with infrastructure improvements to ensure that roads remain accessible during and immediately after storm or disaster events through drainage improvements and undergrounding power lines. Infrastructure improvement projects include the installation of solar-powered streetlights with battery backup, signage to direct residents to CACs, and policies to organize road clearing and utility maintenance response efforts.

Table 07: Strategy: Improve Transportation and Communication Connectivity

Project Name	Project Description	Cost Estimate	Category	Regional
Baldwin Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. After a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort.	\$1,100,000	Proposed	No
East Baldwin Road Raising	Road raising and associated drainage improvements along Washington Place, Hayes Place, Van Buren Place and Jackson Place.	\$2,000,000	Proposed	No
Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. It would establish a communication network that more effectively links the local government, emergency management agencies, residents, businesses and non-profit organizations.	\$20,000	Proposed	Yes
Lifeline Corridor Study and Guidelines	Study will be undertaken to identify best practices and develop design guidelines for resilient streetscapes. The guidelines will present design options for Merrick Road.	\$120,000	Proposed	Yes

Table 07 (cont'd): Strategy: Improve Transportation and Communication Connectivity

Project Name	Project Description	Cost Estimate	Category	Regional
Lifeline Network: Priority Local Road Streetlight Retrofit	Installation of solar photovoltaic (PV) powered LED streetlights with battery backup on utility poles along Merrick Road in Baldwin.	\$2,500,000	Featured	No
Green Infrastructure: Pilot Project Implementation at Steele Elementary School	Project proposes the study, design, and construction of a 0.4 acre-foot infiltration basin in combination with bioswales at Steele School.	\$240,000	Featured	No
Public Communication and Education Gap Analysis – Phase 2	This project is Phase 2 of the proposed project 'Public Communication and Education Gap Analysis' and includes the implementation of the gap analysis recommendation. Topics covered may include garage and parking design, stairway and entryway design, mechanical systems, home appliance placement, structural reinforcement, materials recommendations, and resilient landscapes.	\$500,000	Featured	Yes
West Baldwin Road Raising and Drainage Improvement Study	Study includes assessment and determination of works needs to alleviate the continual and severe flooding issues. Area includes Grand Boulevard, Hayes Street, Van Buren Street and Byrd Place.	\$250,000	Featured	No

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 RSFs of Infrastructure, Housing, and Natural and Cultural Resources and Economic Development. In some instances a regional approach to solving shared issues between Communities along the south shore of Nassau County can provide better outcomes, especially through close coordination with the Nassau County and Town of Hempstead governments.

The Downtown and Commercial Corridor Resiliency Plan would establish new standards for residential building and bring economic activity to the Community’s downtown areas. Community participation in a regional energy plan could help identify opportunities for energy infrastructure upgrades in commercial areas. A business continuity program would contribute to greater economic resilience by enabling local business owners to better withstand future storm impacts.

This strategy also includes projects to revise building codes and zoning regulations to support resilient construction and development. Specific design issues must also be addressed with targeted policies for resilience. Fuel oil tanks pose a threat to properties in flood risk areas. Regulations for residential fuel oil use and storage could prevent damage from spills and dislodged tanks, and can be coupled with incentives for converting to alternative energy sources for home heating and hot water. Aging or damaged bulkheads also contribute to flooding and coastal erosion. A repair and replacement effort administered by the Town of Hempstead would help to alleviate these issues.

Table 08: Strategy: Establish Programs and Policies for Resilient Planning and Design

Project Name	Project Description	Cost Estimate	Category	Regional
Downtown and Commercial Corridor Resiliency Plan	This project is a resiliency study to plan for the long-term future of the commercial corridors in Baldwin and the area of Downtown Baldwin.	\$800,000	Proposed	No
Business Continuity Program	Staff person to assist businesses in creating business continuity plans. Identify business assistance funding.	\$40,000	Proposed	Yes
Home Heating Upgrades	Incentivize the conversion of home heating systems from fuel oil to electric heat pumps, solar thermal, or natural gas in extreme and high risk areas. Amend building and planning regulations to phase out the use of fuel oil tanks south of Merrick Road, and incorporate temporary-intermediary regulations to require proper anchoring requirements based on anticipated inundation levels.	\$50,000	Featured	No
Lifeline Network: Priority Local Road Streetlight Retrofit	Installation of solar photovoltaic (PV) powered LED streetlights with battery backup on utility poles along Merrick Road in Baldwin.	\$2,500,000	Featured	No
Improve Resilience of Community Marinas	Emergency preparedness guidelines, recommendations and education to increase resiliency of marinas and docks.	\$100,000	Featured	No

Table 08 (cont'd): Strategy: Establish Programs and Policies for Resilient Planning and Design

Project Name	Project Description	Cost Estimate	Category	Regional
Strategic Adaptation for Coastal Development	Identify long-term retreat and resilience options for Baldwin to protect future residents and business from higher occurrence and more intense storms/surges. Work with flood insurance providers to study existing models and assumptions. Use a combination of climate change and sea level rise forecasts and actual events to develop triggers for changes to zoning, planning, and building regulations.	\$1,000,000	Featured	No
Neighborhood Preservation Guidelines	Creation of new residential design guidelines for improving architectural quality and functionality in newly raised homes.	\$80,000	Featured	Yes
Street-end Bulkhead Replacement/Upgrades	This project will inspect and identify the bulkheads at street ends and canal ends that fall under the Town of Hempstead ownership which require raising or replacement to improve resiliency as a result of recent storms. The project will identify, design, and construct up to 1,000 linear feet of bulkhead.	\$2,700,000	Featured	No

Enhance the Community’s Natural and Cultural Resources

The Community’s natural and cultural resources are integral to the health and well-being of its residents. Erosion and wetland loss have deteriorated these assets and limited their public use. This strategy primarily addresses the Natural and Cultural Resources RSFs, although it also includes initiatives that align with the Economic Development, Infrastructure, and Community Planning and Capacity Building RSFs.

The projects developed for this strategy include the restoration and incorporation of resilience measures along the Community’s shoreline assets. A regional assessment of shoreline conditions would help Communities along the south shore locate and prioritize improvements to reduce erosion and storm surge impacts. The projects proposed for Baldwin Park and Oakwood Beach Club would combine protection measures with capital improvements and incorporate policies to increase community member access. Resilience improvements for Community marinas would reduce storm damage to these assets and surrounding properties.

Table 09: Strategy: Enhance the Community’s Natural and Cultural Resources

Project Name	Project Description	Cost Estimate	Category	Regional
Silver Lake Park Drainage Improvements	A comprehensive drainage study will be undertaken to assess the flow controls at these basins to identify the cause of flooding in this area during regular rainfall events and guide the design of drainage improvements and improvements to the park for the Community.	\$600,000	Proposed	No
Baldwin Park Water Promenade	The project involves the strategic implementation of both natural and structural storm protection features along the shoreline to create a promenade and minimize further erosion and damage.	\$3,800,000	Proposed	No
Oakwood Beach Restoration	Assessment, design, and construction for the restoration of the privately-owned Oakwood Beach and Club and appurtenances for use by the entire Community.	\$2,500,000	Proposed	No



Section IV: Implementation – Project Profiles

This section of the NY Rising Community Reconstruction (NYRCR) Baldwin Plan provides project profiles for each Proposed or Featured Project developed by the NYRCR Baldwin Planning Committee (Committee) over the course of the NYRCR Program. These projects address the needs and opportunities presented by recent storm events and capture the aspirations and ideas of NYRCR Baldwin Community (Community) residents and stakeholders. They are the result of an extensive, deliberative, participatory planning process.

The NYRCR Community Reconstruction Program has allocated to the Community up to \$10.6 million (Baldwin: \$3 million; Baldwin Harbor: \$7.6 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 Baldwin Plan (NYRCR Plan), the NYRCR Planning Committee (Committee) took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. The Committee 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 projects and actions listed in the NYRCR Plan fall within a discrete category but are not listed in an order of priority – all projects within a category are of equal priority. Proposed Projects are projects proposed for funding through the Community’s allocation of CDBG-DR funding. Featured Projects are projects and actions that the 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 Committee would like to highlight, but that are not categorized as Proposed Projects or Featured Projects.

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

In addition to providing a detailed description of each project, the profiles include information on two important elements used by the Committee and Consultant Team to evaluate the value of each project – a Cost-Benefit Analysis (CBA) and a Risk Reduction Analysis. Before proceeding to the projects themselves, it is important to understand these two analytical elements of the Project Profiles.

Project Costs

Project Profiles include a capital cost estimate. The CBA cannot, however, forecast 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 implementing a project is just one aspect of the justification for funding these projects. Conversely, another important variable is the future costs of not implementing these 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 in repeated inability to access vast areas of the Community.

Project Benefits

The projects listed offer a number of benefits, which have been grouped into the following categories:

- **Risk Reduction & Resiliency:** 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:** 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 including, where applicable, potential for job creation; 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:** 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 secured; 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; and,

- **Environmental:** 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, and the creation of open space or a new recreational asset.

Cost-Benefit Analysis

A CBA is a tool used to calculate and compare the benefits and costs associated with a project. The CBA provides decision-makers with a framework for comparing different projects (i.e., anticipated cost of implementation against total expected benefits) and determining whether the benefits of a particular project outweigh the costs. More specifically, the value of the CBA is two-fold: (1) to inform the Committee as they formulate and identify projects for implementation; and, (2) to help municipalities prepare grant applications for funding.

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 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.

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.

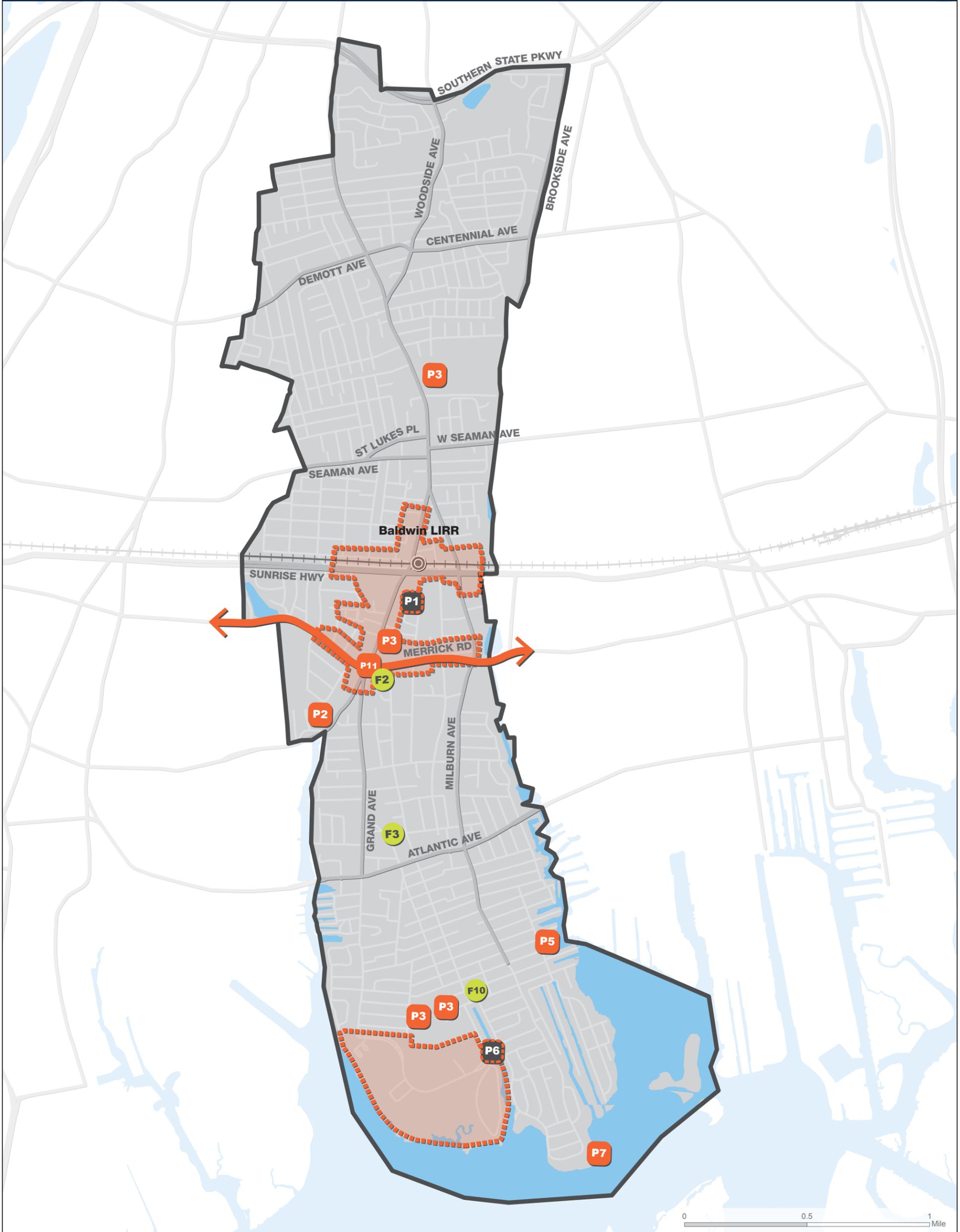
The Risk Reduction Analysis uses a tool called "Scenario Planning." Scenario planning measures a project's potential to reduce risk under a variety of potential future environmental conditions or scenarios (e.g., different levels of projected sea level rise). A risk reduction score is then assigned to each project scenario. This helps communities and decision-makers understand the potential environmental, social, and economic outcomes associated with each scenario.

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	Downtown and Commercial Corridor Resiliency Plan	
P2	Proposed	Silver Lake Park Drainage Improvements	
P3	Proposed	Baldwin Community Assistance Centers	
P4	Proposed	Green infrastructure: NYRCR Baldwin Tree Planting Subsidy Program	Not shown, Community-wide
P5	Proposed	East Baldwin Road Raising	
P6	Proposed	Baldwin Park Water Promenade	
P7	Proposed	Oakwood Beach Restoration	
P8	Proposed	Public Communication and Education Gap Analysis	Not shown, Community-wide
P9	Proposed	Business Continuity Program	Not shown, Community-wide
P10	Proposed	South Shore Stormwater System Modeling and Analysis	Not shown, Community-wide
P11	Proposed	Lifeline Transportation Network Pilot Project	
F1	Featured	Home Heating Upgrades	Not shown, Community-wide
F2	Featured	Lifeline Network: Priority Local Road Streetlight Retrofit	
F3	Featured	Green infrastructure Pilot Project Installation at Steele Elementary School	
F4	Featured	Tidal Check Valve Installation and/or Replacement	Not shown, location TBD
F5	Featured	Improve Resilience of Community Marinas	Not shown, coastline
F6	Featured	Strategic Adaptation Plan for Coastal Development	Not shown, Community-wide
F7	Featured	Neighborhood Preservation Guidelines	Not shown, Community-wide
F8	Featured	Public Communication and Education Gap Analysis - Phase 2	Not shown, Community-wide
F9	Featured	Street-End Bulkhead Replacement/Upgrade	Not shown, coastline
F10	Featured	West Baldwin Road Raising and Drainage Improvements Study	

Figure 08: Proposed and Featured Projects



Legend

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

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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Proposed Project: Downtown and Commercial Corridor Resiliency Plan



Artist's impression of a resilient Downtown Baldwin (source: Arup)

Downtown Baldwin is home to clusters of businesses near the Long Island Rail Road (LIRR) station that provide commercial, retail, and entertainment uses to local residents. The economic health of this area is crucial to the appeal of living in NYRCR Baldwin Community (Community). Similarly, the key commercial corridors provide important retail services. Fortunately, nearly all of the Community's commercial corridors are located on high ground; only a small number of businesses were flooded by Superstorm Sandy. Portions of Grand Avenue and Merrick Road that run along inlets and inland ponds suffered flood damage, including areas around Silver Lake. The entire section of Atlantic Avenue near Milburn Creek and up to Milburn Pond was inundated as well. While some local businesses, like Samuel Kolstein & Son Ltd. and Manhattan Refrigeration, rebuilt their facilities and reopened, other businesses are still rebuilding or are permanently closed.

While the predominant land use in the Community is residential, there is little housing in the Downtown area and limited multifamily housing options in the Community. Significant areas of residential housing, particularly near and along the waterfront, were inundated during Superstorm Sandy and Hurricane Irene and are subject to future flooding. These storms have negatively impacted the economic health of local residents. The cost of raising and maintaining a home in the Community has significantly increased in an area where existing home prices were already high. Downtown Baldwin has been identified as an area where housing opportunities could be created in the future. Downtown Baldwin was also identified in the Nassau County Infill Redevelopment Feasibility Report as an area with Transit Oriented Development (TOD) potential.

This project includes a comprehensive planning and resiliency study to re-envision the downtown and commercial corridors in the Community. The project would study and make recommendations on the broad range of issues that can create vibrant, safe, active, and resilient mixed-use downtown development and economically successful, attractive commercial corridors. The project will build on the work previously done by Nassau County in the study noted above.

The Downtown and Commercial Corridor Resiliency Plan will address the following:

- **Mix of Uses, Amenities, and Housing Choices:** This will identify opportunities for housing and commercial business locations outside of high and extreme flood risk areas and in central locations close to transit and the Baldwin Long Island Rail Road (LIRR) station. New housing would diversify the current housing stock, which is almost exclusively single-family units. When implemented, new housing would make it feasible for young people, seniors, and low- and moderate-income residents to stay in Baldwin, while enabling current residents to relocate away from higher risk areas within the Community and encouraging prospective new residents to move to the area.

The residential component would be balanced with economic development initiatives to identify new commercial opportunities in the Community, create new commercial spaces and utilize vacant ones. These initiatives would also support measures that contribute to the economic vitality of the Downtown and commercial corridors, including parking improvements, public space enhancements or expansion, and traffic and circulation improvements. The potential increase in residential and commercial development will expand the local tax base. Creation of a Business Improvement District will be considered with area stakeholders and business leaders.

- **Regulations for Resiliency:** The plan will recommend new zoning, building codes, and/or design regulations to make Downtown and the commercial corridors more resilient and vibrant.



Downtown Baldwin (source: Arup)

The plan will identify stormwater management, including green infrastructure, which could be incorporated by existing property owners as well as into new developments.

- **Improving Infrastructure:** Multimodal transportation recommendations will be identified through a combination of Nassau County's traffic study and studies performed as part of this Downtown and Commercial Corridor Resiliency Plan. Improvements for transit, including LIRR station access and Nassau Inter County Express (NICE) bus service, as well as measures that can be taken to improve traffic flow near the station, will be identified. This includes traffic signal optimization, parking supply/demand analysis, and route improvements for bicycles and pedestrians.
- **Safety and Resiliency:** The Downtown and Commercial Corridor Resiliency Plan will assess emergency needs related to Downtown Baldwin. This would include the potential repurposing of the currently closed Milburn Elementary School to operate as a Community Assistance Center (CAC) after future disasters and provide information year-round. (Note that Community Assistance Centers is a separate proposed project included in this NYRCR Baldwin Plan.) The plan will evaluate demand for hotels and potential for existing buildings and facilities to be used as temporary shelters. It will also evaluate the



The Baldwin LIRR Station (source: Arup)

possibility of installing microgrids for alternative power generation. The plan will assess emergency needs related to Downtown as a hub for major evacuation routes (car, rail, mass transit) and identify necessary improvements.

Estimated Project Cost

The total estimated project cost is \$800,000.

Project Benefits

Creating a plan for the downtown area provides an opportunity to create a safer, cleaner, more attractive, and more economically-resilient Community. The Downtown and Commercial Corridor Resiliency Plan addresses all of the Recovery Support Functions.

Risk Reduction and Resiliency Benefits

The proposed project will create a plan for downtown growth that allows for the construction of new residences and businesses outside of low-lying and flood-prone areas. As a result, lower risk options for housing and commercial space will be available for residents and businesses currently located in higher risk areas. It would offer an opportunity to relocate should a resident or business wish to move out of a risk zone yet remain in the Community. The regulatory recommendations for resilient buildings will ensure that the risk of flooding to newly constructed buildings is adequately reduced. Lastly, the investigation of

microgrid potential in Baldwin may provide an opportunity for greater energy reliability in the Community during future events and reduce the risk of unsafe conditions following future disasters.

Economic Benefits

Implementation of the plan will help the Community develop a more robust economy as well as potentially increase tax revenues through development, commercial, and retail uses. In developing a microgrid, energy costs can be reduced and capacity can be increased to enable anticipated Downtown and Transit Oriented Development (TOD) economic growth. Greater economic continuity can be achieved if businesses can be located outside of risk areas, protecting a valuable revenue stream for local governments should future storms occur.

Health and Social Benefits

Social benefits of the plan include access to more affordable and diverse housing options. Providing new housing, economic development, and recreation opportunities in the downtown area can improve the public realm and facilitate walkability. These areas will also provide better transit access and improve access to community services for socially vulnerable populations. Developing a central location with a cluster of essential services that can effectively avoid power loss through implementation of a microgrid is highly beneficial to Community members' ability to obtain resources and information directly following a future disaster. Diverting or delaying stormwater from entering the drainage system through the development of green infrastructure systems can protect community assets, homes, and businesses from flooding.

Environmental Benefits

A walkable and attractive downtown area can also reduce road congestion and vehicle emissions by reducing the need for short car trips to the train station or shopping areas. Sustainable mobility options may also reduce the amount of pollution in stormwater runoff that results from driving automobiles. The development of a microgrid can also enable the generation of clean energy, improving local air quality and reducing the generation of greenhouse gases

in the Community. Green infrastructure can also provide numerous environmental benefits including groundwater recharging, pollutant reduction in bays and wetlands, aesthetics, air quality improvements, and shade and cooling on hot days.

Cost-Benefit Analysis

Creating a plan for future resiliency and economic development in the Community's Downtown and along commercial corridors would cost approximately \$800,000. In the creation of opportunities for growth, development and possible relocation to less risky areas, the plan and subsequent development can reduce both the exposure to harm and the need to rebuild by creating opportunities to relocate to areas of greater safety within Baldwin. The development that results from the Downtown plan will generate construction jobs during the building phase and local jobs at retail or commercial establishments after the project(s) are built. Finally, green infrastructure can reduce or eliminate the costs of future storm-water drainage infrastructure by dealing with storm-water on site. The additional tax revenue that can be generated from attractive commercial development and subsequent increase in local spending can also help to justify the project cost.

Risk Reduction Analysis

This proposed project will offer suitable areas for relocation of businesses and residents who want to relocate closer to Downtown and away from the shoreline or other high risk areas. The plan can lead to the development of hundreds of new houses outside of flood risk areas, reducing the risk to the overall housing market in the Community.

General Timeframe for Implementation

This proposed project can be implemented within 24 months of project commencement.

Regulatory Requirements Related to Project

No regulatory requirements related to this project.

Jurisdiction

The Town of Hempstead has jurisdiction and permitting approval for property improvement projects in downtown Baldwin. The Town is also responsible for the Building Zone Ordinance.

Proposed Project: Silver Lake Park Drainage Improvements

Silver Lake Park is a nine acre park located in a residential area on Foxhurst Road, just south of Merrick Road in Baldwin. It was acquired by Nassau County in 1946 and is one of several County properties that were originally designed for drainage purposes and later turned into public parks. It is now a key community recreational asset and environmental open space, while retaining its original role as a drainage facility. Silver Lake Park was part of a three pond capital improvement restoration project completed in 2007, which included cleaning and dredging of the pond; planting of trees, shrubs, and aquatic plants; and, restoration of walkways.

The Silver Lake Park Drainage Improvements will analyze and construct improvements to reduce flood risk to the Park and surrounding neighborhoods during major storm events, as well as regular non-catastrophic rain or tidal events.



Silver Lake Park and surrounding neighborhoods (source: Arup)

Silver Lake is the confluence of two urban watersheds and stream corridors and is linked with a series of stormwater basins that includes Caroline's Lake, Lofts Pond, and Parsonage Creek. Committee members and residents stated that it is suspected but not known whether Silver Lake is also connected to Maple Street's historic drainage basin. The area around Silver Lake Park on Foxhurst Road flooded during Hurricane Irene and Superstorm Sandy and it has a history of flooding during regular rainfall events.

This project proposes to fund a comprehensive, in-depth drainage study and construct drainage improvements. The project includes the following:

- Document historic (including Superstorm Sandy and Hurricane Irene), current, and anticipated flooding causes (upstream stormwater, regular precipitation events, and various tidal conditions);
- Assess the water flow controls within and between the stormwater basins;
- Address any bottlenecks to drain ponds;
- Study options to increase stormwater storage capacity of the ponds and the potential for use of the unused 72-inch conduit adjacent to Sunrise Highway;
- Study freshwater fish migration (e.g., alewife) and identify opportunities to improve habitat; and,
- Guide the design and construction of drainage improvements (e.g., tide gate, dams, and additional retention basins) and additional community amenities, which could include a new passive park, playground, and/or dog park.

Nassau County is planning a pilot project to control floatable debris for Milburn Pond. That project will serve as a demonstration project that can be applied at other bodies of water in the County. Silver Lake could also be a site for a future floatable debris control project based on the success of the pilot project at Milburn Pond. The potential application of the improvement will be analyzed in the comprehensive drainage study for Silver Lake.



Silver Lake Park (source: Arup)



Outlet of Silver Lake into Parsonage Creek (source: Arup)

Estimated Project Cost

The total estimated project cost is \$600,000. The drainage study would cost approximately \$200,000 and the construction of drainage improvements would cost approximately \$400,000.

Project Benefits

The Silver Lake Park Drainage Improvements proposed project seeks to reduce flooding impacts and increase flood protection for the park and surrounding neighborhoods. The project supports the Recovery Support Functions of Natural and Cultural Resources, Infrastructure, Housing and Economic Development.

Risk Reduction and Resiliency Benefits

This project will reduce flood risk to Silver Lake Park and surrounding neighborhoods during major storm events, as well as regular non-catastrophic rain or tidal events. A reduced flood risk in these areas also translates to a reduced public safety risk following future disasters. By reducing flooding on roads, emergency responders and Community members will maintain better access to these areas during tidal or extreme flooding events.

Economic Benefits

Improved flood management and resilience at Silver Lake Park will improve the protection of community assets, including public infrastructure, open spaces, houses, and businesses. By reducing the risk of flooding to these assets, future costs of reconstruction and recovery can be reduced. Incorporating resilient design standards into the improvements will enable Nassau County and Community homeowners and businesses to reduce maintenance and flood repair costs.

Health and Social Benefits

Reduced flood risk will increase the overall attractiveness of the park as both a passive and active recreational asset in the Community. This will encourage more social interaction as well as community understanding of the value of parks and open spaces. In addition, reduced flooding of nearby roads will enable better disaster management, response, and recovery, improving public health and safety in the process. By reducing the amount of standing water on adjacent roadways, this project will also improve traffic safety and minimize road congestion, which in turn affects travel times and vehicle operating costs.

Environmental Benefits

The incorporation of a freshwater fish migration study will improve the understanding of environmental factors at Silver Lake, which will inform the selection and design of drainage improvements so that environmental benefits can be maximized.

Cost-Benefit Analysis

The proposed drainage study and improvements at Silver Lake Park would cost approximately \$600,000. The park is a valued Community amenity and one of the few passive and active recreation open spaces in the area. However, its original and main function is for stormwater drainage, and improving and maximizing this function is essential to the Community. Public infrastructure, namely roads and park walkways, will also be protected. These foregone costs of reconstruction and maintenance if the project is completed justify the project cost. In addition, the drainage study will enable calculating precise project benefits and evaluating the most cost-effective and beneficial approaches to implementation.

Risk Reduction Analysis

This project will reduce flood risk to Silver Lake Park, a key community recreational asset and environmental open space, for major storm events as well as regular non-catastrophic rain or tidal events. In addition, flood risk to dozens of nearby houses, a few commercial buildings, and a number of roads and walkways may be reduced.

General Timeframe for Implementation

It is estimated that the study and construction related to this project could be completed in 18 months from commencement.

Regulatory Requirements Related to Project

There are no regulatory requirements with regards to the study phase of the project. Design and construction of drainage improvements may involve the Town of Hempstead, NYS Department of Environmental Conservation (NYS DEC), U.S. Army Corps of Engineers (USACE), Nassau County, and Coastal Zone Management (CZM) consistency concurrence (NYS Department of State) and will be determined during the study phase.

Jurisdiction

Nassau County has jurisdiction and permitting approval over Silver Lake Park.

Proposed Project: Baldwin Community Assistance Centers

During Superstorm Sandy, Hurricane Irene, and other storms, many NYRCR Baldwin Community residents were unprepared for the impact of the storm and either were not aware of or did not heed emergency preparedness recommendations and/or evacuation orders issued by Nassau County and the Town of Hempstead. There was a lack of clarity on where to go for information, comfort, and relief services. Residents at Committee meetings and Public Engagement Events expressed frustration with the lack of information on how and where to go for help, the lack of safe access to drinking water due to the sewage spill that occurred, communication access, social isolation, difficulty accessing prescription medication, and restricted access to food. Many of these concerns were exacerbated by the extended power outage, which lasted approximately two weeks.

A number of needs were identified to enable the Community to recover more readily after a storm, including being better prepared; having more information after storms; having access to computers, Internet connections, and cellphones; and, having supplies stockpiled at shelters and other local distribution locations.

This project proposes establishing two Community Assistance Centers (CACs) as places that can provide information to residents throughout the year, as well as supplies, resources, information, and comfort after storms. The selected locations are Baldwin High School and Baldwin Public Library (the possibility of retrofitting and utilizing the currently closed Millburn Elementary School is also under consideration; see Proposed Project Downtown and Commercial Corridor Resiliency Plan). These sites were chosen because of their community familiarity, their location on or near County Evacuation Roads or key local streets and in lower-risk areas, and the fact they suffered little or no damage during the recent storms. There are currently no designated support centers in the Community like the proposed CACs.

Under normal conditions, CACs would serve residents by providing information about emergency preparedness in addition to other ongoing community activities scheduled at the facility. If Baldwin High School were to be used as a CAC, information could be disseminated by sending students home with important information and events could be held on



Baldwin Public Library (source: Arup)



Baldwin High School (source: Arup)

weekends, at night, and over the summer so as not to interrupt regular school and after-school activities. After a storm, CACs will become a place for residents to gather, collect and distribute resources, including emergency supplies (not funded by this project), and provide access to electricity and the Internet.

This project would include an assessment of the current infrastructure at each location and the installation of an emergency backup natural gas generator, additional electricity 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 Nassau County Office of Emergency Management (OEM), as well as listing resources available at the Center. Finally, this

project proposes the employment of a Local Disaster Recovery Manager. When combined with other Nassau County NYRCR Communities, this could result in one to two full time staff. Responsibilities of the Local Disaster Recovery Manager (LDRM) are defined as:

- Develop a Resiliency Education Program that provides preparedness-training sessions geared towards businesses and community members;
- Provide yearly workshops to the community on what types of assistance will and will not be available in pre-disaster and post-disaster phases;
- Ensure information is accessible and understandable to residents (including non-English speaking residents);
- Establish a list of recovery supplies, such as toiletries, water, food, and supplies, to be added to CACs and implement them (not funded by project).

The generators are proposed to have the following capacities:

- Baldwin High School: 400 kW
- Baldwin Library: 100 kW

For each site, installation of the following:

- Wi-Fi system unit cost: \$5,000
- Controller: \$3,800
- High-capacity charging station: \$2,000
- Electronic signage: \$52,000/sign (purchase, ship, install, training)

The project will assess the existing building infrastructure and if there are any funds saved by using existing infrastructure, it will go towards increasing the size of the emergency backup generator and/or the Resiliency Education Program.

Estimated Project Cost

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

Project Benefits

This proposed project seeks to establish locations within the Community for residents to learn about disaster preparation and response as well as obtain

resources and information after a future disaster. This project addresses the Recovery Support Functions (RSF) of Community Planning and Capacity Building, Health and Social Services, and Infrastructure.

Risk Reduction and Resiliency Benefits

The creation of CACs within the Community reduces the risk that residents and businesses will not be able to obtain information and resources locally after a future disaster.

Economic Benefits

The project provides an economic benefit by reducing disaster relief and recovery costs by utilizing Federal and State public grants for preparation costs and creates employment opportunities through the creation of the LDRM positions.

Health, Social and Public Safety Services

Major concerns about the disaster response and recovery process following Superstorm Sandy cited at NYRCR Baldwin Committee Meetings and at Public Engagement Events included the need for improved access to information, connectivity to family and friends, and understanding of what was happening in the region. The CACs address urgent human needs after a major storm event by providing information and communication support in local areas. The CACs will provide a year-round 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 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.

Socially vulnerable populations will benefit from the employment of the LDRM, who will ensure that all residents, despite English literacy, mobility, or ability understand disaster preparation and recovery

protocols. In addition, these residents, who may be more likely to have insufficient access to post-disaster comforts and necessities, will have these resources available in the Community.

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 for, and how to respond before, during and after, an event. Greater levels of preparedness, 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. People will be more informed by the community education programs supported by the CAC. This will help build support for following directives from local, State, and Federal officials, as well as reducing the possibility that local community members will not know what to do and, therefore, stay behind.

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, such as Superstorm Sandy, it also offers the opportunity for 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 CACs can tabulate the needs and issue requests for support to the local areas.

This project cultivates preparedness in the local area and allows a more informed population to take appropriate actions before and after events occur. The benefits of a more informed Community and potential for this information to prevent injury, illness or loss of life justify the cost of the project.

Risk Reduction Analysis

Lack of information was cited as a major issue in the Community and a problem requiring a response in this NYRCR Plan. 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 and will therefore be more likely to respond appropriately. On a day-to-day level the CAC can distribute information about preparedness.

During or after a storm event, if people are unable to access television, radio, or the Internet because communication lines are down or power is not available, there is currently no method of informing them of appropriate actions or activities to undertake. A CAC can be an information clearinghouse, providing information to the local population so they can make informed and safe choices. It also provides an opportunity for local populations to communicate news and needs outward to friends, family and supporting organizations. The CACs can offer information about health and safety risks and where it is safe to return and where it is not, dispense necessary supplies, and provide communication links between local populations and family or friends further away. This reduces the risk that people will enter into hazardous areas or undertake activities, such as drinking unsafe water or entering a home, before knowing whether it is safe to do so.

General Timeframe for Implementation

This project will take approximately 24 months to complete.

Regulatory Requirements Related to Project

There are no regulatory approvals required for this project, however, consent to use school and other public facilities as CACs will be required. Coordination with Nassau County OEM will also be required to ensure consistency of information and that post-disaster responsibilities are complementary and not duplicated.

Jurisdiction

The Baldwin High School is operated by the local school district. The Library is responsible for its own operation.

Proposed Project: Green Infrastructure: NYRCR Baldwin Tree Planting Subsidy Program

Significant storms in recent years such as Superstorm Sandy and Hurricane Irene have damaged or destroyed street trees throughout many neighborhoods in NYRCR Baldwin Community. Street trees greatly contribute to the Community's character and residents at Public Engagement Events noted their loss and need for replacement. New street trees will beautify the Community and improve the environment by reducing stormwater runoff, decreasing soil erosion, reducing heat, and protecting infrastructure. This program addresses the Recovery Support Functions (RSF) of Natural and Cultural Resources, as well as Housing, by improving stormwater management, neighborhood aesthetics, and property values.

This project proposes to subsidize fees associated with securing a street tree in the Community through programs like the Town of Hempstead's Tree Planting Program. The Town plants curbside tree(s) in front of a residential property in its right-of-way at the written request of the property owner. The fee for planting is currently \$150 per tree, but is waived for seniors 62 and older. The NYRCR Baldwin Tree Planting Subsidy Program will subsidize the replacement trees felled by storms or add trees in new locations. In 2013, the Town implemented a similar program to replace trees felled by Superstorm Sandy and waived the \$150 fee for replacement trees while supplies lasted. A tree-planting program has also been underway in Nassau County to replace trees destroyed along roads and in County parks by Superstorm Sandy.

Trees that fall during storm events can compromise above ground utilities, such as electric and telephone lines. This was a major problem during both Superstorm Sandy and Hurricane Irene. The Town offers property owners a choice of tree, including options that are considered "wire friendly", which can safely be located near or under utility lines.

The NYRCR Baldwin Tree Planting Subsidy Program shall subsidize all costs to Community residents, including the application fee (\$150), up to the \$800,000 project cap funding amount. The Town currently covers installation costs for street trees. In the event the Town's program is not practicable for this project, up to an additional \$400 per street tree will be allocated. Since the Town program only applies to residential properties and Town rights-of-way, the

NYRCR Baldwin Tree Planting Subsidy Program will also consider requests for tree planting subsidies from businesses, schools, and other properties ineligible for the Town program, as well as home and business owners adjacent to State facilities, such as highways. Subsidies can be applied to permit fees, tree purchase, and/or installation. This will result in at least 1,500 newly planted trees in the Community.

Estimated Project Cost

The total estimated project cost is \$800,000.

Project Benefits

The program addresses Recovery Support Functions of Economic Development and Natural Resources.

Economic Benefits

Street trees can provide economic benefits to the Community's commercial corridors. Stores and businesses on tree-lined streets have been shown to generate 20% more income than those on non-tree-lined streets.⁸² Realtor estimates also show a \$15-25,000 increase in home or business values on tree-lined versus non-tree-lined streets.⁸³ Street trees can also produce a cost saving for local governments,



Street trees provide numerous benefits and co-benefits (source: www.local ecology.org)

who may need fewer drainage system improvements and reduced system maintenance due to stormwater runoff reductions.

Health and Social Benefits

Street trees provide numerous co-benefits, including improved aesthetics and local air quality, and shade and cooling on hot days. In addition, appropriately placed street trees can reduce speeding on residential streets which can prevent car accidents involving pedestrians and children playing outside. Tree-lined streets also provide a more pleasant walking environment, which can improve public safety through increased foot traffic.

Environmental Benefits

Street trees help reduce surface water runoff and decrease soil erosion. In addition, they improve air quality and reduce the number of greenhouse gas emissions that enter the atmosphere. Finally, trees provide habitat for birds, which thrive in contiguous tree covered areas, and other animals.

Cost-Benefit Analysis

Studies conducted by the American Planning Association and the American Society of Landscape Architects demonstrate that a healthy tree canopy enhances the absorption of water within a community and reduces overall stormwater in storm drains. These studies also demonstrate that trees have a positive effect on adjacent property values. This program, at a very small cost, adds value to the local Community's properties, while also addressing green infrastructure needs and allowing for the targeted introduction of tree species that are most suitable for the area. The program's low cost offers a high benefit in terms of impact and justifies the allocation of budget.

Risk Reduction Analysis

Street trees will reduce risk of flooding by reducing surface water runoff, which overwhelms drainage systems as well as reducing damage to infrastructure by decreasing soil erosion.

General Timeframe for Implementation

Tree planting by the Town will be conducted over a period of approximately two months in autumn, when planting is typically most successful.

Preparatory activities leading up to the planting will take additional time and will greatly depend on the availability of Town resources to respond to requests for street trees from Community property owners. For every application, a Town inspector must visit the property to determine if it is a suitable location for planting. After the site visit, the Town's Engineering Department sends a response letter indicating the number of trees that have been approved for planting, along with a color brochure indicating the type of trees available. The homeowner must then return the form indicating their preferred tree species, with payment (to be subsidized through this NYRCR Tree planting subsidy program), to be placed on the planting list for the following fall planting season.

Regulatory Requirements Related to Project

Tree planting permits are required from the Town of Hempstead if a property owner plants his/her own tree, but are included in the application fee if the Town is planting the tree. Coordination with the Town of Hempstead for site inspections and evaluations is required to ensure the feasibility of planting.

Jurisdiction

The Town of Hempstead has jurisdiction for tree plantings in its rights-of-way. Nassau County may have jurisdiction over plantings on County-owned roads.

Proposed Project: East Baldwin Road Raising

In the Community, the streets of Washington Place, Hayes Place, Van Buren Place, and Jackson Place experienced severe tidal flooding during Hurricane Irene and Superstorm Sandy. Since those storms, these streets have experienced an increase in tidal flooding during monthly high tides.

Development in the neighborhood along canals began in the 1930s, before any flood insurance study or the establishment of flood zones. The neighborhood roadways were established to accommodate the first floor elevations of houses. FEMA has subsequently rated this area as an “AE” Special Flood Hazard Area (SFHA). Large sections of these streets are less than 1.5 feet of elevation above the National Geodetic Vertical Datum (NGVD), making them susceptible to varying levels of tidal flooding from the adjacent Milburn Creek and Baldwin Bay. Such tidal flooding occurs on weekly and monthly bases, along with significant flooding when major rainstorms coincide with a high tide period.

Costs associated with these flood events include damage to private property, ranging from internal flooding to properties in severe floods to damage to lawns and landscaping in the less severe cases. Vehicles parked and/or driven through the saltwater flooding can also become damaged. In addition, there is disruption to sanitary curbside garbage collection, interruption of mail services, and general disruption to the residents’ daily lives. The continual flooding has directly affected the quality of life throughout the Community and property values have suffered.

To alleviate some of the above issues, the proposed project will include the raising of approximately 2,215 linear feet of local residential streets along Washington Place, Hayes Place, Van Buren Place, and Jackson Place. The intent of the project is to reconstruct the roads with a sufficient minimum gutter elevation to FEMA’s 10-year still water level. The project design will include the replacement of concrete curbs and sidewalks, improvements to the stormwater drainage system, installation of check valves at outfalls, and the reconstruction of street end bulkheads to minimum elevations of 7.5 NGVD to prevent flooding. To prevent road raising from having negative impacts on private properties, improved roads will have new storm drain inlets installed at property frontages.



Frequently flooded Community roads (source: Arup)

This is a shovel-ready project as the Town of Hempstead completed the design work following Hurricane Irene for an unsuccessful Hazard Mitigation Grant Application. The permits are in place to undertake this work immediately.

The budget estimate for this project is \$2 million, with \$1.5 million for road raising and \$0.5 million for bulkhead raising. This project directly addresses the Recovery Support Functions of Infrastructure and Housing.

Estimated Project Cost

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

Project Benefits

This project, which addresses the Infrastructure and Housing Recovery Support Functions (RSF), will reduce the risk of flooding to Community transportation infrastructure and houses.

Risk Reduction and Resiliency Benefits

The drainage system improvements will reduce episodic flooding and reduce the likelihood of the 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 for all residents, including vulnerable populations.

Economic Benefits

Economic benefits will include improvements in local property values and may include reduced recovery and reconstruction costs following future flooding events. There are approximately 60 residential properties adjacent to the proposed road raising projects.

Cost-Benefit Analysis

The Community regularly cited this as an important project. The cost – in terms of both time and expense – for design and securing permits for the road raising have been borne by the Town. NYRCR Program funds would be used to fund the capital outlay for the construction of the improvements, which can begin in the near term. The cost of this project is just more than \$30,000 when averaged across the approximately 60 benefiting properties. This project's benefits far outweigh its costs, particularly when compared with the costs these property owners incur periodically from flooding damage to homes and vehicles and the negative impact of flooding on property values. In addition, the project would improve the quality of life for property owners and their families by reducing the threat of flood impacts and increasing safety. The Town also benefits from obtaining road and infrastructure improvements with limited local expenditure.

Risk Reduction Analysis

The roadway reconstruction in this flood-prone neighborhood will reduce the risk of flooding to community transportation infrastructure by raising road levels above the elevation where tidal flooding occurs. With the new roadway, new storm drain systems will be provided, enhancing the performance of the storm-water drainage system in the area. By addressing the flooding on the roadway, system improvements will extend benefits to roughly 60 private properties 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

It will take approximately six construction-season months to implement this project from the date of project inception, assuming the designs are fully executed and all permitting is still current.

Regulatory Requirements Related to Project

The required permits have been secured. This may involve NYS Department of Transportation (NYS DOT), NYS Department of Environmental Conservation (NYS DEC), U.S. Army Corps of Engineers (USACE) and Coastal Zone Management (CZM) coastal consistency concurrence (NYS Department of State).

Jurisdiction

The Town of Hempstead has jurisdiction over these roads.

Proposed Project: Baldwin Park Water Promenade

This project focuses on a waterfront area adjacent to Baldwin Park, which suffered soil erosion damage during Hurricane Irene and Superstorm Sandy. The Park is in need of rehabilitation and protection from storm surges and tidal wave action.

The project involves the strategic implementation of storm protection measures along the shoreline to minimize further erosion and damage, along with the improvement and expansion of the recreation area for the public. The shoreline storm protection measures entail the design and construction of a combination of structural and natural features and the improvement and integration of the promenade into a bulkhead along Parsonage Cove and Middle Bay. This would be in line with the National Oceanic and Atmospheric Administration (NOAA) 'Living Shorelines' program. Efforts will be made to minimize structural elements to keep a natural feel to the parkland settings. The recreation area will involve the creation of parkland with permanent waterfront access and a boat ramp for kayaks and canoes as part of the South Shore Blueway. The project involves determining confirmation of land ownership and agreements with stakeholders to confirm the project is viable. In order for this project to succeed, ownership and maintenance issues need resolution between the Town and State. This would ensure the park receives adequate attention and maintenance.



Pavilion in Long Dock Park, a former industrial waterfront in Beacon, NY (source: Arup)

The project includes study of land ownership and design, as well as construction of structural and natural shoreline features and the creation of a promenade along Parsonage Cove and Middle Bay. Design assumptions include:

- 200 foot bulkhead;
- 200 feet soft landscaped edges with robust shoreline landscaping;
- 400 feet elevated timber decking; 12 ft. W x 400 ft. L, 4 ft. above grade;
- 200 foot elevated promenade (concrete sidewalk); and,
- 400 foot metal railing.

Estimated Project Cost

The total estimated project cost is \$3,800,000.

Project Benefits

Risk Reduction and Resiliency Benefits

This project would help protect a key community Natural and Cultural asset from future flood risk and erosion and reduce the need for recovery resources following a major storm event.

Economic Benefits

The reconstruction of Baldwin Park could spur economic development by attracting residents and regional visitors to a currently neglected waterfront area.

Health and Social Benefits

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is periodically prepared by the NYS Office of Parks, Recreation and Historic Preservation (OPHRP) to provide statewide policy direction on its recreation and preservation mandate. It is used to guide the allocation of State and Federal funds for recreation and open space projects and provides guidance for the allocation of municipal funds to local areas and facilities with the greatest needs. According to the Plan, Nassau County can improve its parks and recreation opportunities by increasing day-use recreation opportunities, which can be

accommodated at the Baldwin Park. In addition, the SCORP included the top nine issues of concern to the public, which included: government increase and creation of additional public access to water resources and government increase in spending for the development of recreation facilities. This Baldwin Park Water Promenade project addresses these issues. The restoration of this facility would also improve opportunities for social cohesion and passive and active recreation for residents.

Environmental Benefits

The new landscaping will help expand environmental open space, improve the resilience of the shoreline, and potentially restore existing or former ecosystems.

Cost-Benefit Analysis

A well-functioning coastal park can have many benefits to residents and businesses, as outlined above. The investments needed to improve Baldwin Park are substantial, but the benefits to the environment, local neighborhood aesthetic, waterfront recreation, and economy can outweigh the costs. Parks and open spaces that lack a defining feature, such as a waterfront trail, are typically less likely to be utilized regularly than those that do. Providing such a feature at Baldwin Park can provide Community residents with an upgraded local amenity.

Risk Reduction Analysis

This project would help protect the Baldwin Park Water Promenade, a key community recreational asset, from future flood risk and erosion. In addition, if properly designed and maintained, the Park can reduce the risk of flood damages to the neighborhoods to the north and to Baldwin Middle School. These neighborhoods may also be at reduced risks of neighborhood blight from the neglect.

General Timeframe for Implementation

It is estimated implementation will take 24 months.

Regulatory Requirements Related to Project

This project will require coordination with the Town of Hempstead Department of Conservation and Waterways and the NYS Department of Environmental Conservation. This may involve U.S. Army Corps of Engineers and Coastal Zone Management (CZM) coastal consistency concurrence (NYS Department of State).

Jurisdiction

The project includes a Town of Hempstead-owned park and an adjacent parcel owned by New York State, which was on lease to the Town of Hempstead, however, the lease is currently expired.

Proposed Project: Oakwood Beach Restoration



Artist's impression of the Oakwood Beach Club pool and facilities after restoration (source: Arup)

The Oakwood Beach Club, also known as the Baldwin Harbor Pool Club, was established in 1962 as a privately-owned beach on Middle Bay. Membership was limited to residents in a small community in Baldwin Harbor named Oakwood. The club's pool and facilities were added later with membership contributions and membership was eventually opened to residents in the surrounding communities. It is now a major recreational asset enjoyed by many residents in Nassau County.

Oakwood Beach received significant damage from several natural disasters in the recent past, including Hurricane Irene. The damage is related to erosion of the beach and surrounding wetlands by nor'easters,



The current condition of the Oakwood Beach Club (source: Arup)



View of Middle Bay from Oakwood Beach Club (source: Arup)

hurricanes, and other storms. During Superstorm Sandy, Oakwood Beach Club experienced further damage, forcing its closure.

This project will identify options for transferring ownership to a public entity to enable Oakwood Beach's restoration as a public space. The project would also include the design and construction of capital improvements to restore the club and its facilities to working condition.

The anticipated capital improvements included in this project are as follows:

- Replace or add 150 linear feet of bulkhead;
- 4,000 square feet of clearing and grubbing, landscaping;
- Install 200 linear feet of soft landscaped edges with robust shoreline landscaping;
- Replace or add 8,000 square feet of concrete sidewalk;
- Resurface 30,000 square foot parking lot;
- Refurbish pool structure, mechanical equipment, and appurtenances;
- Add 200 linear feet of metal railing;
- Install retaining wall/steps; and,
- Refurbish comfort station, snack bar, and bathrooms.

All capital improvements would meet the Americans with Disabilities Act (ADA) specifications, ensuring that people of all ages and abilities can enjoy this community asset.

Estimated Project Cost

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

Project Benefits

The project addresses the Recovery Support Functions of Natural and Cultural Resources, Infrastructure, and Health and Social Services by providing additional social and recreational options for people of all ages and abilities.

Risk Reduction and Resiliency Benefits

This project would help protect a key Community Natural and Cultural asset from future flood risk and erosion and reduce the need for recovery resources following a major storm event.

Economic Benefits

The reconstruction of Oakwood Beach could spur economic development by attracting residents and regional visitors to a currently neglected waterfront area.

Health and Social Benefits

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is periodically prepared by the NYS Office of Parks, Recreation and Historic Preservation (OPHRP) to provide statewide policy direction on its recreation and preservation mandate. It is used to guide the allocation of State and Federal funds for recreation and open space projects and provides guidance for the allocation of municipal funds to local areas and facilities with the greatest needs. According to the Plan, parks and recreation opportunities can be improved by increasing day-use parks and outdoor swimming, both of which can be accommodated at the Oakwood Beach Club. In addition, the SCORP included the top nine issues of concern to the general public, which included: government increase and creation of additional public access to water resources increase of federal financial assistance to

support state and local recreation development and land acquisition, increase of government spending for the development of recreation facilities, (e.g., pools), and consideration of public/private partnerships to expand and develop recreational facilities. This Oakwood Beach restoration project addresses all of these issues. The restoration of this facility would create social and recreational benefits for people of all ages. Transferring the property to public ownership will help ensure continued access to the Oakwood Beach Club for the public, including members of vulnerable populations.

Environmental Benefits

The new landscaping will help expand environmental open space, improve the resilience of the shoreline, and potentially restore existing or former ecosystems.

Cost-Benefit Analysis

Oakwood Beach has been a valuable community asset since the 1960s, providing opportunities for recreation and connection with nature and the waterfront for generations of Community residents. It is now possible to broaden that opportunity to the public. There is little, if any, waterfront land available for development as a public recreational facility in either the Community or its neighboring communities, so the opportunity to protect this space as public land supports the goal of a sustainable statewide open space park system. The Oakwood Beach site and facilities may be made available to a public entity for no cost through transfer of ownership, which would be a valuable contribution to the public park system. The cost of the capital improvements to ready Oakwood Beach for public use likely does not exceed the value of the land that will be transferred and provides a myriad of environmental, recreational, social, and community-building benefits associated with creating a new public park on Baldwin Bay.

Risk Reduction Analysis

This project would help protect the Oakwood Beach Club, a key community recreational asset, from future flood risk and erosion. In addition, the privately owned property could potentially be sold for development, thus transferring the property to a public

entity reduces the risk of future homes and/or businesses being built in an extreme flood risk area. The improvements could also possibly reduce flooding risk to the adjacent residential neighborhoods.

General Timeframe for Implementation

It is anticipated that this project will take approximately 12 months to complete.

Regulatory Requirements Related to Project

The capital improvements will require permits, approvals and/or coordination with USACE, NYS DOS, NYS DEC, Nassau County, and the Town of Hempstead.

Jurisdiction

The proposed project area is currently held by the local residents of Oakwood at Baldwin. It is possible to transfer of the property to a public entity or private owner in order to fund this project. Capital improvements and the operation and maintenance of the facility will be the responsibility of the entity taking ownership.

Proposed Project: Public Communication and Education Gap Analysis

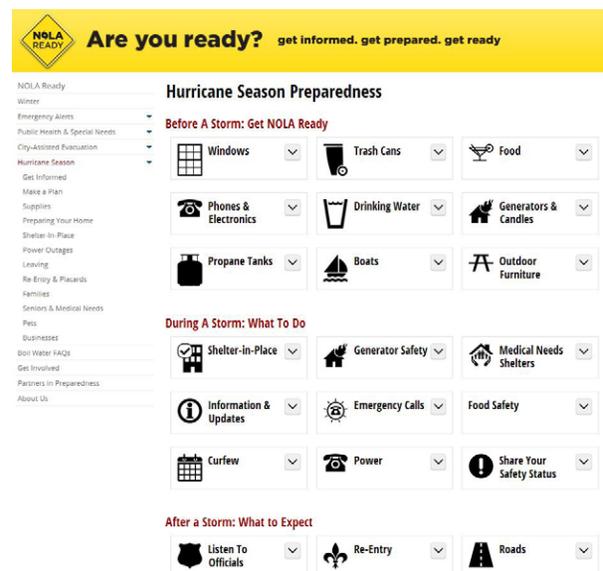
Currently, Nassau County Office of Emergency Management (OEM) coordinates all Federal, State, and local agencies to create and implement an Emergency Operations Plan. OEM identifies vulnerabilities, mitigates disasters, provides public education, responds to all-hazard emergencies, and protects Nassau 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 to include the creation of an educational component, using the website to promote educational seminars on disaster planning.



The City of New Orleans' "NOLA Ready" hurricane preparedness portal (Source: www.nola.gov/ready)



"Prepare SoCal" is a public awareness campaign to prepare Southern California for major earthquakes (Source: www.preparesoocal.org)

Estimated Project Cost

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

Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services 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 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 by 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 Analysis

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

General Timeframe for Implementation

24 months

Regulatory Requirements Related to Project

No regulatory requirements related to this project.

Jurisdiction

Nassau County Office of Emergency Management

Proposed Project: Business Continuity Program

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

According to data from the U.S. Small Business Administration (SBA), 59 Community businesses, with 441 employees, applied for disaster management assistance after Superstorm Sandy. These applications verified a total of \$2.0 million in real property damage, \$496,030 of machinery damage, an inventory loss of \$88,132, and a leaseholder improvement loss of \$164,807. Of these applications, only 11 (18.6%) were approved for an amount totaling slightly more than \$337,500, roughly one-eighth of the \$2.8 million applied for in verified damage assistance.

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

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

The program proposes working with Adelphi University and the Business Continuity Institute to lead training sessions for local business owners.



A commercial district in the Community (Source: Arup)

Through ongoing coordination with Baldwin Chambers of Commerce (and those of other hamlets and villages) 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 proposed project is also in the NYRCR Plans for the neighboring NYRCR Communities of Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequa. The approximate project cost is \$200,000, with an estimated contribution of \$40,000 by the NYRCR Baldwin Community.

Project Benefits

This project addresses the Economic Recovery Support Function (RSF). Given it is a shared project across multiple NYRCR areas, the Community gets the full benefits of the program at a lower level of cost than if the project were fully undertaken solely at the direction of the local Community.

Economic Benefits

The Community's commercial sector is largely comprised of retail businesses. When these businesses close, even for a short period of time, it is disruptive to the Community's economy and affects wholesalers and other businesses in the supply chain. Loss in sales across a number of businesses can lead to considerable lost sales tax revenue for Nassau County and the Town of Hempstead. Employees may lose wages or become unemployed due to long periods of closure. When employees are laid off or hours are reduced, income taxes are affected at both the State and Federal level. In addition, better preparedness and education can lead to a reduction in post-disaster business claims for financial assistance from state and federal programs.

For many Community business owners, damage caused by Superstorm Sandy was a serious financial burden and one that owners could not rebound from if it happened again. A business continuity plan would assist business owners in knowing what the best resiliency-related investments would be and how to plan for their future. Program staff would also help to connect business owners to grants, incentives, and other funding sources, helping to strengthen the local economy.

Health and Social Benefits

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

Environmental Benefits

For businesses that handle environmentally hazardous material, flooding can cause widespread environmental damage. Better education about the risks of flooding and how to plan for storm events can help to prevent this type of environmental damage from occurring by helping business owners adapt their

operations to store and operate hazardous materials in a manner that removes the risk of contaminating floodwaters.

Cost Benefit Analysis

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

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

Risk Reduction Analysis

Ensuring a stable economic base reduces the risk of loss of community, 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

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

Estimated Project Cost

This proposed project has also been proposed in the neighboring NYRCR Communities of Seaford/Wantagh, Bellmore/Merrick, and Massapequa. The approximate total project cost is \$2,900,000, with an estimated contribution of \$725,000 by the NYRCR Baldwin Community.

Project Benefits

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

Risk Reduction and Resiliency Benefits

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

Economic Benefits

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

Health and Social Benefits

This project will improve access to information on critical assets and facilities during storms and other projects that result from this project will improve access for fast and safe evacuation. By reducing the amount of standing water on roadways, this project will improve vehicle operation during all types of inclement weather, as well as reduce road congestion.

During major storms, improved drainage will increase the amount of time that roads are available to emergency services at the storm's outset, and will shorten the recovery time for road access after a storm event.

Environmental Benefits

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

This project has the potential lead to the reduction of pollutants carried by stormwater runoff entering tributaries and the South Shore Estuary. The findings from the study can be used for the next State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s), managed by the NY State Department of Environmental Conservation.⁸⁴

Cost-Benefit Analysis

With the ability to identify drainage improvements through 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 from 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 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

There are multiple municipalities with jurisdiction over the drainage system in the five NYRCR areas: Nassau County, Town of Hempstead, Town of Oyster Bay, Village of Massapequa Park, and New York State Departments of Transportation and Environmental Conservation.

A multi-jurisdictional committee/consortium consisting of municipalities could also be considered. This form of governance and administration has already proved 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 appointing a fiduciary responsible for grant management, with the committee/consortium itself 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 crossing 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.

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 proposed project is being shared with the neighboring NYRCR Communities of Freeport, Bellmore/Merrick, Seaford/Wantagh and Massapequa. NYRCR Baldwin Community’s contribution to the shared study is \$120,000 of the total estimated project cost of \$600,000.

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 also reduces government expenditures by reducing the cost of power supply to public facilities. Enhancement of roadway corridors in this manner will increase the attractiveness of more areas in the Community. This will provide economic benefit

by diversifying the locations to which waterfront land-owners could relocate within the community if they seek to move to less risk-prone areas.

Health and Social Benefits

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

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

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

Environmental Benefits

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

Cost-Benefit Analysis

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

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

Risk Reduction Analysis

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

General Timeframe for Implementation

12 months

Regulatory Requirements Related to Project

There are no regulatory requirements related to this project.

Jurisdiction

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

Featured Project: Home Heating Upgrades

Home heating oil tanks and systems create significant safety and environmental hazards during a flooding event. The project will develop policy recommendations as well as an incentive program for those who choose to convert from home heating oil to natural gas or other renewable methods of heating, such as solar-powered heating, in all risk areas. Ideally, all structures in extreme, high, and moderate risk areas will convert over time to natural gas and/or other power sources for heat and hot water. The benefit of conversion is to remove heating oil systems in homes and other buildings in flood areas thereby reducing the risk that harmful pollutants will be released into the environment.

The cost for this project includes the administrative cost for changing applicable planning and building regulations and for establishing a budget for the incentive program. This project addresses the RSFs of Infrastructure, Housing, Natural and Cultural Resources, and Health and Social Services.

Nassau County staff, Committee members, and Community residents all reported that residential fuel tanks were a major source of damage during Superstorm Sandy. Home heating oil tanks across south shore communities leaked during inundation as floodwaters displaced fuel inside the tanks. The leaked fuel caused permanent damage to residences, businesses, parks, marshlands, and waterways. In some instances, tanks were removed from their foundations by the force of floodwaters and became floating hazards to people, cars, buildings, and infrastructure. Residents, businesses, and community organizations are still cleaning up the damage from displaced oil more than a year after Superstorm Sandy and some residents can still smell 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 the Town of Hempstead to enforce due to the added homeowner expense.

Estimated Project Cost

This featured project will cost an estimated \$50,000 to implement.



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

Project Benefits

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

Risk Reduction and Resiliency Benefits

The primary benefit of this project lies in the reduced risk of contamination and damage to homes, businesses, parks and open spaces, waterways, and infrastructure in flood risk areas. Reduction of debris, such as oil tanks, will help maintain roads used to provide public safety services and access to community resources.

Economic Benefits

The economic benefits include the reduced costs of repairs to damage caused by oil tanks that may detach and becoming floating debris in future

storms, as well as mitigating the costs of cleaning up contamination that displaced fuel from the tanks may leave behind after flood waters retreat.

Health and Social Benefits

This project improves energy security for affected properties, reducing the chance that they will be without heat during and after major autumn or winter storms. In addition, by reducing the chance of oil leaks, it reduces public health and environmental risks. Community residents and businesses will experience public health benefits from breathing cleaner air, both in homes and in the Community.

Environmental Benefits

The bays, marshes, wetlands, and wildlife will be better protected from contamination hazards. Environmentally, the benefits include reduced contamination of waterways, groundwater systems, and surrounding ecosystems caused by displaced fuel, as well as mitigating 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.

Cost-Benefit Analysis

By developing design guidelines and a phasing policy that includes incentives for local homeowners, this program can introduce natural gas and phase out home heating oil over time. This would allow areas to evolve and convert to this alternative fuel supply, which carries less risk for pollution in homes, businesses, and the environment as it does not carry the potential for toxic fluids to mix with floodwaters.

Risk Reduction Analysis

This project will reduce both environmental risk and the risk of damage to properties from fuel oil spills. It will also reduce the potential for damage to structures from floating oil tanks that have become unearthed or dislodged. Less floating debris will contribute to an overall reduction in roadway blockages, improving accessibility during and immediately after a major

storm event. Additionally, conversion to alternative heating sources will reduce the risk that home will be without heat during and after major winter storms, as fuel delivery may be stalled if roads are sufficiently incapacitated.

General Timeframe for Implementation

This project will require approximately three months to implement from inception date.

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's planning and building construction code.

Jurisdiction

The Town of Hempstead administers building codes. National Grid is responsible for construction and maintenance of the regional natural gas network.

Featured Project: Lifeline Network: Priority Local Road Streetlight Retrofit

Through a two-part project NYRCR Baldwin Community (Community) seeks to strengthen evacuation, transportation, circulation, and safety to improve resiliency prior to another major disaster. The first phase of the Lifeline Network formulates guidelines for resilient roads and is described separately in this NYRCR Baldwin Plan. The second phase is this local road streetlight retrofit.

Streetlights in the Community are predominantly mounted on utility poles. Freestanding streetlights in the Community, such as those along parts of Merrick Road, are maintained by the Town of Hempstead. Following Superstorm Sandy, Community residents were without power for up to 16 days, which also impacted many of the local streetlights. The lack of light was reported to be a safety hazard by Community members and negatively impacted first responders' ability to carry out their duties.

The pilot project proposes to retrofit streetlights on existing streetlight poles along Merrick Road with LED lights that include a solar photovoltaic (PV) panel and battery backup. In the Community, Merrick Road is 5,557 feet long; the project assumes streetlight retrofit approximately every 100 feet on alternating sides of the road, which will require retrofitting for 70 street lights.

Backup batteries for these units can typically store enough energy to function for three days. It is hoped that future power outages will not last this long, given the new power generation, distribution protections, and revised response capacities currently being instituted by utility providers as a result of Superstorm Sandy. If future undergrounding of utility lines occurs and new separate street lights are installed, the LED/PV streetlight heads could be relocated to other parts of the Community.

This project addresses the Recovery Support Functions of Infrastructure, Community Planning and Capacity Building, and Health and Social Services.

Estimated Project Cost

The total estimated project cost is \$680,000.



Installation of a solar and wind powered streetlight in Blandensburg, MD (source: flickr.com - thisisbossi)

Project Benefits

This project 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, major rainfall, or winter weather event.

Health and Social Benefits

The solar power and battery backup systems for streetlights will improve public safety at night for emergency responders, officials, residents, and businesses in the Community who may require access to shelter, supplies, or assistance after a storm event – be it a hurricane, wind storm, or major rainfall. These events often disable power lines and render entire areas dark, making movement after sunset

difficult and treacherous. A lack of street lighting also increases the risk of criminal activity, which was noted as one of the main reasons people chose not to leave their homes during Superstorm Sandy and Hurricane Irene – they wanted to protect their primary place of residence. With solar backup, nighttime movement of emergency responders, officials, or local residents can be accomplished in a safe manner. Access to critical assets will be secured, including key routes from coastal areas to Community Assistance Centers. Recovery efforts can continue after daylight hours, improving the pace at which access to roadways and properties can be restored, thereby improving access to community facilities, reducing roadway congestion, improving travel time and fuel efficiency, and expediting local economic recovery.

Environmental Benefits

Replacing grid-powered streetlights with a 100% renewable power source reduces the Community's reliance on fossil fuels, which contribute to global warming through the production of greenhouse gases.

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 major factor contributing to some households' decisions to disregard the order to evacuate. This small investment has a significant return on the public safety of the area where these streetlights will be located and allows for the protection of the key asset classes of housing, public facilities, and infrastructure. The project will allow for emergency responders to move to the necessary locations at night quickly and safely. This would allow them to respond to calls for help, fires, and potential threats to personal property, creating more secure neighborhoods. It would also allow residents to move safely at night, once they are allowed to return to an area, as well as having the potential to reduce the number of residents who stay behind to ensure their home or business is secure.

Risk Reduction Analysis

This project will reduce public safety risk by illuminating the roads at night and 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 to secure their private property, it reduces the number of people in high risk areas during a major storm event.

General Timeframe for Implementation

This project has the potential for implementation within 24 months of commencement.

Regulatory Requirements Related to Project

There are no regulatory requirements.

Jurisdiction

Town of Hempstead Traffic Control and Street Lighting Department, Nassau County Department of Public Works, and utility provider Public Service Enterprise Group (PSEG) have jurisdiction.

Featured Project: Green infrastructure Pilot Project Installation at Steele Elementary School

During Hurricane Irene, precipitation that fell within the Community and stormwater runoff from upland areas overwhelmed stormwater drainage systems, causing localized flooding. Conventional methods to mitigate this type of storm damage may include increasing the capacity of stormwater drainage systems. New approaches to manage stormwater have also been developed. Collectively labeled “green infrastructure,” such projects are engineered to capture or slow the flow of stormwater so that the full intensity of a storm is distributed over time, allowing natural and artificial systems to better cope with the high volume of water.

This project proposes to study, design, and construct two types of green infrastructure at Steele Elementary School, located in Baldwin Harbor, bordered by Atlantic Avenue, Grand Boulevard, Church Street, and Verity Lane. The project includes a 0.4 acre infiltration basin, as well as bioswales, where feasible. Infiltration basins are vegetated depressions designed to store runoff for infiltration into the sub-surface soils. They facilitate the recharge of ground water resources and the replenishment of surface water baseflows, while removing stormwater pollutants via filtration processes occurring within the unsaturated soils beneath the system. Bioswales are shallow channels designed to store and/or convey runoff and remove pollutants. They may be used as conveyance structures to pass runoff to the next stage of the treatment train or they can be designed



Steele Elementary School (source: Arup)

to promote infiltration where soil and groundwater conditions allow. The swale channel is broad and shallow and covered by vegetation to slow down flows, allowing much of the suspended particulate load in the stormwater runoff to settle out and providing effective pollutant removal.

Steele Elementary School was chosen as an ideal demonstration location for green infrastructure due to its location in Baldwin Harbor. Although the school did not experience flooding in recent storms, the community surrounding it did; the line of inundation reached the property boundary of the school.

Estimated Project Cost

The total estimated project cost is \$240,000.

Project Benefits

This project supports the Infrastructure, Natural and Cultural Resources, Health and Social Services, and Community Planning and Capacity Building Recovery Support Functions (RSF).

Risk Reduction and Resiliency Benefits

This green infrastructure project will help reduce the risk of flooding at Steele Elementary School and nearby properties.

Health and Social Benefits

Using Steele Elementary School as a demonstration location for green infrastructure offers an educational benefit to students and the Community, who can observe how the systems work in practice.

Environmental Benefits

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

Cost-Benefit Analysis

Green infrastructure can make significant contributions to mitigating flood conditions while reducing reliance on traditional infrastructure by capturing, storing, and filtering water as it is absorbed into the ground. It also protects waterways and coastal environments by preventing pollutants from entering these areas. Since most of the infrastructure and development in the Community is more than 50 years old, there are few models of green infrastructure currently in place. For a relatively small cost of \$240,000, the green infrastructure pilot installation will directly contribute to reducing potential costly flood impacts to the Steele Elementary School facility and to infrastructure and private properties in the vicinity. The pilot will also serve to demonstrate how green infrastructure techniques manage surface water on both public and private property. Promoting additional green infrastructure projects in the Community can create significant cost savings over time by reducing investments needed to expand traditional storm management infrastructure and reducing repairs to infrastructure damaged by flooding. Any project that reduces flood risks also reduces potential damage to private property and increases the safety of Community residents.

Risk Reduction Analysis

This project will reduce flood risk to Steele Elementary School as well as nearby properties, which were inundated during Superstorm Sandy.

General Timeframe for Implementation

It is estimated this project can be implemented within 18 months.

Regulatory Requirements Related to Project

Town of Hempstead will issue the necessary approvals and permits, if they are required. Coordination with NYS Department of Environmental Conservation may also be needed.

Jurisdiction

Baldwin Union Free School District facilities.

Featured Project: Tidal Check Valve Installation and/or Replacement

South of Merrick Road, the Community is characterized by peninsulas stretching into Middle Bay, with 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.

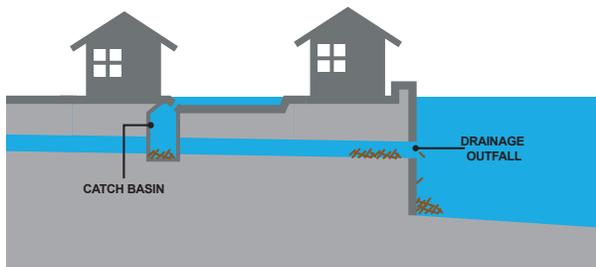
There are approximately 83 drainage outfalls along the coast of the Community that discharge directly into the bays. These outfalls discharge stormwater that has been collected upland from runoff from impervious surfaces, such as building roofs, parking lots, and streets. A check valve at the end of 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 and allowing surface water to back up and flood.

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. Tidal check valves of either the inline pipe

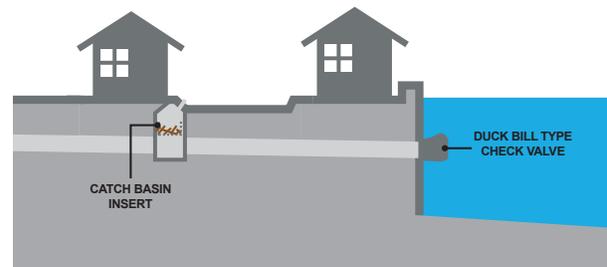
type or the slip-on duckbill type will be installed on approximately 25 critical outfalls. The chosen outfalls will be the ones deemed most effective at preventing upland flooding.

The project will include four phases: 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, as well as 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 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.



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)

Estimated Project Cost

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

Project Benefits

This area is subject to episodic flooding and has a high level of vulnerability during a storm event. The Featured Project addresses the Infrastructure, Housing, Economic Development, and Natural and Cultural Resources Recovery Support Functions (RSF) and provides risk reduction and resiliency, economic, environmental, and 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

The addition of tidal check valves will provide coastal protection during storms, reducing flood risk to assets, including roadways, utilities, and property, as well as residential properties located near outflows. 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 flood waters during a significant high tide or storm surge. This, in turn, maintains access to the local community, while offering greater protection for property in vulnerable areas and reduced damage during storm events by reducing the volume and speed of floodwaters should they enter the Community.

Economic Benefits

By reducing the exposure to flood damage 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 of flood damage to 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 bodies of water and potentially damaging sensitive ecosystems.

Cost-Benefit Analysis

Stormwater and drainage issues are important to the NYRCR Planning Committee, and the 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 \$750,000, 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 assets: Milburn Creek Park, Milburn Creek Elementary School (closed, but proposed to become a Community Assistance Centers), Silver Lake Park, Nassau County Police Department 1st Precinct, three pump stations, Fire Department House 2, Steele Elementary School, Harbor Elementary

School, Meadow Elementary School, Baldwin Middle School, Baldwin Park Administration Building, Baldwin Harbor Park, and the Oakwood Beach Club. 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 from backing up and flooding the drainage system and pushing water 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

This project would require approximately 24 months for implementation from the time of inception.

Regulatory Requirements Related to Project

This project may involve coordination and approval from NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers, and a Coastal Zone Management coastal consistency concurrence from NYS Department of State.

Jurisdiction

The Town of Hempstead Department of Conservation and Waterways, Town of Hempstead Highway Department, and Nassau County Department of Public Works have jurisdiction over this project area. Outfalls are owned by the Town, but many have been built over by private property owners.

Featured Project: Improve Resilience of Community Marinas

The Community is home to three commercial marinas and privately owned docks throughout the Community. During Superstorm Sandy, many boats at marinas or private docks were damaged or caused damage to neighboring properties. Residents complained of receiving guidance from insurance companies that sometimes resulted in increased damage to their property.

Currently, the Town of Hempstead Department of Conservation and Waterways provides staff to consult with marina owners, but best practices have not yet been documented or presented in guideline format. This project involves the creation of marina and dock resiliency guidelines to be developed in partnership with marina and boat operators as well as relevant government agencies. The guidelines will assist boat owners in preparing for future storms as well as teach them how they may be impacted by sea level rise.

The guidelines will include the following:

- Marina and dock design and siting, 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,
- Sea level rise and climate change adaptation education, such as storm frequency and severity awareness, tracking wave height and frequency, and identifying infrastructure exposed to storm events.

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 and Economic Development Recovery Support Functions (RSF).

Risk Reduction and Resiliency Benefits

Improving the resilience of marinas as well as the procedures for securing them will reduce the chance that boats, fuel tanks, and other debris will be released from marinas during high wind and high water events. This will decrease potential property damage as well as reduce resources needed for debris removal.

Economic Benefits

A key economic benefit of better preparedness and education is the reduction in claims to State and Federal programs that provide financial assistance following a natural disaster.

Health and Social Benefits

The project's education component will increase the knowledge and awareness of people responsible for managing facilities and property.

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 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

Agreed and consistent guidelines will help marina operators and Town Conservation and Waterway permit reviewers with the design, construction, and retrofit of public and private marinas in a more resilient way. Consistency will ensure a level playing field amongst operators and best practice will ensure that all potential risks will be addressed with current understanding of resilient design. With the benefits of reduced damage to personal property during a storm event, reduced costs of recovery and debris removal,

and the ability to more readily restore waterfront activities and tourism, the benefits of the expenditure will be realized.

Risk Reduction Analysis

This project will help to protect life and property by reducing 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

This project has the potential for implementation within 12 months from commencement.

Regulatory Requirements Related to Project

No regulatory requirements are related to this project. Consultation with NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers, and NYS Department of State would be beneficial to the success of this project.

Jurisdiction

The Town of Hempstead and NYS Department of Environmental Conservation have jurisdiction over these areas.

Featured Project: Strategic Adaptation Plan for Coastal Development



The Community's coastline (source: Arup)

The results of the New York State Flood Hazard Vulnerability Assessment identifies Nassau County as the county most threatened by and vulnerable to flood losses in the state of New York. Committee Members reported that there is a need to understand how to better plan for flooding risks, increased future vulnerabilities to sea level rise, and climate change.

This project proposes to fund a Strategic Adaptation Plan that seeks to identify long-term retreat and resilience options for the Community to protect future residents and businesses from a higher occurrence and greater intensity of storms and storm surge.

Flood insurance providers will be consulted to analyze and improve existing models and assumptions. A combination of climate change and sea-level rise forecasts and actual events will be used to develop triggers for changes to zoning, planning, and building regulations. These could include placing a moratorium on new construction in extreme risk areas after the occurrence of the next 100-year storm, or, when local sea level rise reaches a set height, a restriction on development of waterfront properties and the institution of a more stringent acquisition program.

Estimated Project Cost

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

Project Benefits

This project supports the Housing, Economic Development, Natural and Cultural Resources, and Community Planning and Cultural Resources Recovery Support Functions (RSF).

Risk Reduction and Resiliency Benefits

By planning for the long-term resiliency of the Community, this Plan will reduce the risk of property loss through development and enforcement of policies informed by scientific analysis.

Economic Benefits

This policy context is valuable from the real estate and development perspective as it creates consistency and certainty, allowing current and perspective property owners to plan their actions with confidence.

Health and Social Benefits

The Plan will provide a means to communicate the Community's expectations on the viability of waterfront development. Waterfront landowners will have access to information about relocation, including specific advice relating to when, or even if, they should relocate.

Environmental Benefits

The long-term resilience of environmental assets benefits from the assurance that marshlands will be restored as areas become uninhabitable and development becomes restricted.

Cost-Benefit Analysis

The long-term costs of not acknowledging the potential impacts of sea-level rise and more frequent and impactful extreme weather, brought on by climate changes, are high. In terms of public health and safety, the creation of a strategic plan now can yield many lives saved and injuries spared from future coastal disasters. In addition, there is great benefit in recognizing areas where residential and commercial buildings are most at risk, as well as the ideal locations for natural coastal defense systems and wetland restorations. The benefits of a more resilient and flexible built environment are apparent.

Risk Reduction Analysis

The Strategic Adaptation Plan will help reduce the risk of property and population loss by providing information and establishing policies to manage waterfront development as flood risk is observed to increase over time. It will study ways to allow populations to retreat from high risk areas while still staying in their local community, helping residents determine their best course of action based on changing flood risks.

General Timeframe for Implementation

This project will require approximately one year for completion.

Regulatory Requirements Related to Project

As the output of this project is a plan, there are no regulatory approvals required. Consultation with NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers, and NYS Department of State would be beneficial to the success of this project.

Jurisdiction

The Town of Hempstead has jurisdiction over this project area.

Featured Project: Neighborhood Preservation Guidelines

Superstorm Sandy resulted in heavy damage, defined as damage totaling to more than 50% of the home value, to 1,270 housing units in the Community. In addition, there are almost 2,000 homes in high and extreme risk flooding areas, which represents approximately 20% of all housing units in the Community.

Residential neighborhoods in the Community 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 feet 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.



Guidelines for resilient construction would protect vulnerable properties from future storms (source: Arup)

Estimated Project Cost

The total estimated project cost is \$80,000.

Project Benefits

This project supports the Recovery Support Functions of Housing, Economic Development, and Community Planning and Capacity Building.

Risk Reduction and Resiliency Benefits

By guiding development, the Community's character will be maintained while risks to private property are reduced.

Economic Benefits

Guidelines for resilient construction and reconstruction will provide greater economic certainty for existing home and business owners, real estate investors, and potential residents and businesses by ensuring that buildings will be better protected from future flood events. In addition, it can lead to a reduction in post-disaster claims for financial assistance from State and Federal programs.

Health and Social Benefits

Guidelines will also convey the Community's expectations for safety, quality, and character to which all development should abide. Neighborhood preservation guidelines will assist individual initiatives to respond to flood risk by providing education and information about issues that building owners need to be aware of in order to protect their properties. 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 the Community. With a small upfront planning cost, the guidelines can be integrated into normal maintenance, as well as the disaster recovery processes. These changes can ensure that neighborhood transformations that occur while residents rebuild their

homes do not negatively impact the Community, instead enhancing the areas. In turn, the Community will remain an attractive place to live and tax revenues, which support town and school district functions, will be maintained.

Risk Reduction Analysis

Risk to property and population will be reduced as individual property owner flood protection projects are designed in accordance with guidelines that identify issues and address the safety and quality expectations of the community. The risk of reduction in home values as a result of inconsistencies in building character and entrance height can be limited.

General Timeframe for Implementation

This project will take approximately six months to complete.

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 Town of Hempstead building, planning, and zoning codes.

Jurisdiction

The Town of Hempstead has jurisdiction over the project area.

Featured Project: Public Communication and Education Gap Analysis - Phase 2

This project is Phase Two of the Proposed Project, Public Communication and Education Gap Analysis. The Proposed 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 find ways to more effectively link the 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 socially vulnerable populations.

This Featured Project is the implementation of the gap analysis recommendations, including the creation of a centralized website with the primary mission of educating residents and businesses about what to do before, during, and after a storm event. The website will be a branded, high-quality, user-friendly site where disaster information is comprehensive and easy to access. The website will include information from all relevant agencies in multiple jurisdictions within Nassau County ensuring people will not have to visit multiple websites. Rather than a solely top-down effort where information is published entirely by governmental entities, the website will allow community members to communicate with each other. During times of need, following a storm, the ability of community members to support one another can reduce the burden on emergency aid organizations and allow people faster access to supplies and care. The uniform branding and emphasis on high-quality design will be a key feature of the site, ensuring the website location is easy to remember and emergency preparedness is given a more accessible, and even positive, tone.

The American Red Cross has sponsored websites like these in other areas, funded by local corporate sponsors. The Proposed Project will include the identification of potential partners, such as the American Red Cross or a similar organization, as well as local corporate sponsors. This will be the model for the implementation of this Featured Project.

Estimated Project Cost

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

Project Benefits

This project, which addresses the Community Planning and Capacity Building and Health and Social Services Recovery Support Functions (RSF), 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 because they know when, where, and how to evacuate.

Health and Social Benefits

Knowledge and understanding of emergency procedures and responsibilities, as well as 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 knowledge of how to properly secure personal property, such as fuel tanks, household paint, and other toxic chemicals, prior to a storm provides environmental benefits by reducing the volume of harmful toxins entering the water during a flooding event.

Cost-Benefit Analysis

A coordinated communication and education analysis will allow emergency response agencies to coordinate efforts before, during, and after storm events, focusing resources to the areas of greatest need. Implementation of the project will improve

access to emergency preparedness information for all Community residents and businesses. Knowledge and understanding of emergency procedures, responsibilities, and location of resources will be increased across the Community.

The benefits of a well-prepared Community include reduced physical damage from storm events, less social strain on the Community during and following disasters, and reduced risk of injury or death. In addition, it can lead to a reduction in post-disaster claims for financial assistance from state and federal programs. An enhanced website that allows Community members, local organizations, and governmental agencies to communicate with each other will benefit recovery and aid efforts, as well as enhance social connections at a time when it is needed the most. Better awareness and knowledge of how to properly secure personal property, such as fuel tanks, household paint, and other toxic chemicals, prior to a storm provides environmental benefits by reducing the volume of harmful toxins entering the water during a flooding event.

Risk reduction analysis

Risk to the 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 through improvement of public access to up-to-date information on hazardous conditions.

General Timeframe for Implementation

This project has the potential for implementation within 36 months from commencement.

Regulatory Requirements Related to Project

There are no regulatory requirements related to this project.

Jurisdiction

The Nassau County Office of Emergency Management handles emergency management and will coordinate with other key stakeholders, including New York State and the Town of Hempstead.

Featured Project: Street-End Bulkhead Replacement/Upgrade

Bulkheads are structures designed to prevent erosion along the shoreline. While not 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 in the Community and across the south shore. In addition, the storm surge height was greater than the current recommended bulkhead height, leaving many areas inundated with floodwaters.

This project will fund the inspection and identification of the public property bulkheads at street ends that require replacement and raising. Bulkheads would be replaced at an appropriate height and with industry best-practice materials, based on site-specific requirements. The proposed bulkheads will be more resilient to erosion, wind, and water damage than traditional timber bulkheads.

The project will identify, design, and construct bulkheads along the Baldwin and Baldwin Harbor waterfront. It includes a detailed inspection of all existing bulkheads to identify specific issues that need to be addressed as well as potential regulatory changes. Existing bulkheads at street ends and canal ends that are public property will be examined. Bulkheads should be within the recommended Town of Hempstead (Town) height range of 6.5-7.5 feet above NGVD.

Geographic Information System (GIS) data will also be updated following the inspection for ongoing asset management. Potential locations that appear to be under Town jurisdiction include: Madison Street, Parsonage Place, Warren Street, Arthur Street, Lincoln Street, Canoe Place, Fishermans Road, Bertha Drive, Bertha Court, North End Drive, Bay Front Drive, Colony Drive, Bay Front Place, South Drive, Northern Boulevard, Jackson Place, Van Buren Place, Hayes Place, Washington Place, Jefferson Place, Cornell Place, Cornell Avenue, and Steele Boulevard.

Estimated Project Cost

The total estimated project cost is \$2,700,000.

Project Benefits

This Featured Project supports the Recovery Support Functions (RSF) of Infrastructure and Natural and Cultural Resources.

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 directly protect roads allowing reliable performance on a day-to-day basis and maintaining access to the local community, providing greater protection for property in vulnerable areas and reducing harm 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

Using industry best practice materials for the bulkhead replacement can benefit the environment as well by limiting the impact of damaged bulkheads on waterways and reducing soil erosion, sedimentation, and saltwater inundation of soil and groundwater systems.

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. There is also the potential benefit of coastal protection, reducing the risk of damage to the Community's assets such as parks, homes, and businesses. The bulkheads can reduce flooding impacts on local streets, helping to maintain access during and after flood events by

reducing erosion effects. The foregone costs of environmental and public and private property damage justify the costs.

Risk Reduction Analysis

This project reduces flood risk to roadways, utilities, and public and private property during storms. Decreasing the potential of unrepaired bulkheads becoming floating debris during future storm events also reduces risks to public safety and environmental quality. By maintaining the state of good repair, these facilities will be more likely to survive intact during a major storm event.

General Timeframe for Implementation

This project will require approximately two years to complete.

Regulatory Requirements Related to Project

Approvals and permits will be required through the Town of Hempstead Department of Waterways and Conservation. This project may also involve coordination and approval from NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers, as well as a Coastal Zone Management coastal consistency concurrence from NYS Department of State.

Jurisdiction

The Town of Hempstead Department of Waterways and Conservation has jurisdiction over this project.

Proposed Project: West Baldwin Road Raising and Drainage Improvements Study

Residents in the Community's west side have reported that the roadways around the intersections of Hayes Street and Van Buren Street with Grand Boulevard and Byrd Place experienced severe tidal flooding during Superstorm Sandy and Hurricane Irene. It was also noted that these streets are prone to flooding during the weekly/monthly high tide periods, along with significant flooding when major rainstorms coincide with a high tide period. These intersections are near, but not immediately adjacent to, the waterfront and are surrounded by a large residential community of predominantly single-family homes. They are also near a number of schools and Baldwin Park.

In addition to the costs to the Town of Hempstead caused by the necessary reaction to these events, the continual flooding has directly affected the quality of life throughout the Community and property values have suffered. The tidal flooding has often caused damage to vehicles parked and/or driven through the salt water on the roadway. Residents also experience damage to private property, including, but not limited to, their lawns and landscaping.

The study includes assessment and determination of works needed to alleviate the continual and severe flooding issues, including raising roads and improving drainage. The proposed study seeks to understand the interactions of the stormwater drainage and tide level, determine causes of flooding, and recommend appropriate solutions to mitigate against this flooding.

Estimated Project Cost

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

Project Benefits

This project, which addresses the Infrastructure and Housing Recovery Support Functions (RSF), will reduce the risk of flooding to Community transportation, infrastructure, and houses.

Risk Reduction and Resiliency Benefits

The study will propose drainage system improvements that can 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 and the risk of injury due to the collapse of buildings. In addition, flooding risk to Baldwin Middle School can be reduced with a concomitant reduction of risk for disruption to educational services.

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 for all residents, including vulnerable populations.

Economic Benefits

Economic benefits include ensuring that any proposed improvements that result from the study will maximize benefits, thereby justifying public investment. Increases in local property values are possible, should the recommended improvements be implemented. In addition, mitigating the impacts of future flooding events can reduce recovery and reconstruction costs. There are approximately 30 residential properties adjacent to the proposed study area.

Cost-Benefit Analysis

At this time, only the study is proposed within this project so the cost is relatively low. Capital improvement costs will be incurred when the recommendations of the study are implemented, which cannot be estimated at this time. There is a clear and demonstrated need in this community for flood mitigation and undertaking the study is the necessary first step in the process.

When the solutions identified in the study are ultimately implemented in this flood-prone neighborhood, the risk of flooding to Community transportation infrastructure will be reduced. In addition, the drainage system improvements will extend benefits to private property in the neighborhood, reducing the likelihood of recurring property damage or the risk of injury due to the collapse of buildings. Maintaining clear roads will improve access for residents who may require shelter, supplies, or assistance. It will also ease access for recovery crews and equipment following a storm, improving responsiveness to

vulnerable populations as well as the rate at which the local economy can recover. Economic benefits will be realized when property values depressed by constant flooding problems are restored.

Risk Reduction Analysis

The road raising and drainage improvements identified through this study, when implemented, will reduce threat to life and property in this residential neighborhood, as well as support protection of, and access to, critical assets and transportation infrastructure in the Community. Grand Boulevard is one of the main thoroughfares providing access from this southern Baldwin Harbor neighborhood to Atlantic Avenue. The intersections identified are also in the vicinity of Meadow Elementary School and are therefore frequently crossed by children and families. 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 and the risk of injury due to the collapse of buildings, while improve the ability of first responders to move through the area in case of another storm-related emergency.

General Timeframe for Implementation

It is estimated that the study could be completed in 12 months.

Regulatory Requirements Related to Project

Performance of the study does not have any regulatory requirements. Consultation with NYS Department of Environmental Conservation, the U.S. Army Corps of Engineers, and NYS Department of State would be beneficial to the success of this project.

Jurisdiction

The Town of Hempstead has jurisdiction over the roads. It is unclear at this time which agencies have jurisdiction over the drainage infrastructure.

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Section V: Additional Materials

The following section provides supporting information for the NYRCR Baldwin Plan (NYRCR Plan):

A. Additional Resilience Recommendations: This section describes resiliency projects and actions for NYRCR Baldwin (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	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems Improve Transportation and Communication Connectivity	West Baldwin Road Raising and Drainage Improvement Study	Study includes assessment and determination of works needs to alleviate the continual and severe flooding issues. Area includes Grand Boulevard, Hayes Street, Van Buren Street and Byrd Place.	\$250,000	No
Establish Programs and Policies for Resilient Planning and Design	Repurpose Public Buildings	This project will issue a Request for Expressions of Interest to identify potential opportunities to repurpose the publicly-owned building for community use. A study will outline the opportunities for the site, as well, as identifying the next steps for the transfer of ownership, operation and maintenance. Collaboration with the NYS Empire State Development Incubator Program and Long Island Business Development Council would be part of this project.	\$100,000	No
Enhance the Community's Natural and Cultural Resources	Brownfield Redevelopment	Design and construction of a neighborhood children's playground at 1211 Coes Neck Road, which is an extension of Coes Neck Park.	\$1,000,000	No
Enhance the Community's Natural and Cultural Resources	Baldwin Banners & Boards	Project involves the installation of six "Welcome to Baldwin" Banners along major thoroughfares.	\$70,000	No
Establish Programs and Policies for Resilient Planning and Design	Voluntary Property Acquisition Program Study	Study potential impacts of existing voluntary acquisition program on Baldwin. Focus on strategies to acquire open space in extreme risk areas for public use.	\$50,000	Yes

Table 11 (cont'd): Additional resiliency recommendations

Strategy	Project Name	Short Description	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning and Design	Inclusive Housing Plan	Develop a housing plan to accommodate the region's aging population and provide new housing opportunities for first-time buyers. Maintain and support existing housing programs that provide funds to purchase and rehabilitate vacant or abandoned properties. Work with Nassau County, the State and private developers to establish a relocation assistance program that gives residents relocated due to strategic adaptation priority in new developments. Provide tax incentives and direct incentives for residents to assist with the adaptation.	TBD	Yes
Improve Transportation and Communication Connectivity Establish Programs and Policies for Resilient Planning and Design	Merrick Road Streetscape Improvements and Urban Design Guidelines	Study to identify ways to make Merrick Road more walkable and attractive. Improved guidelines for commercial development so businesses are oriented to the street and create a better sense of place. Identify opportunities to plant street trees and underground utilities.	\$100,000	No
Establish Programs and Policies for Resilient Planning and Design	Residential Generator Rebate Program	Provide rebates for residential installations of natural gas generators. As part of a homeowner energy education program, provide residents with an overview of the permitting process and outline regulatory requirements for installation.	\$50,000	Yes

B. Master Table of Projects

Table 12: Master table of projects

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Establish Programs and Policies for Resilient Planning, Design, and Housing	Downtown and Commercial Corridor Resiliency Plan	This project is a resiliency study to plan for the long-term future of the commercial corridors in Baldwin and the area of Downtown Baldwin.	Proposed	\$800,000	No
Improve Stormwater Management and Drainage Systems	Silver Lake Park Drainage Improvements	A comprehensive drainage study will be undertaken to assess the flow controls at these basins to identify the cause of flooding in this area during regular rainfall events and guide the design of drainage improvements and improvements to the park for the Community.	Proposed	\$600,000	No
Enhance the Community's Natural and Cultural Resources					
Improve Transportation and Communication Connectivity	Baldwin Community Assistance Centers	Community Assistance Centers are places for residents to gather information about emergency preparedness under normal conditions. After a storm, these centers would become a place to gather, collect and distribute resources, charge cell phones, access the internet/TV, and seek comfort.	Proposed	\$1,100,000	No
Improve Stormwater Management and Drainage Systems	Green Infrastructure: NYRCR Baldwin Tree Planting Subsidy Program	Reintroduce a varied version of the TOH Tree Planting Program for Baldwin residents only to replace trees that have been brought down by storms and plant additional trees.	Proposed	\$800,000	No
Improve Stormwater Management, Drainage Systems	East Baldwin Road Raising	Road raising and associated drainage improvements along Washington Place, Hayes Place, Van Buren Place and Jackson Place.	Proposed	\$2,000,000	No
Improve Transportation and Communication Connectivity					

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

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Enhance the Community's Natural and Cultural Resources	Baldwin Park Water Promenade	The project involves the strategic implementation of both natural and structural storm protection features along the shoreline to create a promenade and minimize further erosion and damage.	Proposed	\$3,800,000	No
Enhance the Community's Natural and Cultural Resources	Oakwood Beach Restoration	Assessment, design, and construction for the restoration of the privately-owned Oakwood Beach and Club and appurtenances for use by the entire Community.	Proposed	\$2,500,000	No
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis	Create a single source for comprehensive information and emergency assistance. It would establish a communication network that more effectively links the local government, emergency management agencies, residents, businesses and non-profit organizations.	Proposed	\$20,000	Yes
Establish Programs and Policies for Resilient Planning and Design	Business Continuity Program	Staff person to assist businesses in creating business continuity plans. Identify business assistance funding.	Proposed	\$40,000	Yes
Improve Stormwater Management and Drainage Systems	South Shore Stormwater System Modeling and Analysis	Hydrologic and hydraulic (H&H) model to determine the causes of localized flooding issues across the catchment and identify measures to prevent the flooding.	Proposed	\$725,000	Yes
Improve Transportation and Communication Connectivity	Lifeline Corridor Study and Guidelines	Study will be undertaken to identify best practices and develop design guidelines for resilient streetscapes. The guidelines will present design options for Merrick Road.	Proposed	\$120,000	Yes

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	Home Heating Upgrades	Incentivize the conversion of home heating systems from fuel oil to electric heat pumps, solar thermal, or natural gas in extreme and high risk areas. Amend building and planning regulations to phase out the use of fuel oil tanks south of Merrick Road, and incorporate temporary-intermediary regulations to require proper anchoring requirements based on anticipated inundation levels.	Featured	\$50,000	No
Improve Transportation Communication and Connectivity Establish Programs and Policies for Resilient Planning and Design	Lifeline Network: Priority Local Road Streetlight Retrofit	Installation of solar photovoltaic (PV) powered LED streetlights with battery backup on utility poles along Merrick Road in Baldwin.	Featured	\$2,500,000	No
Improve Stormwater Management and Drainage Systems Improve Transportation Communication and Connectivity	Green Infrastructure: Pilot Project Implementation at Steele Elementary School	Project proposes the study, design, and construction of a 0.4 acre-foot infiltration basin in combination with bioswales at Steele School.	Featured	\$240,000	No
Improve Stormwater Management and Drainage Systems	Tidal Check Valve Installation and/or Replacement	Project includes the inspection of outfalls to determine the condition and appropriateness of tidal check valves. Also includes the installation of 25 tidal check valves, where they would be most effective in addressing flooding.	Featured	\$2,500,000	No
Establish Programs and Policies for Resilient Planning and Design	Improve Resilience of Community Marinas	Emergency preparedness guidelines, recommendations and education to increase resiliency of marinas and docks.	Featured	\$100,000	No

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	Strategic Adaptation for Coastal Development	Identify long-term retreat and resilience options for Baldwin to protect future residents and business from higher occurrence and more intense storms/surges. Work with flood insurance providers to study existing models and assumptions. Use a combination of climate change and sea level rise forecasts and actual events to develop triggers for changes to zoning, planning, and building regulations.	Featured	\$1,000,000	No
Establish Programs and Policies for Resilient Planning and Design	Neighborhood Preservation Guidelines	Creation of new residential design guidelines for improving architectural quality and functionality in newly raised homes.	Featured	\$80,000	Yes
Improve Transportation and Communication Connectivity	Public Communication and Education Gap Analysis – Phase 2	This project is Phase 2 of the proposed project 'Public Communication and Education Gap Analysis' and includes the implementation of the gap analysis recommendation. Topics covered may include garage and parking design, stairway and entryway design, mechanical systems, home appliance placement, structural reinforcement, materials recommendations, and resilient landscapes.	Featured	\$500,000	Yes
Establish Programs and Policies for Resilient Planning and Design	Street-end Bulkhead Replacement/Upgrades	This project will inspect and identify the bulkheads at street ends and canal ends that fall under the Town of Hempstead ownership which require raising or replacement to improve resiliency as a result of recent storms. The project will identify, design, and construct up to 1,000 linear feet of bulkhead.	Featured	\$2,700,000	No

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

Strategy	Project Name	Short Description	Category	Cost Estimate	Regional
Improve Stormwater Management and Drainage Systems Improve Transportation and Communication Connectivity	West Baldwin Road Raising and Drainage Improvement Study	Study includes assessment and determination of works needed to alleviate the continual and severe flooding issues. Area includes Grand Boulevard, Hayes Street, Van Buren Street and Byrd Place.	Featured	\$250,000	No
Establish Programs and Policies for Resilient Planning and Design	Repurpose Public Buildings	This project will issue a Request for Expressions of Interest to identify potential opportunities to repurpose the publicly-owned building for community use. A study will outline the opportunities for the site, as well, as identifying the next steps for the transfer of ownership, operation and maintenance. Collaboration with the NYS Empire State Development Incubator Program and Long Island Business Development Council would be part of this project.	Additional	\$100,000	No
Enhance the Community's Natural and Cultural Resources	Brownfield Redevelopment	Design and construction of a neighborhood children's playground at 1211 Coes Neck Road, which is an extension of Coes Neck Park.	Additional	\$1,000,000	No
Enhance the Community's Natural and Cultural Resources	Baldwin Banners & Boards	Project involves the installation of six "Welcome to Baldwin" Banners along major thoroughfares.	Additional	\$70,000	No
Establish Programs and Policies for Resilient Planning and Design	Voluntary Property Acquisition Program Study	Study potential impacts of existing voluntary acquisition program on Baldwin. Focus on strategies to acquire open space in extreme risk areas for public use.	Additional	\$50,000	Yes

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	Inclusive Housing Plan	Develop a housing plan to accommodate the region's aging population and provide new housing opportunities for first-time buyers. Maintain and support existing housing programs that provide funds to purchase and rehabilitate vacant or abandoned properties. Work with Nassau County, the State and private developers to establish a relocation assistance program that gives residents relocated due to strategic adaptation priority in new developments. Provide tax incentives and direct incentives for residents to assist with the adaptation.	Additional	TBD	Yes
Improve Transportation and Communication Connectivity	Merrick Road Streetscape Improvements and Urban Design Guidelines	Study to identify ways to make Merrick Road more walkable and attractive. Improved guidelines for commercial development so businesses are oriented to the street and create a better sense of place. Identify opportunities to plant street trees and underground utilities.	Additional	\$100,000	No
Establish Programs and Policies for Resilient Planning and Design	Residential Generator Rebate Program	Provide rebates for residential installations of natural gas 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	\$50,000	Yes

C. Public Engagement Process

The strategies and projects outlined in the NY Rising Community Reconstruction (NYRCR) Baldwin Plan will ultimately impact the quality of life for those who live, work, and play in NYRCR Baldwin (Community). As such, input from residents, business owners, and community leaders has been an important component of the planning process. The NYRCR Baldwin 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 but respond to the requirements of the NYRCR Baldwin Plan (NYRCR Plan). The Committee guided the development of material for the NYRCR Plan and the Community engagement process. Committee members 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 Committee, with the assistance of NY State and the Consultant Team, identified community organizations and individuals that could provide important perspectives and invited their participation. Committee members invited the general public to participate, issued email blasts, distributed flyers, and conducted personal outreach. All Public Engagement Events were posted on the NY Rising website (stormrecovery.ny.gov).

The Committee held eight (8) official meetings over the course of the project and had numerous other meetings amongst themselves and with stakeholders throughout Baldwin. For two of these meetings, the Committee participated in Joint Committee Meetings with the neighboring NYRCR Communities

of Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequas 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 19, 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 10, 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.
- **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 7, 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 14, 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:** The eighth Committee Meeting was held on February 27, 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 22, 2013. The meeting, which included an open house, presentation, and small group discussions, introduced the 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 Baldwin 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, before that, 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 nearly 140 different ideas. The input was reviewed to identify emerging themes that represented issues of concern and ideas for the future that could inform the development of strategies and projects. Listed below are the emerging themes organized by Recovery Support Function (RSF):

- **Community Planning & Capacity Building:** Clear and effective lines of communication and coordination between agencies and with public; Use schools and community facilities as emergency response and evacuation centers; Community Planning - revitalize neighborhoods (e.g. Barnes Avenue); Beautification; Regulate and enforce leaf and grass disposal;

- Economic: Incentivize economic development, particularly in vacant commercial areas; Improve commercial traffic circulation; Update codes and architectural guidelines;
- Health & Social Services: Ensure inclusion of seniors in projects and programs;
- Housing: Address vacant/abandoned homes;
- Infrastructure: Effective back up power; Improved storm water management (e.g. check valve operation); and,
- Natural and Cultural Resources: Utilize Kellogg House; Use green infrastructure for storm water management; Restore Baldwin's public and private beaches.

The ideas generated at the meeting addressed concerns about emergency preparedness and storm mitigation. These were balanced with a significant number of community resiliency ideas could improve the quality of life and economy of the Community.

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, 14, 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 NYRCR Conceptual 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 reviewed material related to two of the six RSFs. 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. The individual questionnaire results are included in their entirety in the appendix along with the small groups' project ideas.

Key Outcomes

Although a full recount of the Public Engagement Event is too extensive to summarize here, there were some interesting findings to highlight. The participants identified the pros and cons of their community. Pros included: wonderful people; celebrating diversity; median income; good water, good air, sanitation; clean (relative) environment; access to physical activities; and, access to good healthcare. The cons were drug use, social isolation, unattractive main streets, and pollution. These pros and cons identify some of the issues that must be addressed moving forward and provide insight into the strong sense of community residents feel that can help support implementation.

By and large, event participants did not think the Community's support networks were prepared for Superstorm Sandy. There were therefore a significant number of ideas generated regarding emergency preparedness, awareness, and support facilities in the Community in case of another disaster. At the same time, attendees recognized the efforts of their local organizations and departments that provided assistance during and after the storm including area churches, the Baldwin School District, the Baldwin Fire Department, and Sani2 (Sanitary District Number Two).

Participants at the events were very interested in the economic development in the Community. Concepts related to improving the local economy, such as revitalizing business districts, attracting investment around the LIRR station, vacant / abandoned commercial space in business districts, beautifying business districts, and incorporating new housing and

retail in existing business districts were considered more important than ideas related to flood impacts on businesses and commercial areas. Ideas suggested everything from a business improvement district to holiday decorations and flags for Grand Avenue.

Event participants were open to expanding housing choices in the Community including, according to the questionnaires, apartments near LIRR, owner-occupied apartments/condos, and then single family homes. Some individual comments suggested preventing or addressing abandoned homes; new housing should have emphasis on green building and energy efficiency; no more housing in the floodplain; and, attainable housing for young people.

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 27, 2014, marked the third Public Engagement Event of the NYRCR Program. The event's objectives were to provide the Community with a progress update, gather Community feedback on the projects being considered for inclusion in the NYRCR Baldwin Plan, and begin to generate public support for implementation. The Community Development Block Grant - Disaster Recovery Program (CDBG-DR), a program funded by the U.S. Department of Housing and Urban Development (HUD) and administered by NY 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 Baldwin 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 of 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 his / her 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.

Key Outcomes

After the meeting, all input received on Project Comment Cards and participant questionnaires was documented verbatim and tabulated. The rating scores were averaged. 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 table below presents the rating results from both Public Engagement Event #3 and the online survey. Proposed Projects and Featured Projects are sorted from highest to lowest based on their rating from the online survey (since more responses were generated online). A score of 2.34-3 is considered high, a score of 1.67-2.33 is medium, and 1-1.66 is considered low.

The vast majority of the projects presented enjoyed support from participants at the Public Engagement Event and the online survey. At the event, for the thirteen Proposed Projects, three were rated high and the balance was rated medium; not one was rated low. In the online survey, nine were rated high and four were rated medium. Interestingly, the top rated project at the Public Engagement Event was Downtown and Commercial Corridor Resiliency Plan while the online survey's top rated project was South Shore Stormwater and System Modeling and Analysis.

With regards to the six Featured Projects, at the Public Engagement Event only one was rated high, three were medium, and two were low while online survey results rated one Featured Projects as high and five as medium. The two top rated Featured Projects were the same for both the questionnaire and online survey: tidal check valve installation and/or replacement, and streetlight retrofits.

The 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 Baldwin NY Rising Community Reconstruction Plan

The fourth and final Public Engagement Event will present the completed NYRCR Baldwin Plan – once it is finalized – to community members and stakeholders in order to lay the foundation for implementation.

Online Presence and Tools

The website 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 retail, healthcare, legal/financial, and manufacturing, and had varying degrees of damage from Superstorm Sandy. The respondents identified the permitting process as

an impediment to business. They also believed that redeveloping blighted areas could help business in the Community.

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 survey informed the preparation of the NYRCR Plan, particularly the Housing Assessment of Needs and Opportunities.

- Transportation barriers;
- Lighting and maintenance;
- Promoting physical activity through recreation, which has multiple community benefits;
- Promoting neighborhood characteristics for social connection; and,
- Stewardship and safety.

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 NYRCR Communities of Freeport, Bellmore/Merrick, Seaford/Wantagh, and Massapequas, commissioned an assessment of health and social service recovery needs and opportunities to plan for social resilience.

In addition to independent research, organizations and individuals in the health and social services fields were identified to participate in key informant interviews. The assessment 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;

D. Community Asset Inventory

The asset inventory and risk assessment performed for the NYRCR Baldwin 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; and,
- **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; and,
- **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; and,
- **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 246	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Baldwin Fd District House	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Fd Headquarters	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Fd Headquarters	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Fd Hose 2	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Fd Hose 3	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Fd Training House	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Baldwin Harbor Middle School	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Baldwin Harbor Park	High	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	3	3.5	2	21
Baldwin High School	Moderate	B	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Baldwin Library	Moderate	Natural and Cultural	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	4	30
Baldwin Park Administration	High	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	Yes	2.5	3	3.5	5	52.5
Brookside Elementary School	Moderate	B	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Coes Neck Park	Moderate	E	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Dawson Taxi	Moderate	Economic	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Fire Dept near Lenox	Moderate	D	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Grand Avenue Elementary School	Moderate	B	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Harbor Elementary School	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
LIRR - Baldwin	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Lofts Pond Park	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Meadow Elementary School	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Milburn Creek Park	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Milburn Elementary School (closed)	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
Mumby Pond	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15
NCPD 1st Precinct	Moderate	Health & Social	Yes	High	No	Yes	Yes	Yes	Yes	Yes	No	2	3	2.5	2	15

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
Oakwood Beach Club	High	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	Yes	2.5	3	3.5	2	21
Plaza School - Baldwin	Moderate	B	No	Medium	No	Yes	Yes	Yes	Yes	No	2	4	2.5	3	30
Police Precinct No.2	Moderate	B	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
Pump Station - Garden & Fox Rd	High	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3.5	5	70
Pump Station - Grand & Washington St	High	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3.5	5	70
Pump Station - Northern & Milburn	High	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	Yes	2.5	4	3.5	5	70
Shubert Elementary School (closed)	Moderate	B	No	Low	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Silver Lake Park	High	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	3	4	36
St. Christopher Elementary School	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
Steele Elementary School	Moderate	Health & Social	No	High	No	Yes	Yes	Yes	Yes	No	2	3	2.5	3	22.5
TOH Sanitation District 2	Moderate	Infrastructure	Yes	High	No	Yes	Yes	Yes	Yes	No	2	4	2.5	5	50
U S Post Office Baldwin	Moderate	Natural and Cultural	No	Medium	No	Yes	Yes	Yes	Yes	No	2	3	2.5	5	37.5
Water Treatment Plant - Seaman Ave	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 funded through the CDBG-DR program.
2. The following localities' allocations comprise the NYRCR Community's total allocation: Baldwin – \$3 million; Baldwin Harbor – \$7.58 million.
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9. "Evacuation Routes." Nassau County New York. <www.nassaucountyny.gov>
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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

